Planning Board
AGENDA

Thursday, March 19, 2026 - 6:00 PM

Regular Meeting
Agawam Senior Center
954 Main Street
Agawam, MA 01001

A. Planning Board

1) PUBLIC HEARING CONT.-Definitive Plan-Old River Street, 27 Walnut Street, & 17 HIgh Street-Calabrese Construction, LLC

2) Site Plan-769 Silver Street-Agawam Energy Center, LLC

3) Site Plan-699 Silver Street-MSR Properties, LLC

4) Request for Bond Release-Samuel Street Subdivision-Calabrese Construction, LLC

5) Discussion and Possible Vote-Planning Board Representative for the CPA

6) Approval of Minutes-March 5, 2026

7) Correspondences

Town of Agawam

Building Department

1000 Suffield Street, Agawam, Massachusetts 01001
Telephone - (413) 821-0632

February 19, 2026

To: Office of Planning and Community Development:

Re: Definitive Subdivision Plan Review Comments for Old River Street, 27 Walnut Street & 17 High Street Agawam, MA 01001:

The Building Department has no zoning issues or concerns at this time for the proposed definitive subdivision plan dated January 30, 2026 for the above referenced properties.

Respectfully,

Kevin Duquette
Kevin Duquette
Inspector of Buildings
Town of Agawam

Stormwater Drainage Report

Proposed Residential Subdivision

Project Location:
Old River Street, 27 Walnut Street & 17 High Street
Agawam, Massachusetts 01001
(Parcel IDs: J17-1-3, J17-1-1 & J17-1-5)

Submitted To:
Town of Agawam Planning Board
1000 Suffield Street
Agawam, Massachusetts 01001

Applicant & Property Owner:
Calabrese Construction, LLC
c/o Mr. Charles Calabrese
7 Brewster Road
West Springfield, Massachusetts 01089



RLA Project File No. 220627
January 30, 2026

R LEVESQUE ASSOCIATES, INC
A LAND PLANNING SERVICES COMPANY
40 School Street · Westfield, MA 01085
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TABLE OF CONTENTS

SECTION PAGE NO.

I. INTRODUCTION....1-1

2. SITE DESCRIPTION....2-1

2.1 Predevelopment Conditions....2-1
2.2 Resource Areas....2-1
2.2.1 Floodplain....2-1
2.2.2 Natural Heritage and Endangered Species Program....2-1
2.2.3 Aquifer Protection District....2-2
2.3 Soils....2-2
2.4 Post Development Conditions....2-3

3. STORMWATER MANAGEMENT SYSTEM....3-1

3.1 Drainage Calculations....3-1
3.1.1 Design Points....3-2
3.1.2 Pre-Development Hydrology....3-2
3.1.3 Post-Development Hydrology....3-2
3.1.4 Peak Discharge Rates....3-3
3.2 Hydraulic Analysis....3-3
3.3 MassDEP Stormwater Management Standards....3-3
3.4 Stormwater Best Management Practices....3-6
3.4.1 Deep Sump Catch Basins....3-6
3.4.2 Proprietary Sedimentation Devices....3-6
3.4.3 Subsurface Detention Basin....3-7
3.5 Protection of Stormwater Best Management Practices during Construction....3-7
3.6 Inspection and Maintenance of Stormwater Best Management Practices....3-7
3.7 Illicit Discharge Compliance Statement....3-7
3.8 Low-Impact Development Alternatives Analysis Narrative....3-7

4. CONCLUSION....4-1

List of Tables

Table Page No.

Table 2.4: Hydrologic Soil Group Classification.... 2-2
Table 3.1: Design Rainfall Data.... 3-1
Table 3.1.4 Pre- and Post-Development Peak Discharge Rates.... 3-3

List of Figures

Figure

Figure 1: Site Locus – USGS Map
Figure 2: FEMA Flood Map
Figure 3: NHESP Map
Figure 4: Pre-Development Watershed Plan
Figure 5: Post-Development Watershed Plan
Figure 6: Inlet Area Plan

Appendices

APPENDIX A: CHECKLIST FOR STORMWATER REPORT
APPENDIX B: SOILS INFORMATION
APPENDIX C: PRE- AND POST- DEVELOPMENT HYDROLOGIC ANALYSIS (2, 10, & 100 YEAR STORM EVENTS)
APPENDIX D: HYDRAULIC ANALYSIS
APPENDIX E: MASSDEP CALCULATIONS
APPENDIX F: CONSTRUCTION PERIOD EROSION CONTROL PLAN
APPENDIX G: LONG-TERM OPERATION AND MAINTENANCE PLAN
APPENDIX H: ILLICIT DISCHARGE COMPLIANCE STATEMENT
APPENDIX I: LOW IMPACT DEVELOPMENT CONSIDERATIONS

I. INTRODUCTION

The project applicant, Calabrese Construction, LLC, is proposing to construct a three (3) lot residential subdivision on approximately 13.1 acres of land located at the terminus of High Street in Agawam, Massachusetts. The project site consists of three parcels located at Old River Street, 27 Walnut Street & 17 High Street and identified as parcels J17-1-3, J17-1-1 & J17-1-5 in the Agawam assessor's office. For the purposes of this report, reference to the project "site" shall comprise all of the properties under common ownership and included in the proposed subdivision. The site where the proposed subdivision is proposed includes properties which are currently developed with residential dwellings. Additionally, the site includes a large portion of property that has been historically disturbed and cleared of mature vegetation. The site is accessed off an undeveloped portion of High Street and is bisected by the Old River Road right-of-way. Currently, there are no stormwater management best management practices located within the project site or High Street right-of-way. Under existing conditions, stormwater runoff generally flows overland toward various design points and ultimately being tributary to the Westfield River offsite to the northeast. A new stormwater management system is being proposed as part of the new residential subdivision.

The proposed project involves the following:

- Construction of approximately 300 feet of roadway from the intersection with Walnut Street to the terminus of the cul-de-sac;
- Construction of three (3) new multi-family residential homes;
- Installation of underground water, sanitary sewer, electric, gas and communication utility services;
- Construction of a stormwater management system including deep sump hooded catch basins, underground infrastructure, proprietary sedimentation device, and subsurface detention basin.

The new drainage infrastructure has been designed utilizing the Agawam Stormwater Management Ordinance Chapter 176, the Town of Agawam Subdivision Rules and Regulations, as well as the Massachusetts Department of Environmental Protection Stormwater Management Handbook.

2. SITE DESCRIPTION

2.1 Predevelopment Conditions

The properties proposed for development are located at Old River Street, 27 Walnut Street, and 17 High Street and are identified by the Town of Agawam Assessor's Office as Parcels J17-1-3, J17-1-1, and J17-1-5. For the purposes of this report, the "site" is defined as all parcels under common ownership included within the limits of the proposed subdivision. The site includes parcels that are currently developed with residential dwellings, as well as a significant portion of land that has been historically disturbed and cleared of mature vegetation. Site access is provided from an undeveloped segment of High Street, and the site is bisected by the Old River Road right-of-way. The project area comprises approximately 13.1 acres and is zoned Residence B. Abutting land uses consist of residentially developed properties to the north and south, Walnut Street to the west, and the Westfield River to the east. The site location is depicted on Figure 1 – USGS Map.

Site topography generally slopes easterly toward Walnut Street or ultimately drains toward the Westfield River. A relatively flat, cleared area is located at the terminus of the High Street right-of-way and will accommodate the majority of the proposed site improvements. A steeply sloping area is present along the northwestern portion of the site, with the top of slope generally coincident with the existing tree line and descending toward the Westfield River. Topography along both the northerly and southerly property boundaries similarly grades downward from Walnut Street toward the river. Pre-development drainage sub-catchment areas are illustrated on Figure 4 – Pre-Development Conditions..

2.2 Resource Areas

Portions of the project site are located within jurisdictional riverfront area associated with the Westfield River to the North. None of the site improvements required to build the proposed subdivision are located within the 200-foot riverfront jurisdictional area.

2.2.1 Floodplain

R. Levesque Associates, Inc. performed due diligence research on the property in regard to FEMA flood zone mapping. According to Flood Insurance Rate Map Number 25013C0382E, effective date 7/16/2013, a portion of the property is shown to be within a special flood zone area "Zone AE" (100-Year storm event) polygon with base flood elevation 65; see Figure 2 – Flood Rate Insurance Map. None of the proposed site improvements required to build the proposed subdivision are located within the floodplain.

2.2.2 Natural Heritage and Endangered Species Program

R. Levesque Associates, Inc. performed due diligence research on the property in regard to Natural Heritage and Endangered Species Program (NHESP) areas. The parcel is not located

within an area delineated by NHESP as priority habitat of endangered species; see Figure 3 – NHESP Map.

2.2.3 Aquifer Protection District

R. Levesque Associates, Inc. performed due diligence research on the property in regard to an Aquifer Protection District. The property is not located within an area delineated as a Zone II Wellhead Protection Area, see Figure 3 – NHESP & Zone II Map.

2.3 Soils

R. Levesque Associates, Inc. researched the soils located on site with information readily available by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). Based on a review of the USDA Soil Survey of Hampden County, Massachusetts, Central Part, the site is comprised of the following soil types:

Table 2.4: Hydrologic Soil Group Classification

Soil Description	Map Unit Symbol	Hydrologic Soil Group
Merrimac Fine Sandy Loam	254B	A

A series of test pits were conducted by Ryan Nelson, P.E. (SE #14394), to verify existing site soil conditions and evaluate the feasibility of incorporating infiltration-based stormwater management practices. A total of six test pits were excavated across the site within proposed development and stormwater management areas. The subsurface conditions observed in all test pits consisted of varying depths of varied fill material overlying native soils. The fill material varied significantly across the site and ranged from loamy sand with no visible debris to fill containing mixed construction materials, including asphalt, brick, concrete, and varied soils. Native soils were encountered only in test pits excavated along the western portion of the site (Test Pits 5 and 7), where the fill material transitioned to native silt loam exhibiting a dense, plasticky consistence.

Estimated seasonal high groundwater was not observed within the fill material; however, groundwater was observed at the interface between the fill material and the underlying native soils. Estimated seasonal high groundwater elevations were observed at approximately 130 inches below grade in Test Pit 5 and 100 inches below grade in Test Pit 7, coinciding with the top of the native silt loam layer. This perched groundwater condition at the fill/native interface further limits the suitability of the site for infiltration-based stormwater practices.

The native silt loam soils encountered in the field do not corroborate the NRCS Soil Survey mapping, which identifies the site as Hydrologic Soil Group A sandy loam. As documented in the Massachusetts Stormwater Management Handbook and supported by the Rawls Rate soil classification charts, silt loam soils are typically classified as Hydrologic Soil Group C, reflecting low infiltration capacity and poor suitability for groundwater recharge. The dense structure and plasticky nature of the native silt loam observed on site are consistent with these classifications.

Based on the presence of varied fill material, the underlying very poorly drained native silt loam, and the observed groundwater conditions at the fill/native interface, the site soils are not suitable to support infiltration-based best management practices. Therefore, compliance with Massachusetts Stormwater Management Standard 3 will be achieved to the maximum extent practicable through non-infiltrating stormwater management measures, consistent with the limitations imposed by verified on-site soil conditions.

2.4 Post Development Conditions

The proposed project consists of the construction of a five (5) lot residential subdivision located on the westerly side of Walnut Street, with access provided via an extension of High Street. The proposed roadway will establish the previously undeveloped portion of High Street and will extend approximately 300 feet from the Walnut Street intersection to the end of the proposed cul-de-sac. The subdivision will include the installation of underground sanitary sewer, water, electric, gas, and communication utilities. A comprehensive stormwater management system has been designed in accordance with the Agawam Stormwater Management Ordinance and the Massachusetts Department of Environmental Protection Stormwater Management Handbook.

Post-development stormwater runoff generated from the proposed roadway, residential building roof areas, driveways, and adjacent landscaped areas will be collected through a network of yard drains and deep-sump hooded catch basins. Runoff captured by these inlet structures will be conveyed via an underground storm drainage system to a proprietary water quality unit providing pretreatment prior to discharge to a subsurface detention basin. The subsurface detention basin has been designed with an outlet control structure to provide peak flow attenuation for the 2-, 10-, and 100-year, 24-hour storm events. Discharge from the outlet control structure will be conveyed to a level spreader to promote non-erosive sheet flow and avoid concentrated point discharges.

The proposed stormwater management system has been designed to meet applicable peak flow attenuation, water quality, and recharge requirements. Due to field-verified subsurface soil conditions, including varied fill overlying native silt loam soils with limited infiltration capacity, groundwater recharge is provided to the maximum extent practicable in accordance with Massachusetts Stormwater Management Standard 3. Water quality treatment is achieved through

a treatment train approach consisting of deep-sump hooded catch basins, a proprietary sedimentation device, and subsurface detention prior to discharge. Overall, the proposed post-development conditions will maintain existing drainage patterns, reduce post-development peak discharge rates, and improve stormwater runoff quality relative to existing conditions. Post-development drainage areas are shown on Figure 5 – Post-Development Watershed Plan.

3. STORMWATER MANAGEMENT SYSTEM

R. Levesque Associates, Inc. has prepared the following drainage system calculations for the proposed project site. These calculations were performed to document compliance with the guidelines set forth by the Agawam Stormwater Management Ordinance Chapter 176, the Town of Agawam Subdivision Rules and Regulations, as well as the Massachusetts Department of Environmental Protection Stormwater Management Handbook (MassDEP Handbook). A detailed hydrologic analysis of the system was completed in order to evaluate the performance of the stormwater management system components. The proposed stormwater management system will collect runoff from on-site impervious areas and utilize stormwater best management practices to provide water quality treatment and peak discharge rate attenuation. See Appendix C - Pre- and Post-Development Hydrologic Analysis for supplemental information.

3.1 Drainage Calculations

R. Levesque Associates, Inc. utilized the HydroCAD software program, Version 10.0, developed by HydroCAD Software Solutions LLC, in order to model and analyze site hydrology. The HydroCAD software is based upon the Soil Conservation Service (SCS) "Technical Release 20 – Urban Hydrology for Small Watersheds" and "Technical Release 55 – Urban Hydrology for small Watersheds" which are generally accepted industry standard methodologies. The analysis was conducted in order to establish the peak discharge rates and estimated run-off volume from the project site. This was accomplished to properly evaluate pre- and post-development conditions during various storm events. Contributing drainage areas were identified and soils, surface cover, watershed slope, and flow paths were evaluated to develop the necessary HydroCAD model input parameters. Pre-development time of concentration (Tc) values were calculated based on existing site conditions. The minimum recommended time of concentration of six minutes was used in the hydrologic calculations.

Drainage calculations were performed for the Pre- and Post-Development conditions for the 24-hour, 2, 10, and 100-year Type III storm events. The total rainfall for each of the storm events was based upon data readily available by the National Oceanic and Atmospheric Administration (NOAA) Atlas 14-point precipitation frequency estimates. Total rainfall values used in the hydrologic modeling for each event are shown in the following table:

Table 3.1: Design Rainfall Data		
2-year, 24-hour storm	10-year, 24-hour storm	100-year, 24-hour storm
3.19 inches	5.16 inches	8.28 inches

3.1.1 Design Points

In order to compare the difference between pre- and post-development peak flows, existing and proposed watersheds were delineated. Multiple design points (DP) were established with flow paths representing the longest time of concentration of run-off in each tributary watershed. For this analysis, the design points were determined as follows:

- DP-1: Offsite to Northeast; This design point represents the destination for stormwater runoff from the project area which flows off site in a northeasterly direction;
- DP-2: Offsite to South; This design point represents the destination for stormwater runoff from the project area which flows in a southerly direction;
- DP-3: Walnut Street; This design point represents the destination for stormwater runoff from the project area which flows in a westerly direction toward the Walnut Street drainage infrastructure;
- DP-4: Offsite to Northwest; This design point represents the destination for stormwater runoff from the project area which flows in a northwesterly direction;

3.1.2 Pre-Development Hydrology

The project area under existing conditions was analyzed as six sub-catchment areas discharging to the design points as described above. The sub-catchments were delineated based on existing site topography and property lines. For further watershed detail please see Figure 4 titled "Pre-Development Watershed Plan". Peak discharge rates for the design point are depicted in Table 3.1.4 below.

3.1.3 Post-Development Hydrology

The project area under proposed conditions was analyzed as seven sub-catchment areas discharging to the same design points as in pre-development conditions. For further watershed detail please see Figure 5 titled "Post-Development Watershed Plan". Peak discharge rates for the design point are depicted in Table 3.1.4 below.

3.1.4 Peak Discharge Rates

The table below summarizes the Pre- and Post-Development peak discharge rates for each Design Point:

Table 3.1.4 Pre- and Post-Development Peak Discharge Rates						
	2-year storm (cfs)		10-year storm (cfs)		100-year storm (cfs)	
	Pre-	Post-	Pre-	Post-	Pre-	Post-
Design Point 1	0.6	0.5	1.0	0.9	2.4	2.4
Design Point 2	0.1	0.1	0.1	0.1	0.7	0.4
Design Point 3	0.0	0.0	0.1	0.1	0.2	0.2
Design Point 4	0.1	0.1	0.1	0.1	0.2	0.2

As depicted in the table, the post-development peak discharge rates do not increase over pre-development peak discharge rates for each of the storm events presented. This is accomplished by providing on site attenuation through the proposed subsurface detention basin.

3.2 Hydraulic Analysis

R. Levesque Associates, Inc. utilized the Hydraflow Storm Sewer Extension for AutoCAD Civil 3D 2022 software program developed by Autodesk, Inc., in order to analyze the hydraulic capacity of the proposed underground infrastructure. The analysis was conducted in order to verify that the proposed conveyance piping has sufficient capacity to convey up to and including the 24-hour, 100-year storm event. The data from the analysis was used to properly size the conveyance piping such that there is no surcharge of stormwater above the rim elevations within the paved areas. As part of the input parameter required for the hydraulic analysis, the tributary inlet areas were delineated based on topography and any additional connected discharges. Additionally, the characteristic land use coverages and flow paths were identified. Please refer to Appendix D for the hydraulic analysis of the proposed stormwater management system.

3.3 MassDEP Stormwater Management Standards

R. Levesque Associates, Inc. has designed the proposed stormwater management system to be in compliance with the MassDEP Stormwater Management Standards. Chapter 1, Volume 3 of the

MassDEP Handbook outlines specific calculations, and other information, which must be submitted with each report to document compliance. The following summary highlights elements of the proposed project and how they apply to each standard.

- *Standard #1 - No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

  The proposed project provides water quality treatment to the guidelines of the MassDEP Handbook. Therefore, no new untreated stormwater is discharged.

- *Standard #2 – Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.*

  The proposed stormwater management system has been designed such that the post-development peak discharge rates are less than the pre-development discharge rates for the 2-year, 10-year, and 100-year 24-hour storms. See Appendix C for the Hydrologic Analysis.

- *Standard #3 - Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater BMPs, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required volume as determined in accordance with the Massachusetts Stormwater Handbook.*

  Based on field-verified soil evaluations demonstrating variable depths of varied fill overlying native Hydrologic Soil Group C silt loam with observed perched seasonal high groundwater at the fill/native soil interface, infiltration-based recharge practices are not feasible; therefore, groundwater recharge is addressed to the maximum extent practicable in accordance with the Massachusetts Stormwater Management Handbook.

- *Standard #4 – Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of TSS. It is presumed that this standard is met when:*

  a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;

  b. Structural stormwater BMPs practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and

  c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook

The treatment train utilizes deep-sump hooded catch basins, a proprietary sedimentation device and a subsurface detention basin to meet water quality standards. See Appendix E for the Water Quality and Total Suspended Solids Removal Calculations.

- *Standard #5 - For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by MassDEP to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.*

  This standard is not applicable.

- *Standard #6 – Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater BMPs determined by MassDEP to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.*

  This standard is not applicable.

- *Standard #7 – A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural BMPs requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.*

This standard is not applicable.

- *Standard #8 – A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention) shall be developed and implemented.*

  A Construction Period Erosion Control Plan has been provided in Appendix F.

- *Standard #9 – A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

  A Long-term Operation & Maintenance Plan has been provided in Appendix G.

- *Standard #10 - All illicit discharges to the stormwater management system are prohibited.*

  An illicit discharge statement will be provided prior to discharge of stormwater to post-construction BMPs. See Appendix H for a copy of the Illicit Discharge Statement.

3.4 Stormwater Best Management Practices

The proposed stormwater management system was designed utilizing stormwater best management practices (BMP) as set forth by the MassDEP Handbook. The BMPs utilized as part of the stormwater management system include deep-sump hooded catch basins, a proprietary sedimentation device, and a subsurface detention basin. All of the BMPs were designed to meet the requirements of the MassDEP Handbook and will provide water quality treatment and peak rate attenuation in order to mitigate the impacts of the proposed site improvements. See Appendix E – MassDEP Calculations for the calculations required to document compliance. The following section provides a description of the best management practices (BMPs) being utilized on site.

3.4.1 Deep Sump Catch Basins

Deep-sump catch basins equipped with oil/gas hoods are being utilized as structural pretreatment devices within the proposed stormwater management system. The catch basins will be constructed with a 4′-0″ deep sumps to function as a settling chamber and allow for adequate storage of collected sediments. Catch basins are typically first in the line of water quality treatment.

3.4.2 Proprietary Sedimentation Devices

The stormwater management system is utilizing a proprietary treatment device for the pretreatment of stormwater runoff in order to ensure that the required water quality treatment is being performed prior to discharge to the downgradient BMP.

3.4.3 Subsurface Detention Basin

Subsurface Detention Basins are well suited to provide groundwater attenuation from watershed areas such as those associated with this project. The subsurface detention basin consists of underground stormwater chambers embedded in stone. Stormwater discharge is conveyed to the subsurface detention basin via up-gradient drainage infrastructure. The subsurface detention basin has been designed with an outlet control structure such that the post-development discharge rates are less than or equal to pre-development rates.

3.5 Protection of Stormwater Best Management Practices during Construction

Protection of the stormwater best management practices during construction will ensure the proper functioning of the stormwater management system and provide protection to the undisturbed areas until the site has been stabilized. Certain specific erosion and sedimentation controls and good practices to be performed by the site contractor have been documented in a Construction Period Erosion Control Plan. See Appendix F – Construction Period Erosion Control Plan.

3.6 Inspection and Maintenance of Stormwater Best Management Practices

Frequent maintenance of the stormwater best management practices is essential to ensuring that the stormwater management system will function properly long-term. The MassDEP provides guidelines for the regular inspection and maintenance of the proposed stormwater best management practices. A Long-Term Stormwater Operation and Maintenance Plan has been prepared which dictates the inspection frequency and maintenance operations for each BMP. See Appendix G – Long-Term Operation and Maintenance Plan.

3.7 Illicit Discharge Compliance Statement

RLA has prepared an Illicit Discharge Compliance Statement to document compliance with the Massachusetts Department of Environmental Protection Stormwater Management Handbook, see Appendix H.

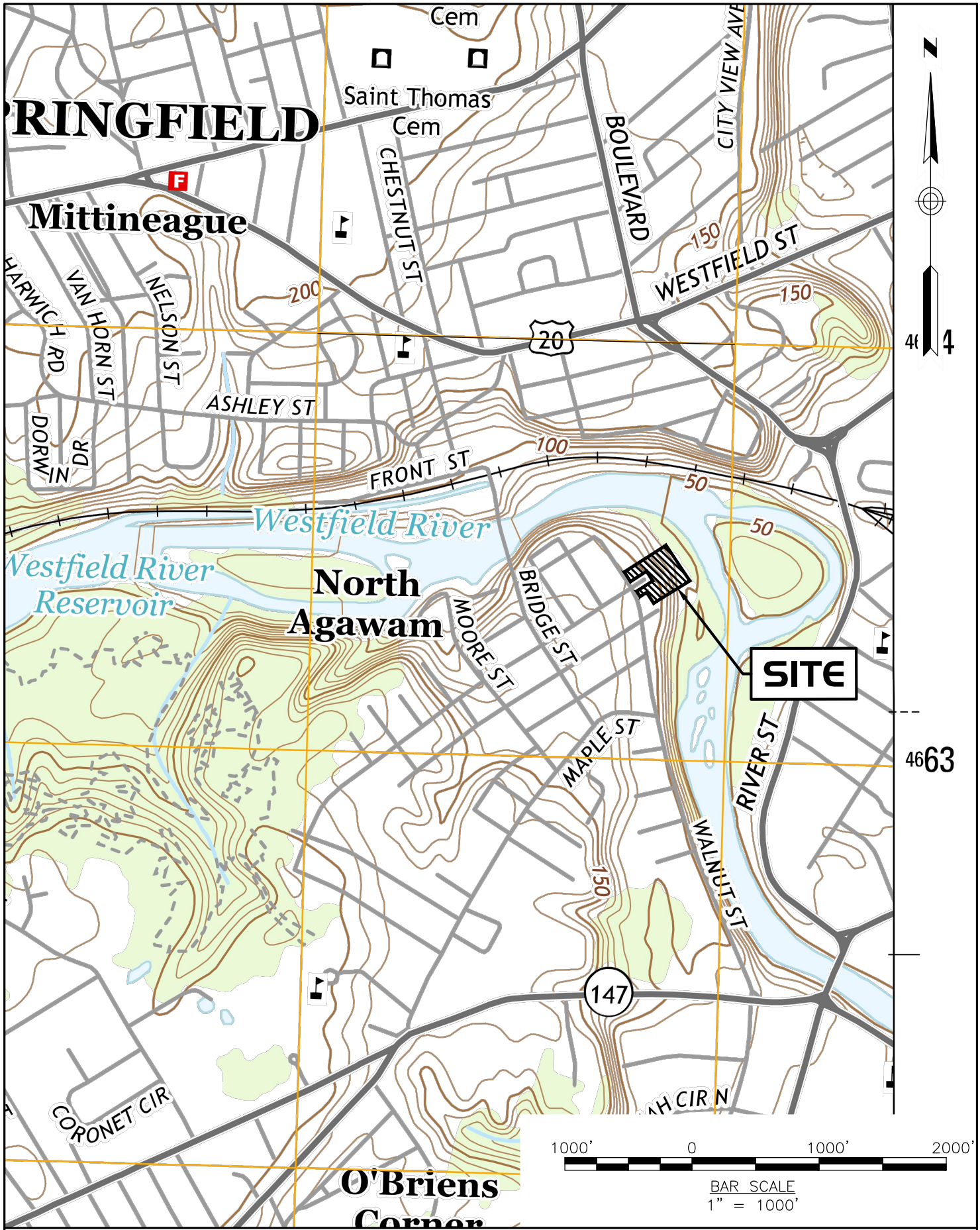
3.8 Low-Impact Development Alternatives Analysis Narrative

RLA has prepared a Low-Impact Development Alternatives Analysis Narrative as part of the Stormwater Drainage Report, see Appendix I.

4. CONCLUSION

The proposed stormwater management system has been designed to mitigate the impacts of the proposed site improvements by providing effective control of stormwater runoff water quality and water quantity. The proposed site improvements, including the stormwater management system, utilize best management practices approved by the Massachusetts Department of Environmental Protection Stormwater Management Handbook. These best management practices have been incorporated to provide water quality treatment and peak discharge rate attenuation for the post-development conditions. Groundwater recharge is addressed to the maximum extent practicable based on field-verified soil evaluations demonstrating site conditions that are not suitable for infiltration-based practices. Implementation of stormwater best management practices such as deep-sump hooded catch basins, a proprietary sedimentation device, and a subsurface detention basin provides a stormwater drainage design that is in conformance with the criteria set forth in the Agawam Stormwater Management Ordinance (Chapter 176), the Town of Agawam Subdivision Rules and Regulations, and the Massachusetts Department of Environmental Protection Stormwater Management Handbook.

Figure 1: Site Locus – USGS Map



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SITE LOCUS
USGS MAP

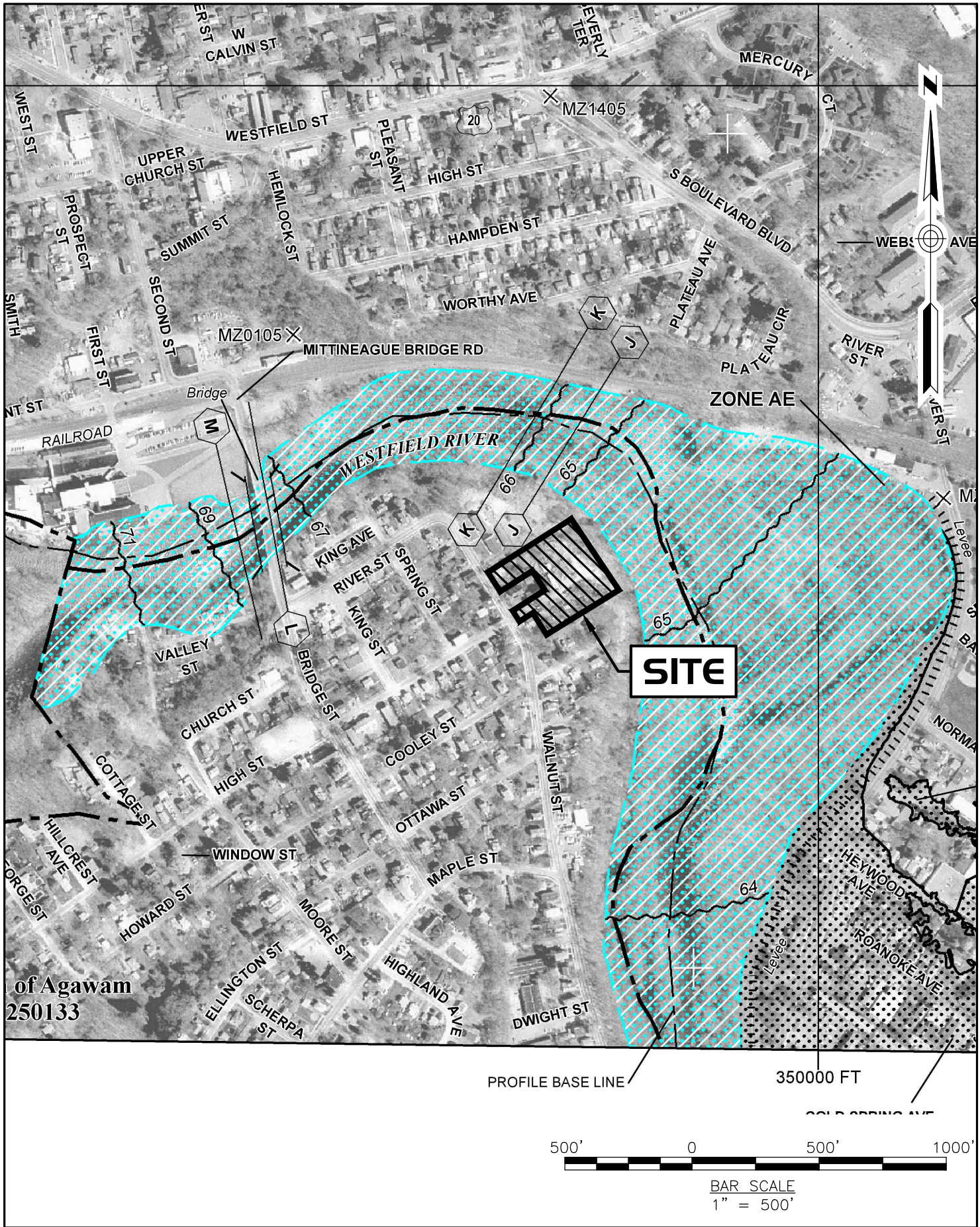
Proposed Residential Subdivision
27 Walnut Street and Old River Street
Agawam, Massachusetts

Calabrese Construction, LLC
7 Brewster Road
West Springfield, Massachusetts

JOB NO: 220627
DATE: 1/29/26
SCALE: AS NOTED

FIG-1

Figure 2: FEMA Flood Map



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FLOOD RATE INSURANCE MAP

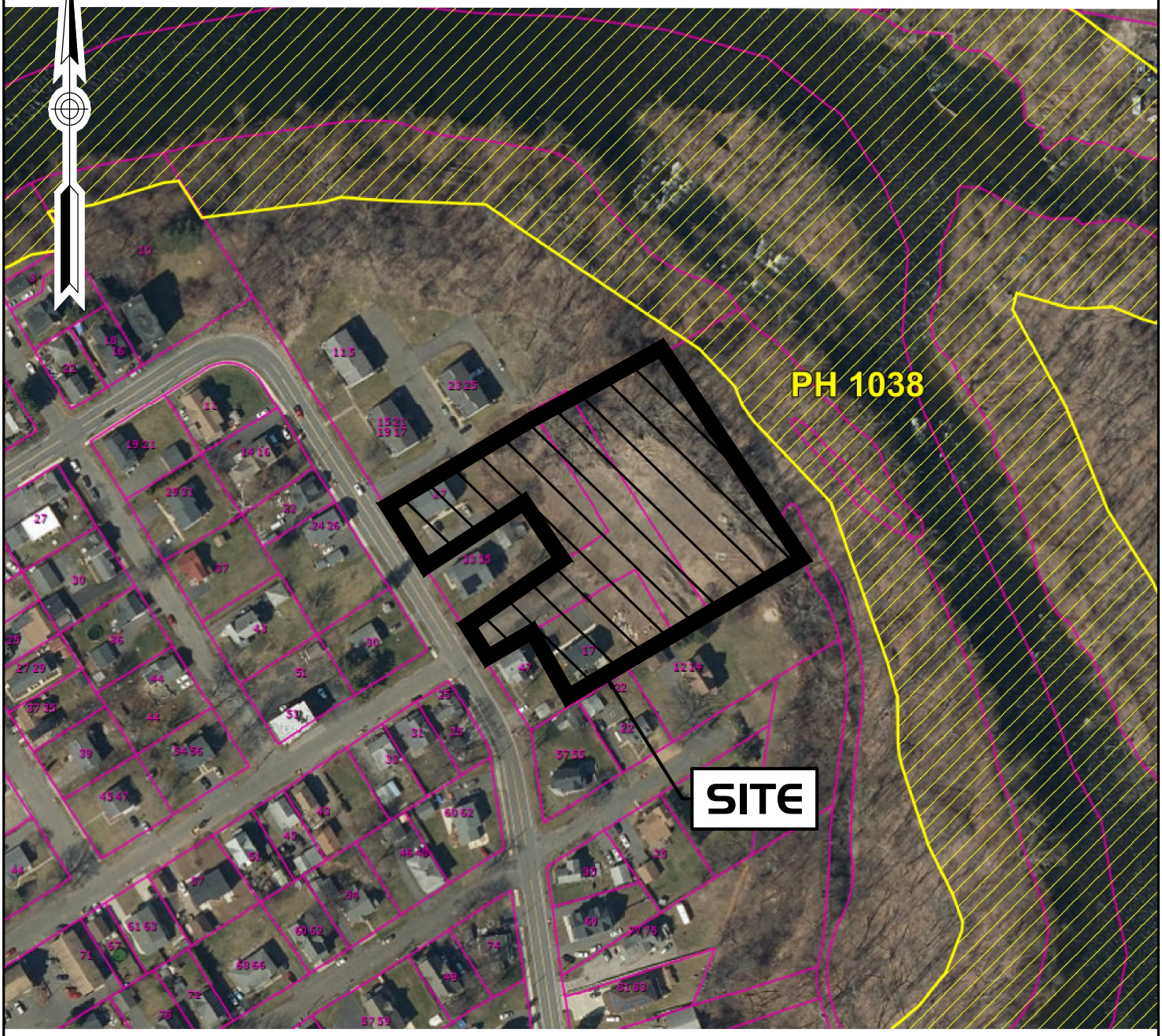
Proposed Residential Subdivision
27 Walnut Street and Old River Street
Agawam, Massachusetts

Calabrese Construction, LLC
7 Brewster Road
West Springfield, Massachusetts

JOB NO: 220627
DATE: 1/29/26
SCALE: AS NOTED

FIG-2

Figure 3: NHESP Map



1000' 0 1000' 2000'

BAR SCALE
1" = 1000'

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NHESP Area Map

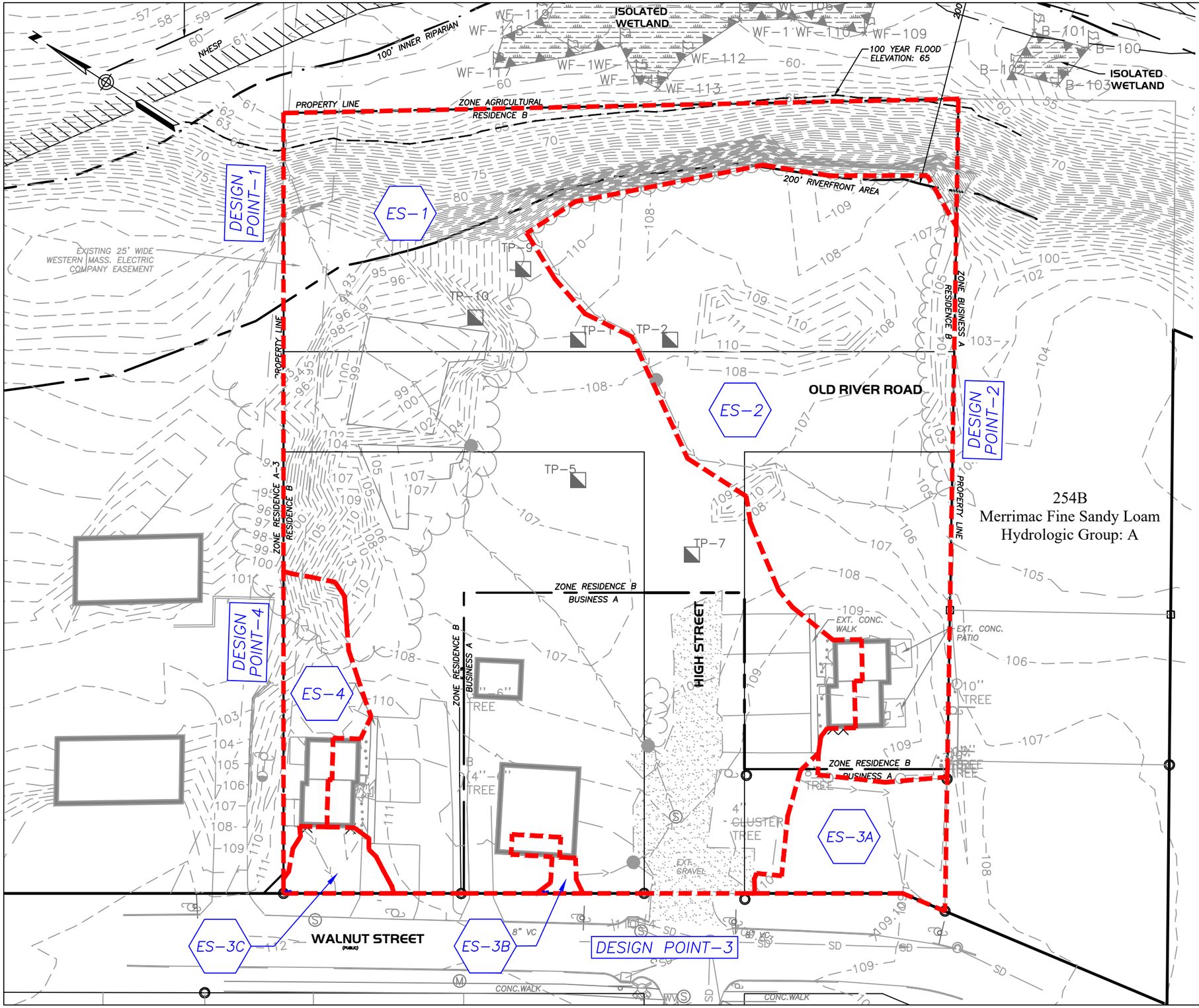
Proposed Residential Subdivision
27 Walnut Street and Old River Street
Agawam, Massachusetts

Calabrese Construction, LLC
7 Brewster Road
West Springfield, Massachusetts

JOB NO: 220627
DATE: 1/29/26
SCALE: AS NOTED

FIG-3

Figure 4: Pre-Development Watershed Plan



LEGEND

- TIME OF CONC. FLOW PATH
- ES-1 — SUBCATCHMENT NAME
- SUB WATERSHED
- SOIL BOUNDARY

1" = 50'

25 0 50

R LEVESQUE ASSOCIATES, INC
A Land Planning Services Company
40 School Street · P.O. Box 640 · Westfield, MA 01086
ph: 413.568.0985 fax: 413.568.0986 rlaland.com

Pre-Development Watershed Plan

Proposed Residential Subdivision
Old River Road
Agawam, Massachusetts

Calabrese Construction, LLC
7 Brewster Road
West Springfield, MA 01089

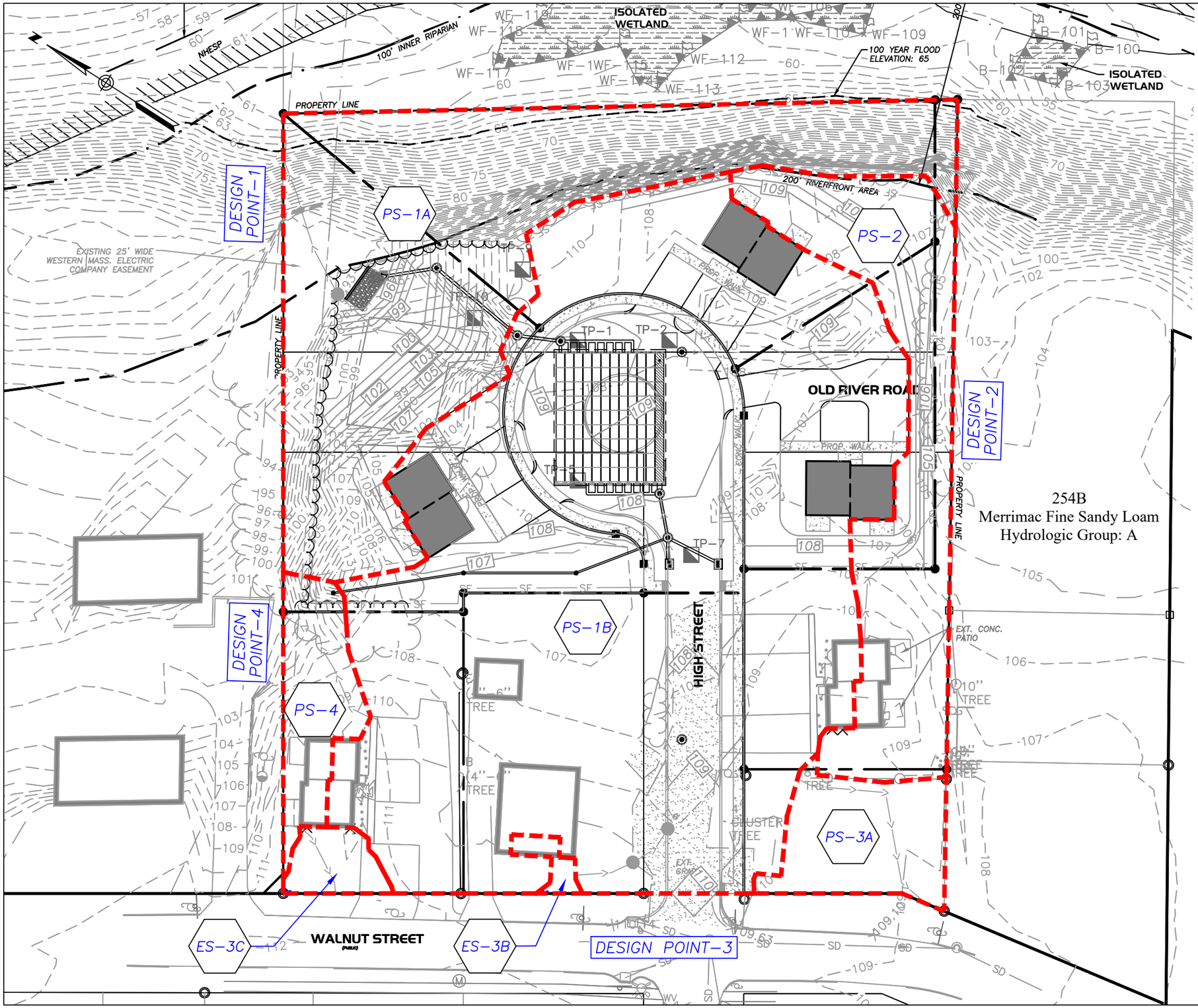
JOB NO.: 220627

DATE: 1/30/26

SCALE: As Noted

FIG-4

Figure 5: Post-Development Watershed Plan



LEGEND

- TIME OF CONC. FLOW PATH
- ES-1 — SUBCATCHMENT NAME
- SUB WATERSHED
- SOIL BOUNDARY

1" = 50'
25 0 50

R LEVESQUE ASSOCIATES, INC
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Post-Development Watershed Plan

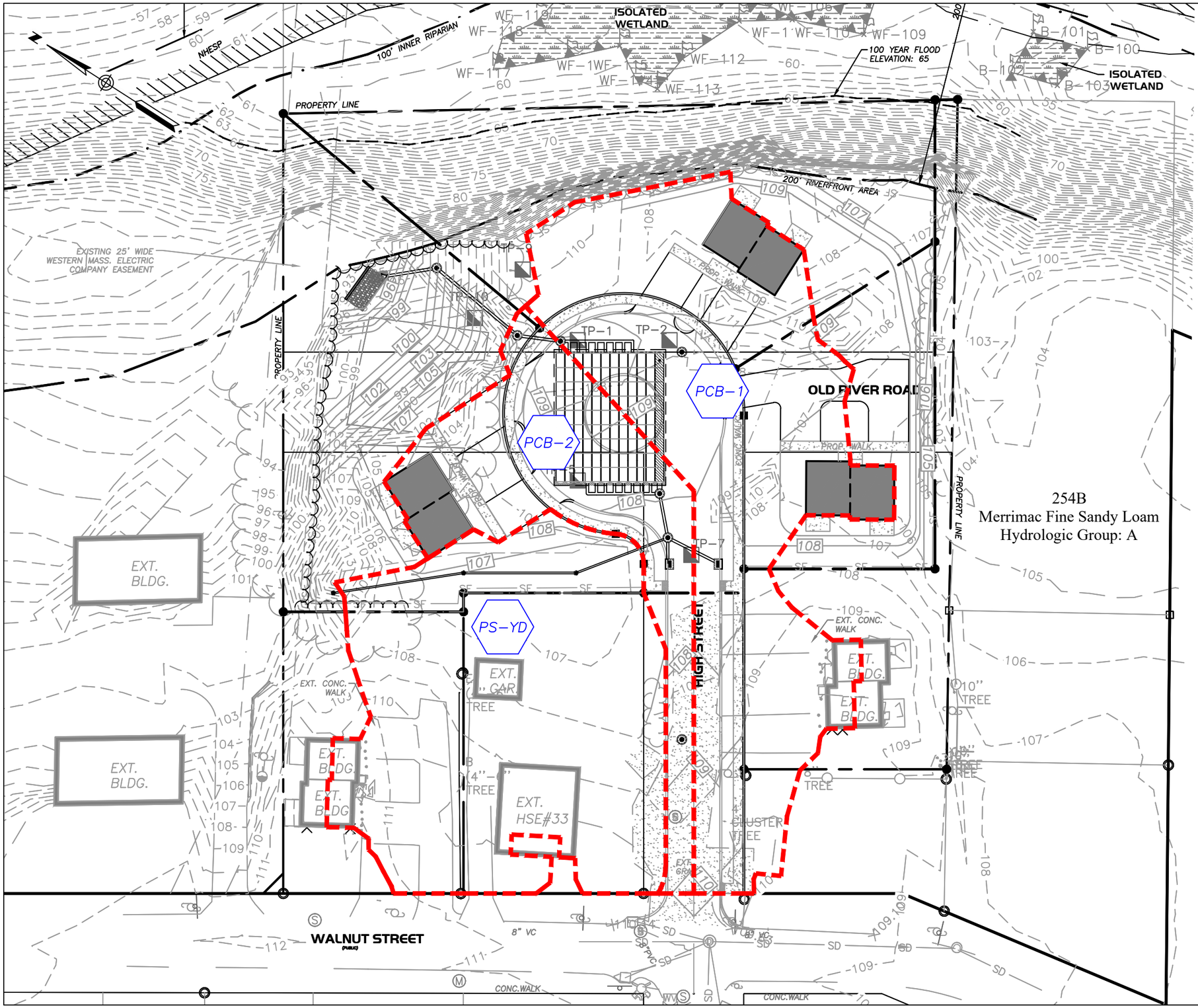
Proposed Residential Subdivision
Old River Road
Agawam, Massachusetts

C.D.C. Realty, Inc.
7 Brewster Road
West Springfield, MA 01089

JOB NO.: 220627
DATE: 1/30/26
SCALE: As Noted

FIG-5

Figure 6: Inlet Area Plan



LEGEND

- TIME OF CONC. FLOW PATH
- ES-1 — SUBCATCHMENT NAME
- SUB WATERSHED
- SOIL BOUNDARY

1" = 50'

25 0 50

R LEVESQUE ASSOCIATES, INC
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Inlet Area Plan

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Old River Road
Agawam, Massachusetts

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7 Brewster Road
West Springfield, MA 01089

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SCALE: As Noted

FIG-6

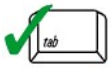
Appendix A: Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.





A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

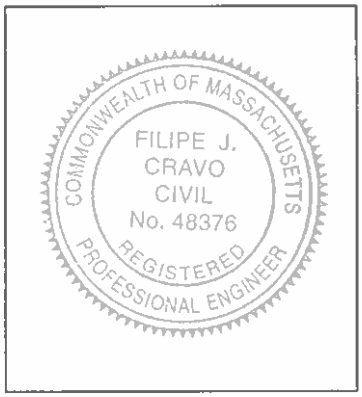
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



1/30/26

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☒ Other (describe): Proprietary Sedimentation Device, Subsurface Infiltration Basin

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☒ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

☐ The ½" or 1" Water Quality Volume or

☒ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

☐ Limited Project

☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.

☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area

☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff

☐ Bike Path and/or Foot Path

☐ Redevelopment Project

☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix B: Soils Information

- NRCS Custom Soil Resource Report

- Test pit information

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Hampden County, Massachusetts, Central Part

Walnut Street



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....12
Map Unit Descriptions.....12
Hampden County, Massachusetts, Central Part.....14
254B—Merrimac fine sandy loam, 3 to 8 percent slopes.....14
References.....16

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



Map Scale: 1:1,120 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hampden County, Massachusetts, Central Part
Survey Area Data: Version 19, Sep 5, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	2.6	100.0%
Totals for Area of Interest		**2.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Hampden County, Massachusetts, Central Part

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqs
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash

Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Walpole

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

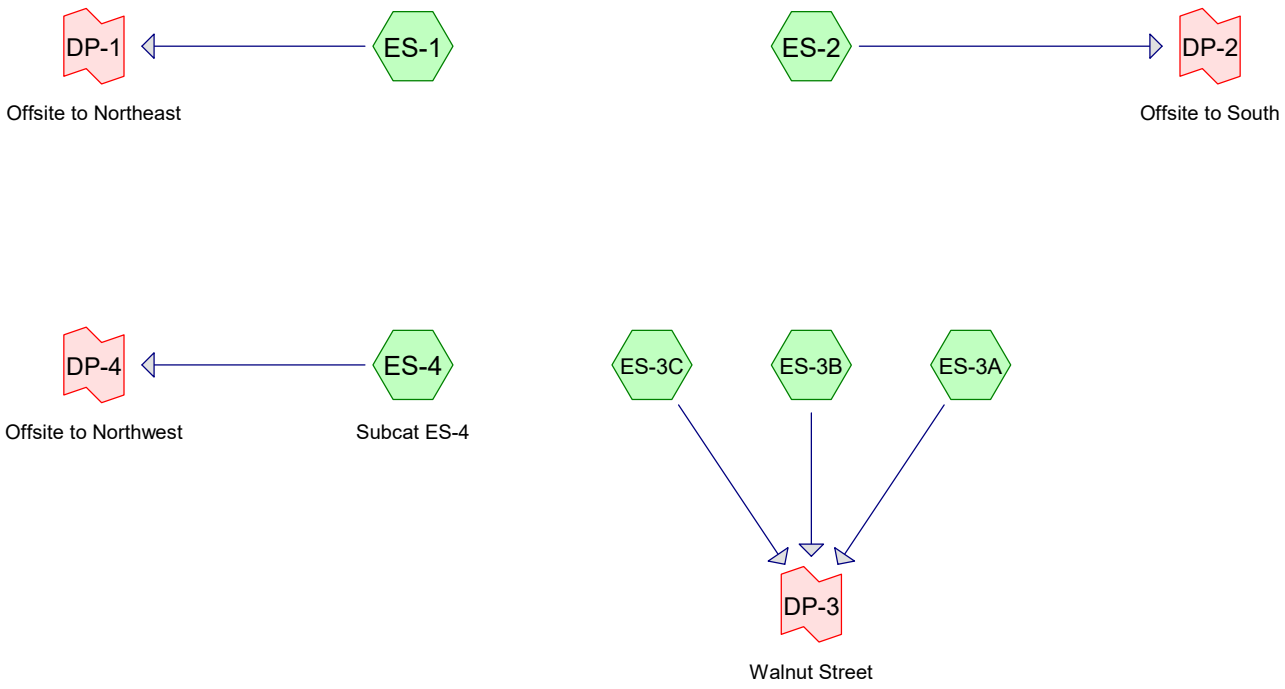
United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix C: Pre- and Post- Development Hydrologic Analysis (2, 10, & 100 Year Storm Events)



Subcat Reach Pond Link

Routing Diagram for 220627 - PRE
Prepared by R Levesque Associates
HydroCAD® 10.20-8a s/n 13073 © 2025 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.19	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.16	2
3	100-Year	Type III 24-hr		Default	24.00	1	8.28	2

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES-1: Runoff Area=84,098 sf 11.89% Impervious Runoff Depth=0.35"
Flow Length=469' Tc=10.0 min CN=WQ Runoff=0.6 cfs 2,465 cf

Subcatchment ES-2: Runoff Area=36,222 sf 2.65% Impervious Runoff Depth=0.08"
Flow Length=281' Tc=14.6 min CN=WQ Runoff=0.1 cfs 237 cf

Subcatchment ES-3A: Runoff Area=4,834 sf 14.73% Impervious Runoff Depth=0.44"
Flow Length=107' Slope=0.0110 '/' Tc=19.8 min CN=WQ Runoff=0.0 cfs 176 cf

Subcatchment ES-3B: Runoff Area=497 sf 48.79% Impervious Runoff Depth=1.44"
Tc=6.0 min CN=WQ Runoff=0.0 cfs 60 cf

Subcatchment ES-3C: Runoff Area=1,425 sf 0.17% Impervious Runoff Depth=0.01"
Flow Length=39' Slope=0.0103 '/' Tc=9.0 min CN=WQ Runoff=0.0 cfs 1 cf

Subcatchment ES-4: Subcat ES-4 Runoff Area=3,963 sf 20.57% Impervious Runoff Depth=0.61"
Flow Length=71' Slope=0.1296 '/' Tc=6.0 min CN=WQ Runoff=0.1 cfs 201 cf

Link DP-1: Offsite to Northeast Inflow=0.6 cfs 2,465 cf
Primary=0.6 cfs 2,465 cf

Link DP-2: Offsite to South Inflow=0.1 cfs 237 cf
Primary=0.1 cfs 237 cf

Link DP-3: Walnut Street Inflow=0.0 cfs 236 cf
Primary=0.0 cfs 236 cf

Link DP-4: Offsite to Northwest Inflow=0.1 cfs 201 cf
Primary=0.1 cfs 201 cf

Total Runoff Area = 131,039 sf Runoff Volume = 3,139 cf Average Runoff Depth = 0.29"
90.29% Pervious = 118,309 sf 9.71% Impervious = 12,730 sf

Summary for Subcatchment ES-1:

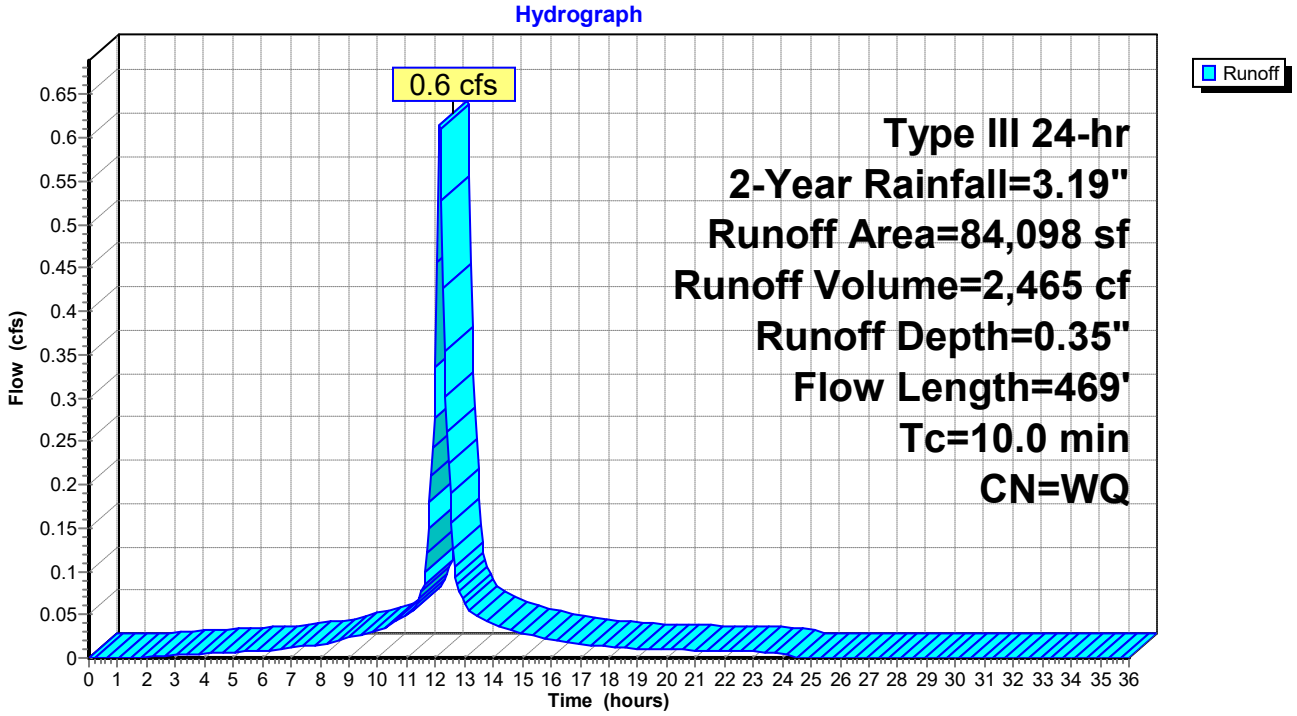
Runoff = 0.6 cfs @ 12.14 hrs, Volume= 2,465 cf, Depth= 0.35"
Routed to Link DP-1 : Offsite to Northeast

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
39,863	39	>75% Grass cover, Good, HSG A
6,325	98	Paved parking, HSG A
3,674	98	Roofs, HSG A
34,236	30	Woods, Good, HSG A
84,098		Weighted Average
74,099	35	88.11% Pervious Area
9,999	98	11.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	29	0.0207	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
0.8	71	0.0289	1.44		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
2.5	185	0.0059	1.24		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.3	184	0.2065	2.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.0	469	Total			

Subcatchment ES-1:



Summary for Subcatchment ES-2:

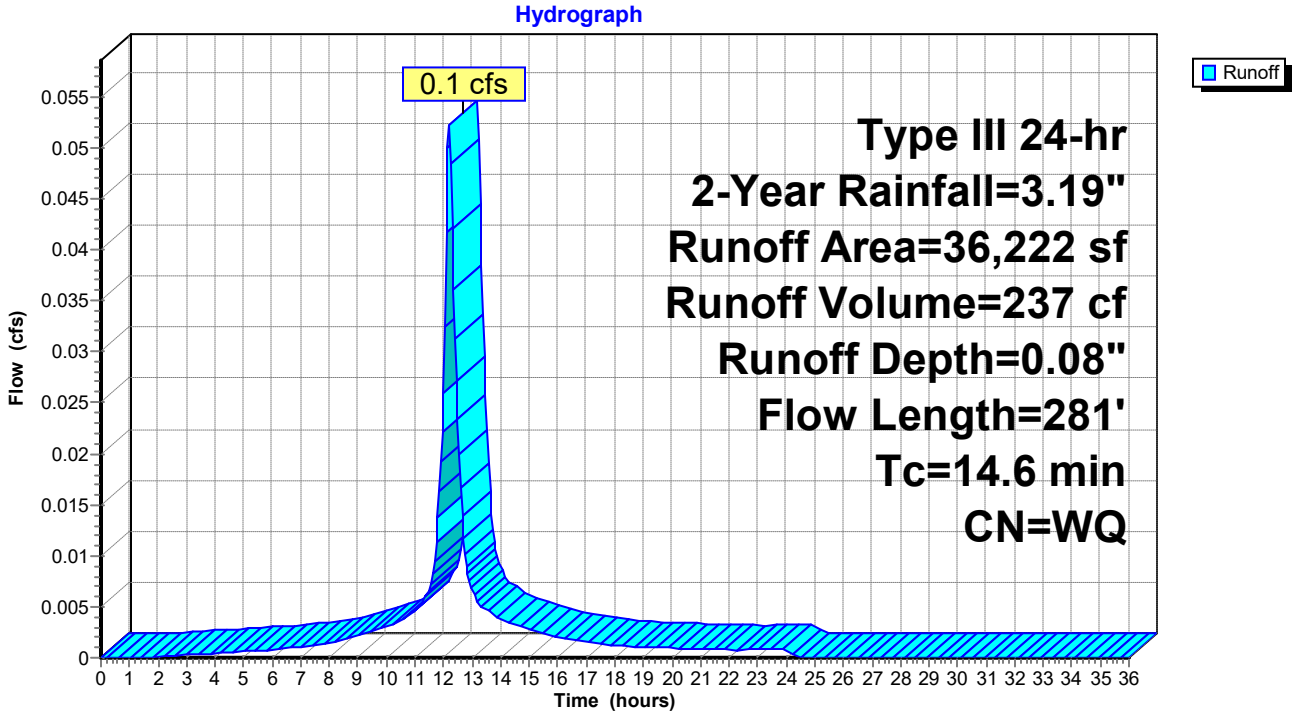
Runoff = 0.1 cfs @ 12.19 hrs, Volume= 237 cf, Depth= 0.08"
Routed to Link DP-2 : Offsite to South

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
33,745	39	>75% Grass cover, Good, HSG A
325	98	Paved parking, HSG A
634	98	Roofs, HSG A
1,519	30	Woods, Good, HSG A
36,222		Weighted Average
35,263	39	97.35% Pervious Area
959	98	2.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0260	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
1.3	181	0.0215	2.36		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.6	281	Total			

Subcatchment ES-2:



Summary for Subcatchment ES-3A:

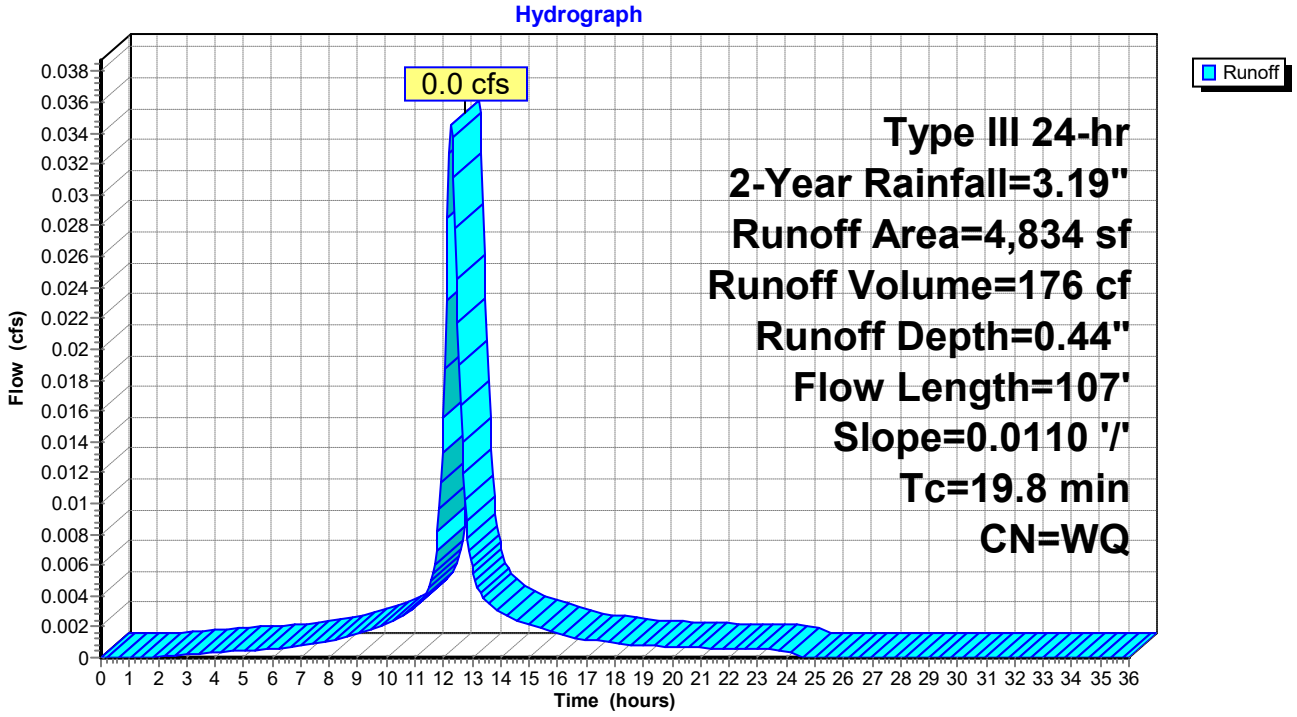
Runoff = 0.0 cfs @ 12.26 hrs, Volume= 176 cf, Depth= 0.44"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
4,122	39	>75% Grass cover, Good, HSG A
149	98	Paved parking, HSG A
562	98	Roofs, HSG A
4,834		Weighted Average
4,122	39	85.27% Pervious Area
712	98	14.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	107	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment ES-3A:



Summary for Subcatchment ES-3B:

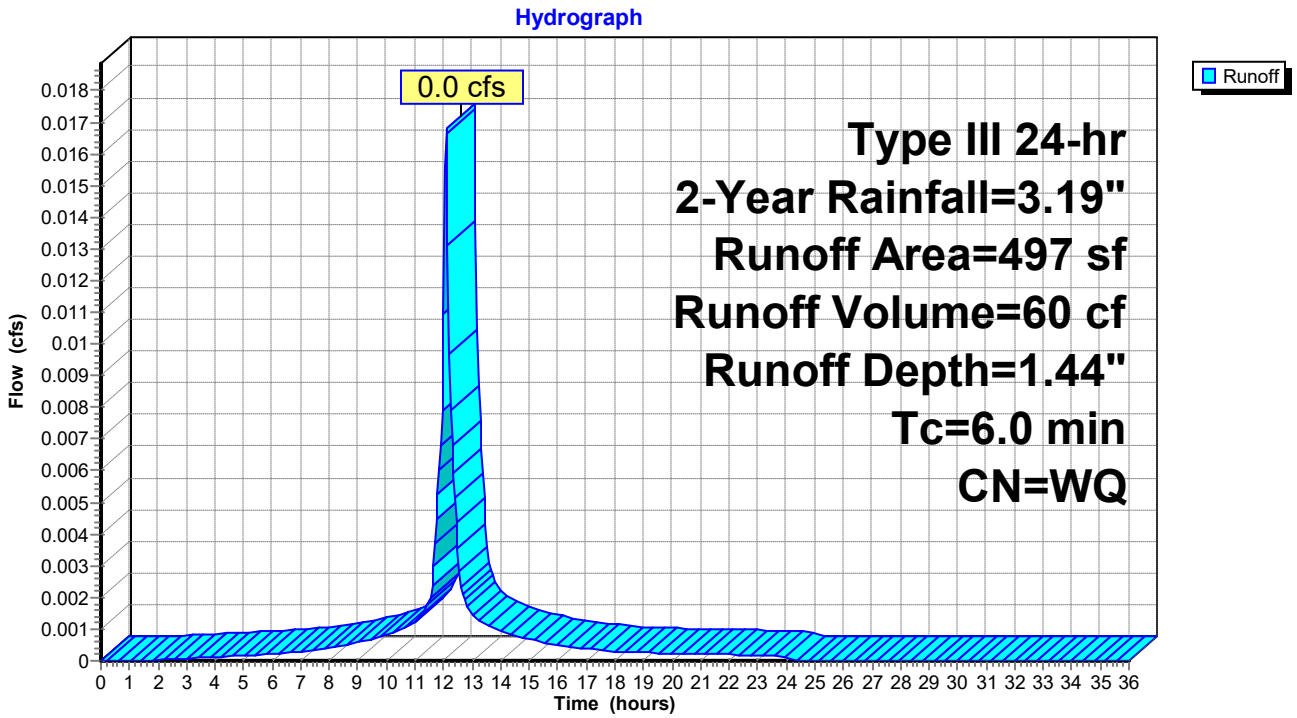
Runoff = 0.0 cfs @ 12.09 hrs, Volume= 60 cf, Depth= 1.44"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
255	39	>75% Grass cover, Good, HSG A
242	98	Roofs, HSG A
497		Weighted Average
255	39	51.21% Pervious Area
242	98	48.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment ES-3B:



Summary for Subcatchment ES-3C:

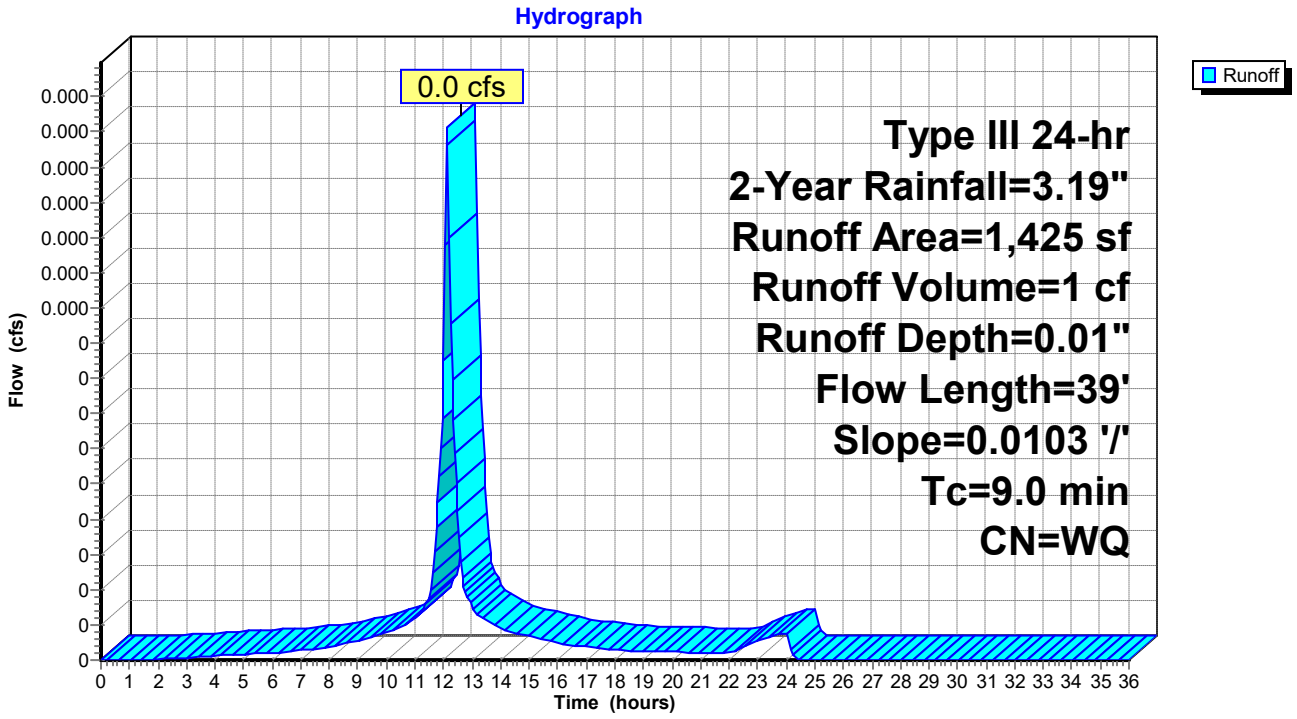
Runoff = 0.0 cfs @ 12.12 hrs, Volume= 1 cf, Depth= 0.01"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
1,422	39	>75% Grass cover, Good, HSG A
2	98	Paved parking, HSG A
1,425		Weighted Average
1,422	39	99.83% Pervious Area
2	98	0.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	39	0.0103	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment ES-3C:



Summary for Subcatchment ES-4: Subcat ES-4

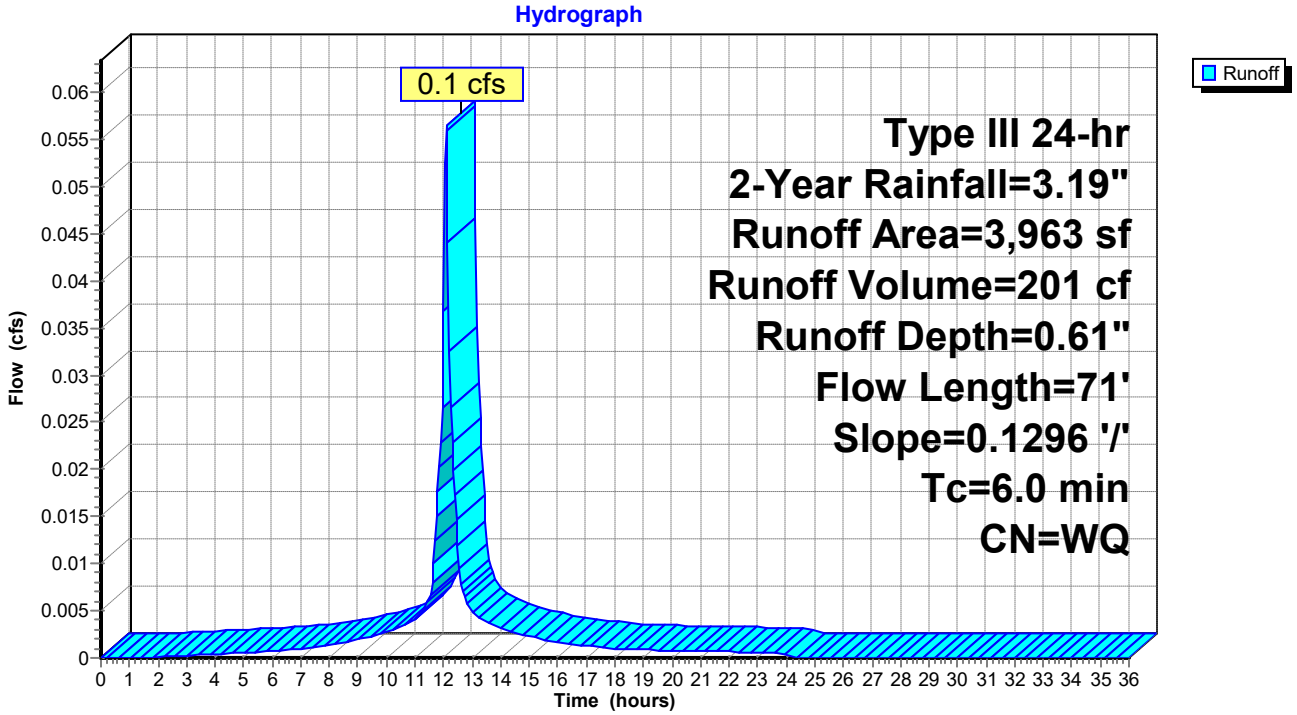
Runoff = 0.1 cfs @ 12.09 hrs, Volume= 201 cf, Depth= 0.61"
Routed to Link DP-4 : Offsite to Northwest

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
2,344	39	>75% Grass cover, Good, HSG A
211	98	Paved parking, HSG A
604	98	Roofs, HSG A
804	30	Woods, Good, HSG A
3,963		Weighted Average
3,148	37	79.43% Pervious Area
815	98	20.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	71	0.1296	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
5.3	71	Total, Increased to minimum Tc = 6.0 min			

Subcatchment ES-4: Subcat ES-4

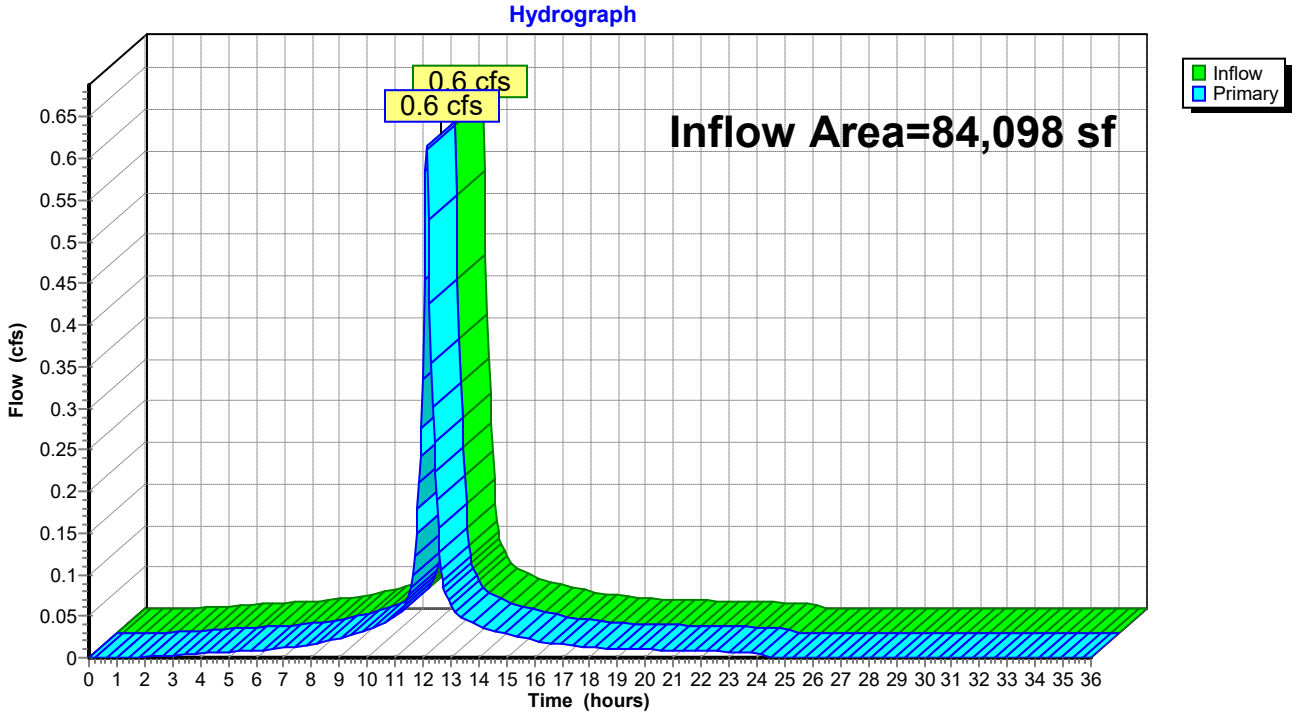


Summary for Link DP-1: Offsite to Northeast

Inflow Area = 84,098 sf, 11.89% Impervious, Inflow Depth = 0.35" for 2-Year event
Inflow = 0.6 cfs @ 12.14 hrs, Volume= 2,465 cf
Primary = 0.6 cfs @ 12.14 hrs, Volume= 2,465 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link DP-1: Offsite to Northeast

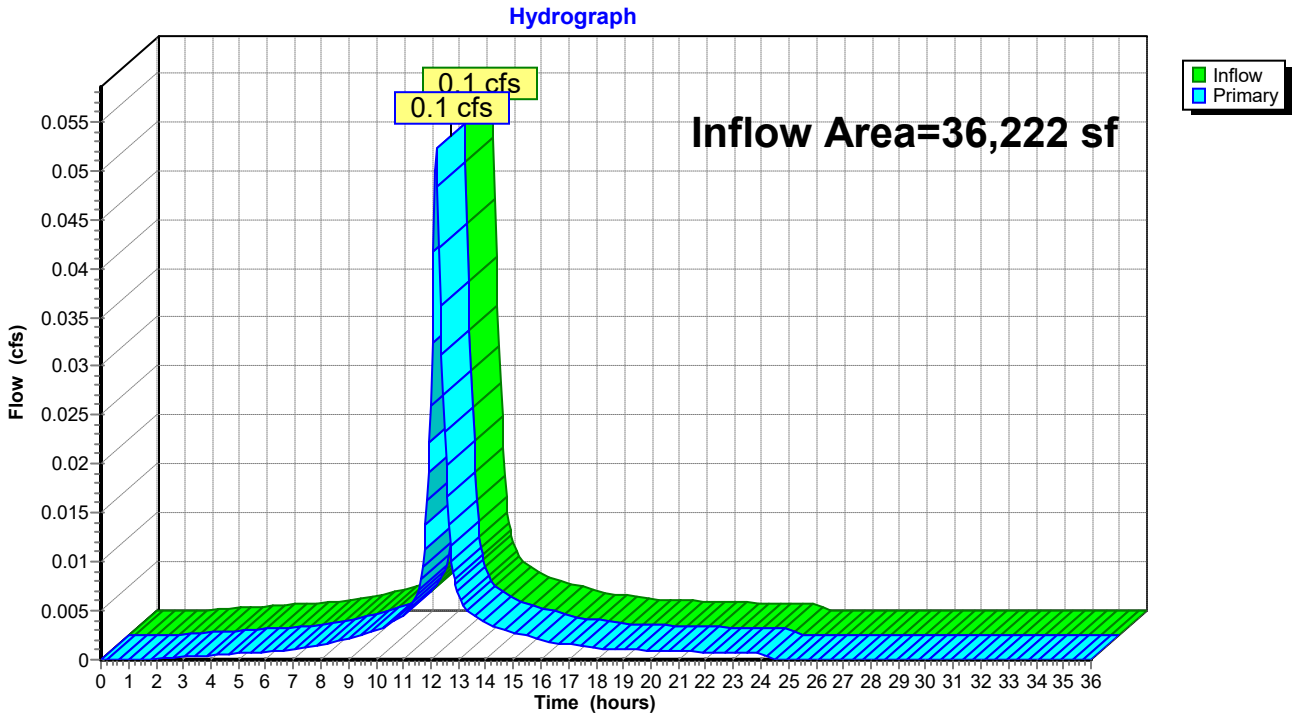


Summary for Link DP-2: Offsite to South

Inflow Area = 36,222 sf, 2.65% Impervious, Inflow Depth = 0.08" for 2-Year event
Inflow = 0.1 cfs @ 12.19 hrs, Volume= 237 cf
Primary = 0.1 cfs @ 12.19 hrs, Volume= 237 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link DP-2: Offsite to South

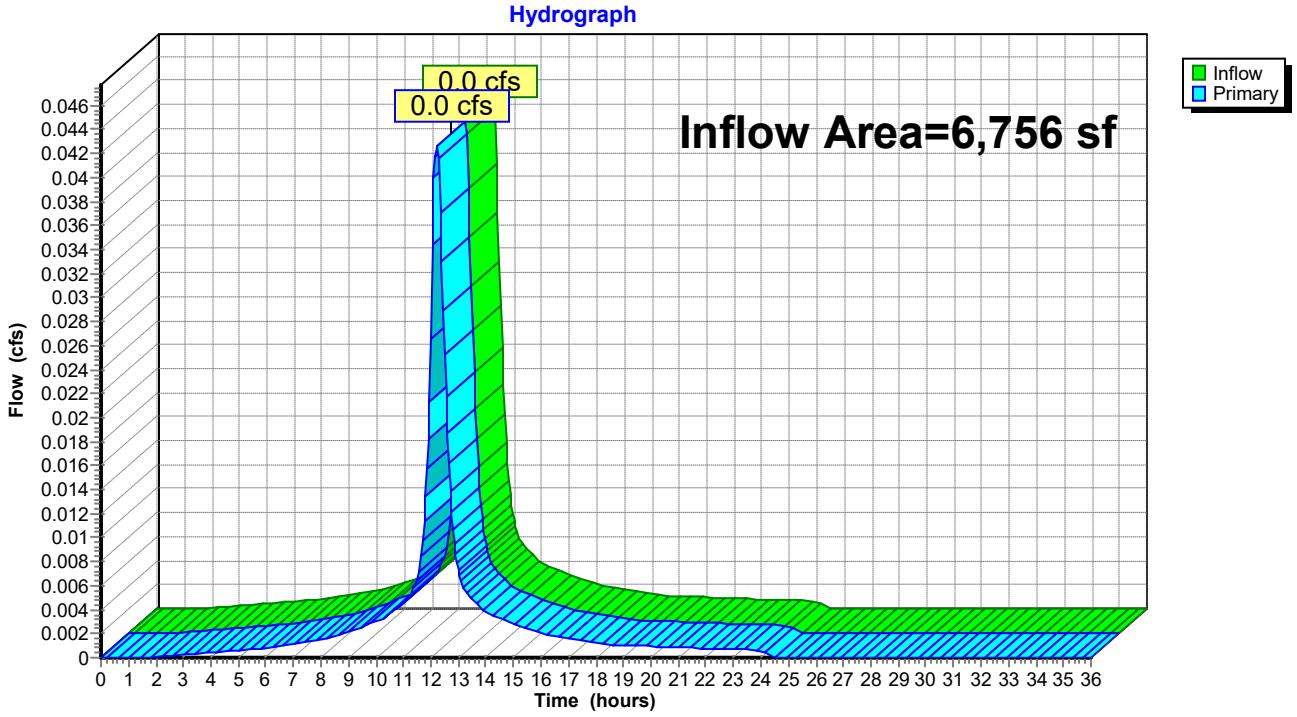


Summary for Link DP-3: Walnut Street

Inflow Area = 6,756 sf, 14.16% Impervious, Inflow Depth = 0.42" for 2-Year event
Inflow = 0.0 cfs @ 12.22 hrs, Volume= 236 cf
Primary = 0.0 cfs @ 12.22 hrs, Volume= 236 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link DP-3: Walnut Street

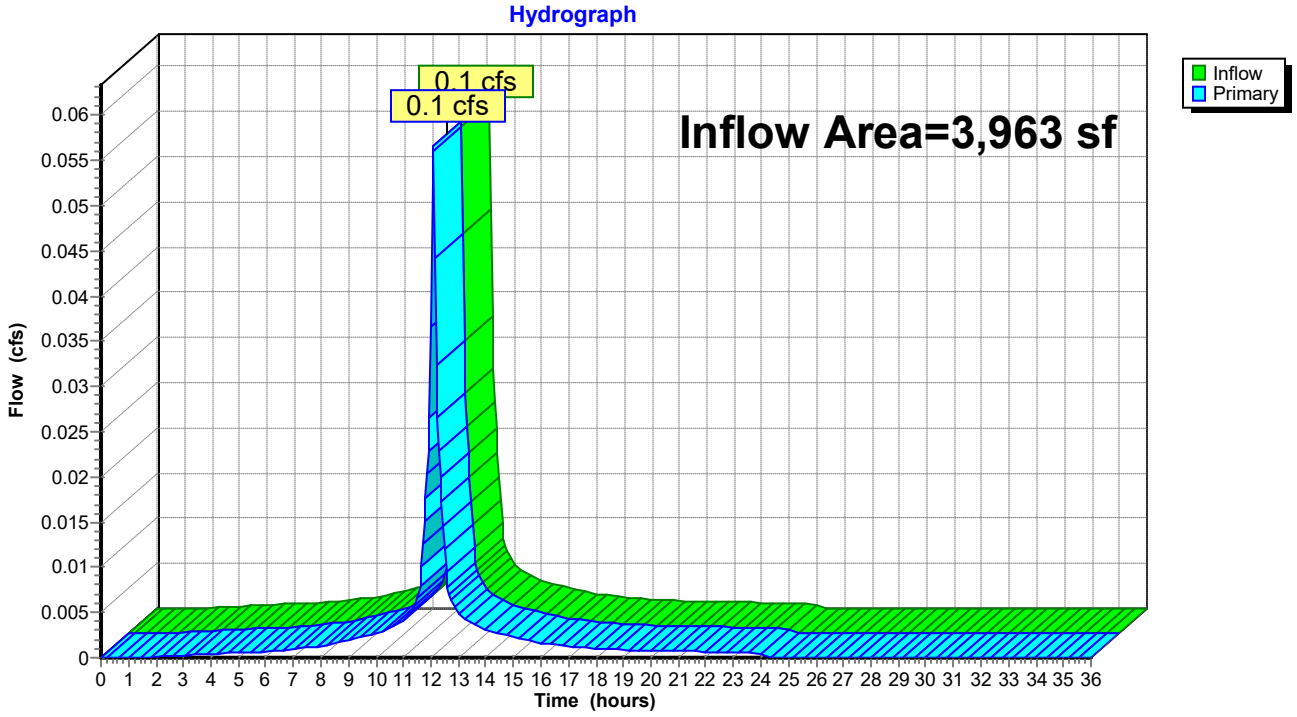


Summary for Link DP-4: Offsite to Northwest

Inflow Area = 3,963 sf, 20.57% Impervious, Inflow Depth = 0.61" for 2-Year event
Inflow = 0.1 cfs @ 12.09 hrs, Volume= 201 cf
Primary = 0.1 cfs @ 12.09 hrs, Volume= 201 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link DP-4: Offsite to Northwest



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES-1: Runoff Area=84,098 sf 11.89% Impervious Runoff Depth=0.70"
Flow Length=469' Tc=10.0 min CN=WQ Runoff=1.0 cfs 4,907 cf

Subcatchment ES-2: Runoff Area=36,222 sf 2.65% Impervious Runoff Depth=0.35"
Flow Length=281' Tc=14.6 min CN=WQ Runoff=0.1 cfs 1,052 cf

Subcatchment ES-3A: Runoff Area=4,834 sf 14.73% Impervious Runoff Depth=0.92"
Flow Length=107' Slope=0.0110 '/' Tc=19.8 min CN=WQ Runoff=0.1 cfs 372 cf

Subcatchment ES-3B: Runoff Area=497 sf 48.79% Impervious Runoff Depth=2.52"
Tc=6.0 min CN=WQ Runoff=0.0 cfs 104 cf

Subcatchment ES-3C: Runoff Area=1,425 sf 0.17% Impervious Runoff Depth=0.24"
Flow Length=39' Slope=0.0103 '/' Tc=9.0 min CN=WQ Runoff=0.0 cfs 29 cf

Subcatchment ES-4: Subcat ES-4 Runoff Area=3,963 sf 20.57% Impervious Runoff Depth=1.15"
Flow Length=71' Slope=0.1296 '/' Tc=6.0 min CN=WQ Runoff=0.1 cfs 381 cf

Link DP-1: Offsite to Northeast Inflow=1.0 cfs 4,907 cf
Primary=1.0 cfs 4,907 cf

Link DP-2: Offsite to South Inflow=0.1 cfs 1,052 cf
Primary=0.1 cfs 1,052 cf

Link DP-3: Walnut Street Inflow=0.1 cfs 505 cf
Primary=0.1 cfs 505 cf

Link DP-4: Offsite to Northwest Inflow=0.1 cfs 381 cf
Primary=0.1 cfs 381 cf

Total Runoff Area = 131,039 sf Runoff Volume = 6,845 cf Average Runoff Depth = 0.63"
90.29% Pervious = 118,309 sf 9.71% Impervious = 12,730 sf

Summary for Subcatchment ES-1:

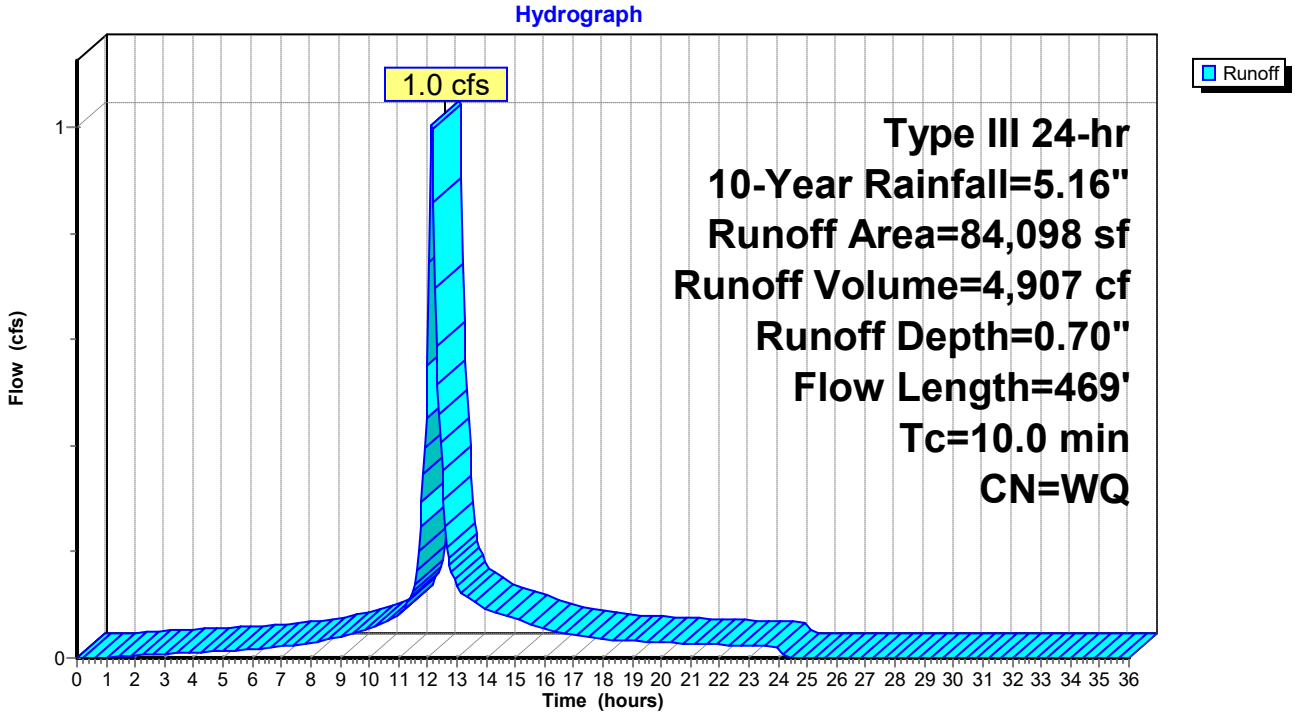
Runoff = 1.0 cfs @ 12.14 hrs, Volume= 4,907 cf, Depth= 0.70"
Routed to Link DP-1 : Offsite to Northeast

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
39,863	39	>75% Grass cover, Good, HSG A
6,325	98	Paved parking, HSG A
3,674	98	Roofs, HSG A
34,236	30	Woods, Good, HSG A
84,098		Weighted Average
74,099	35	88.11% Pervious Area
9,999	98	11.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	29	0.0207	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
0.8	71	0.0289	1.44		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
2.5	185	0.0059	1.24		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.3	184	0.2065	2.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.0	469	Total			

Subcatchment ES-1:



Summary for Subcatchment ES-2:

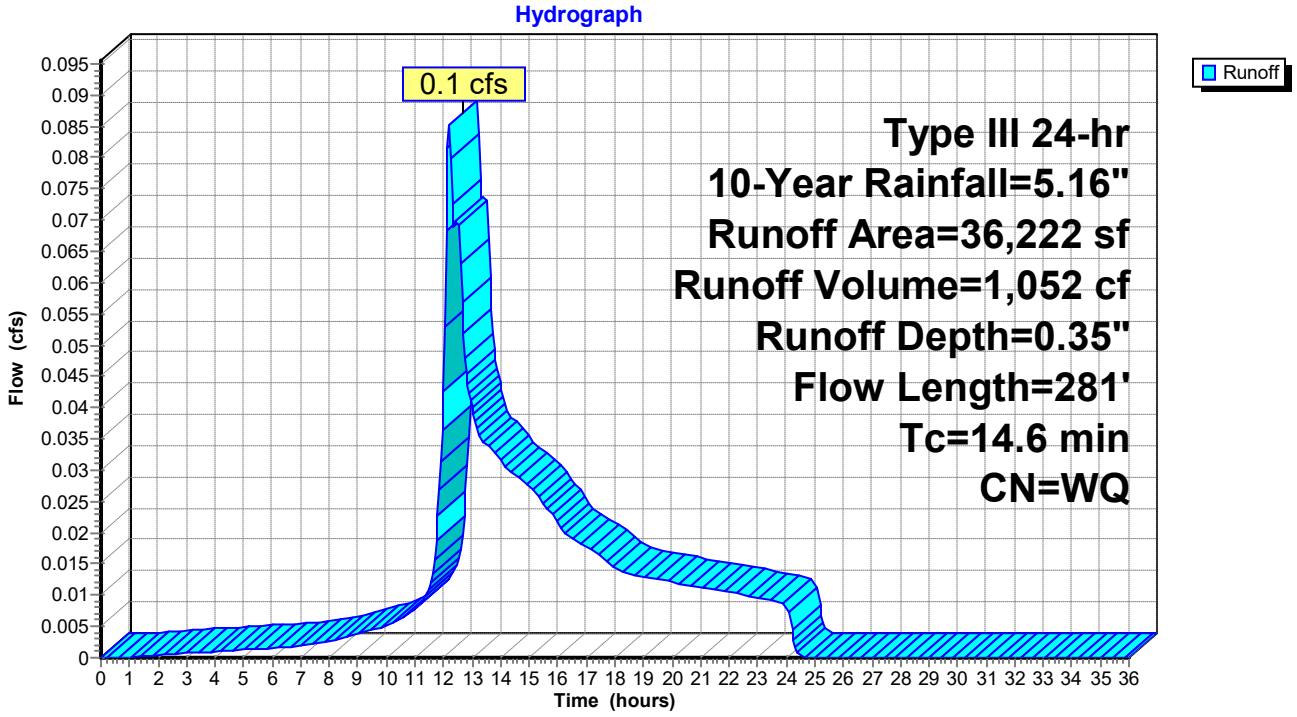
Runoff = 0.1 cfs @ 12.20 hrs, Volume= 1,052 cf, Depth= 0.35"
Routed to Link DP-2 : Offsite to South

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
33,745	39	>75% Grass cover, Good, HSG A
325	98	Paved parking, HSG A
634	98	Roofs, HSG A
1,519	30	Woods, Good, HSG A
36,222		Weighted Average
35,263	39	97.35% Pervious Area
959	98	2.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0260	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
1.3	181	0.0215	2.36		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.6	281	Total			

Subcatchment ES-2:



Summary for Subcatchment ES-3A:

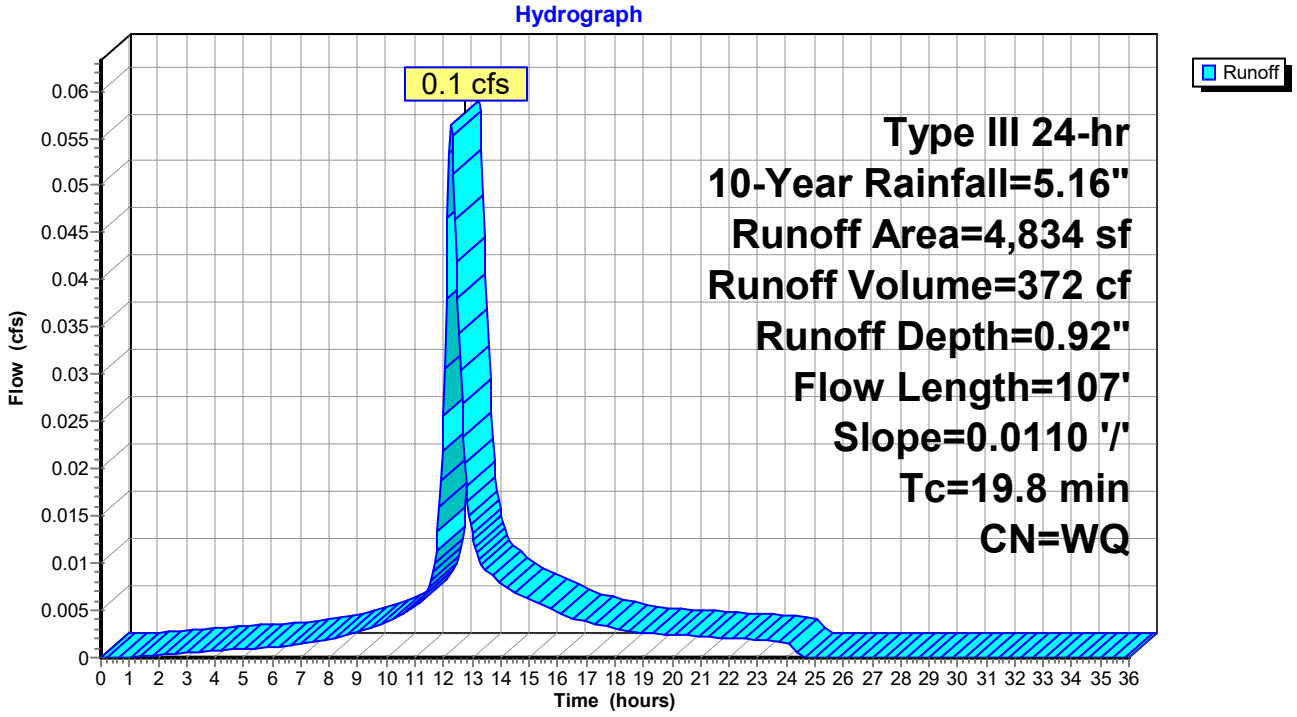
Runoff = 0.1 cfs @ 12.26 hrs, Volume= 372 cf, Depth= 0.92"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
4,122	39	>75% Grass cover, Good, HSG A
149	98	Paved parking, HSG A
562	98	Roofs, HSG A
4,834		Weighted Average
4,122	39	85.27% Pervious Area
712	98	14.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	107	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment ES-3A:



Summary for Subcatchment ES-3B:

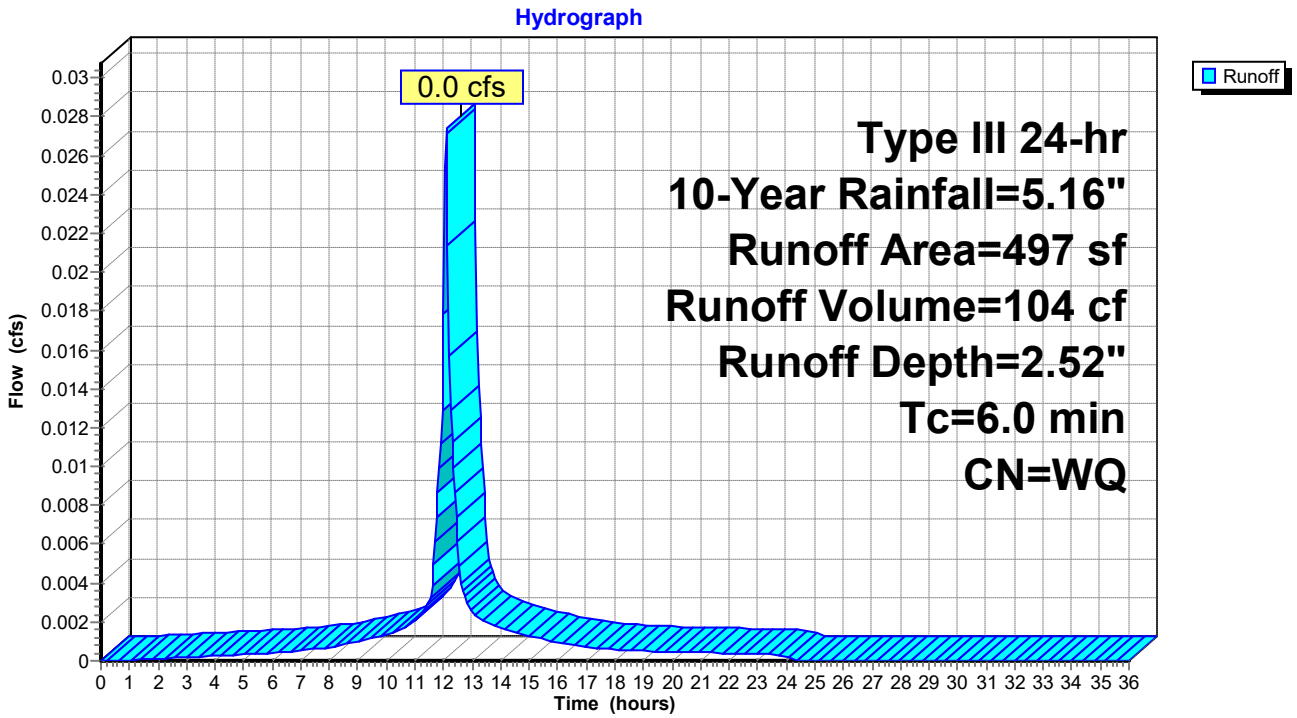
Runoff = 0.0 cfs @ 12.09 hrs, Volume= 104 cf, Depth= 2.52"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
255	39	>75% Grass cover, Good, HSG A
242	98	Roofs, HSG A
497		Weighted Average
255	39	51.21% Pervious Area
242	98	48.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment ES-3B:



Summary for Subcatchment ES-3C:

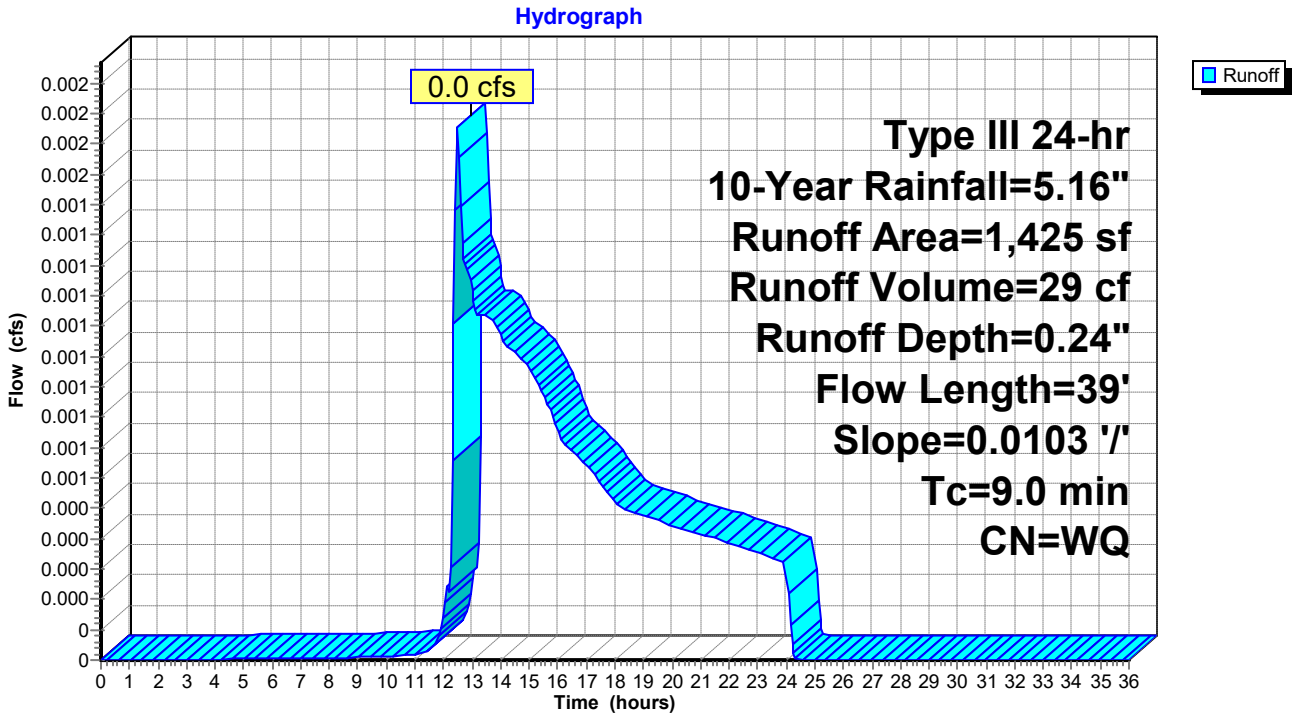
Runoff = 0.0 cfs @ 12.49 hrs, Volume= 29 cf, Depth= 0.24"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
1,422	39	>75% Grass cover, Good, HSG A
2	98	Paved parking, HSG A
1,425		Weighted Average
1,422	39	99.83% Pervious Area
2	98	0.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	39	0.0103	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment ES-3C:



Summary for Subcatchment ES-4: Subcat ES-4

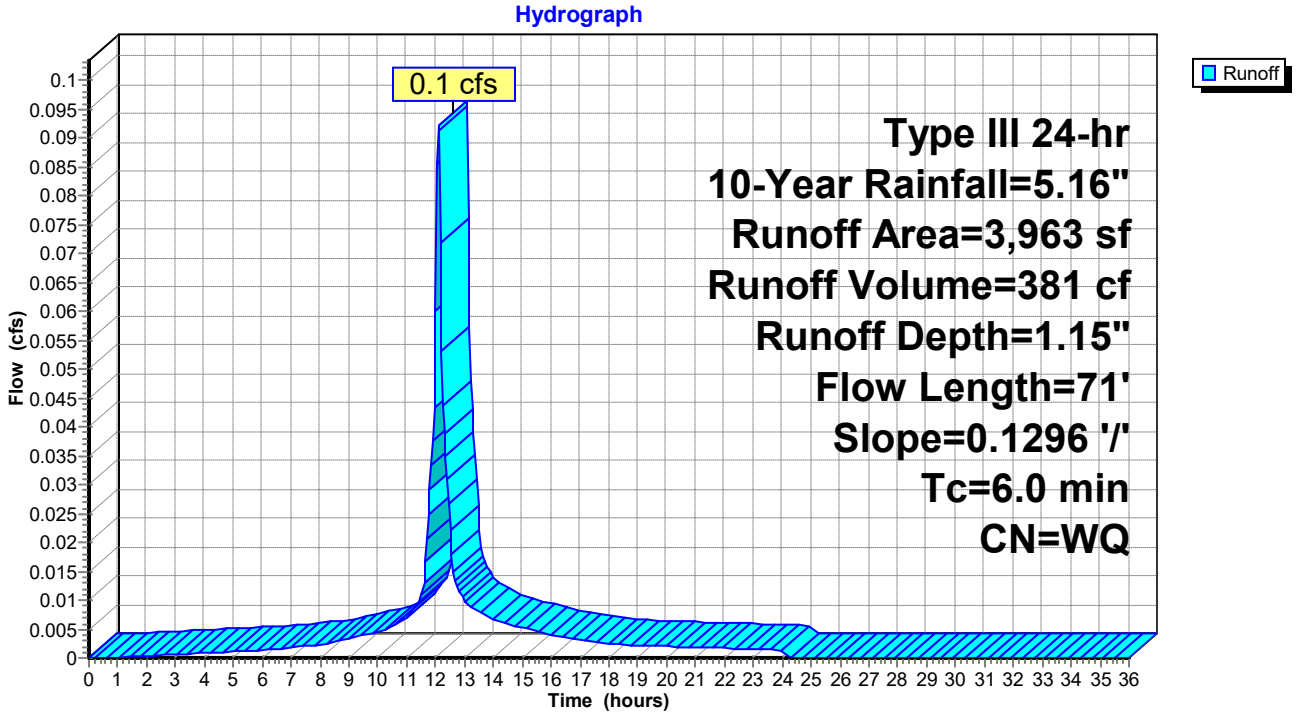
Runoff = 0.1 cfs @ 12.09 hrs, Volume= 381 cf, Depth= 1.15"
Routed to Link DP-4 : Offsite to Northwest

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
2,344	39	>75% Grass cover, Good, HSG A
211	98	Paved parking, HSG A
604	98	Roofs, HSG A
804	30	Woods, Good, HSG A
3,963		Weighted Average
3,148	37	79.43% Pervious Area
815	98	20.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	71	0.1296	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
5.3	71	Total, Increased to minimum Tc = 6.0 min			

Subcatchment ES-4: Subcat ES-4

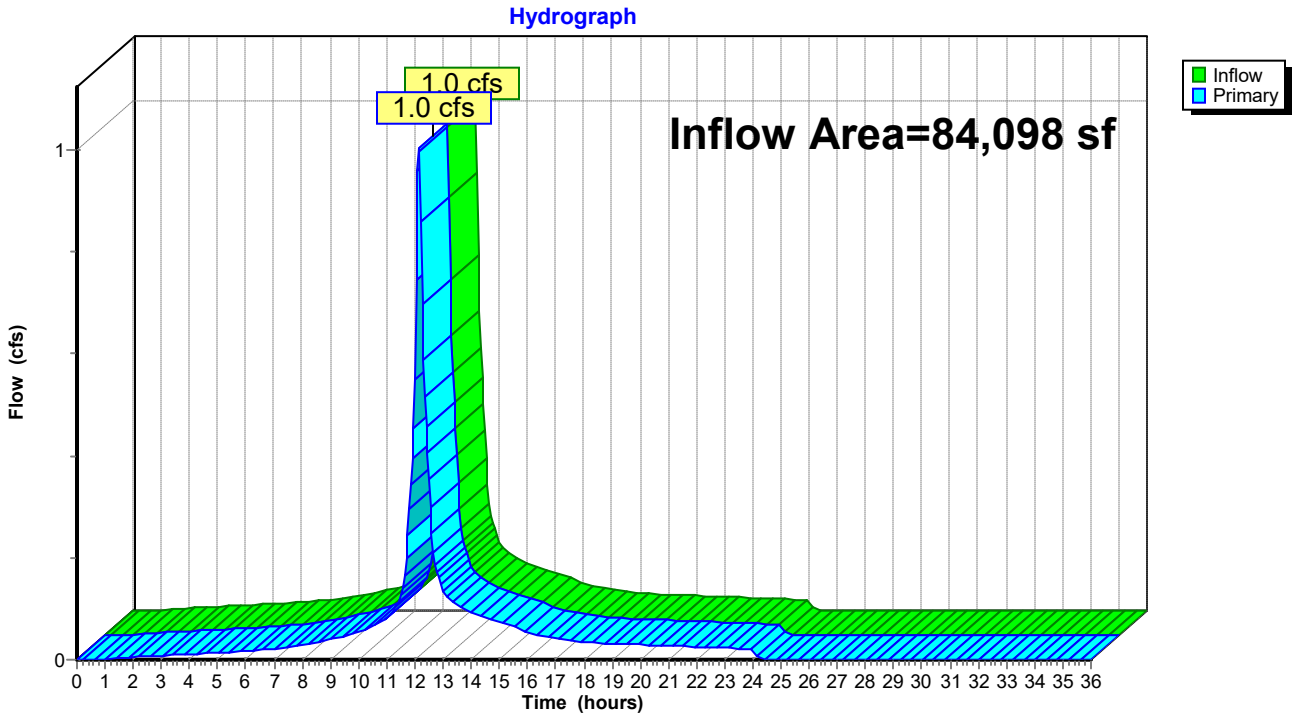


Summary for Link DP-1: Offsite to Northeast

Inflow Area = 84,098 sf, 11.89% Impervious, Inflow Depth = 0.70" for 10-Year event
Inflow = 1.0 cfs @ 12.14 hrs, Volume= 4,907 cf
Primary = 1.0 cfs @ 12.14 hrs, Volume= 4,907 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link DP-1: Offsite to Northeast

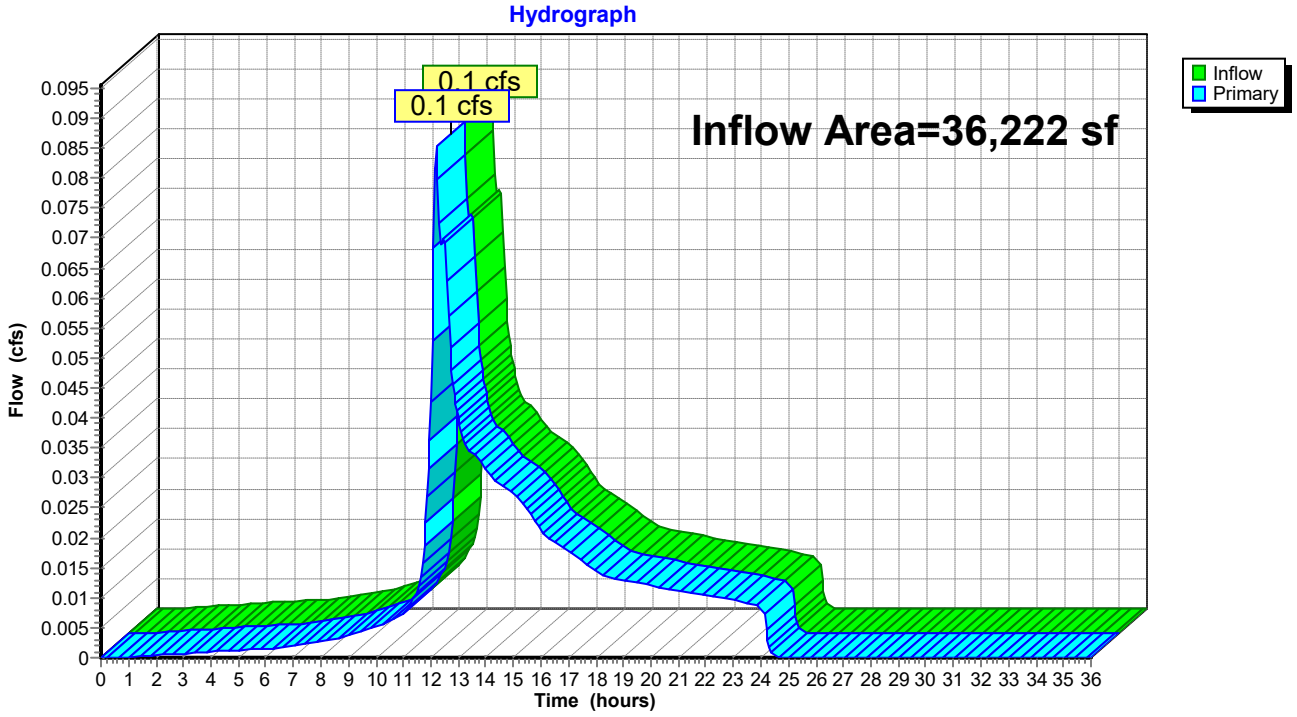


Summary for Link DP-2: Offsite to South

Inflow Area = 36,222 sf, 2.65% Impervious, Inflow Depth = 0.35" for 10-Year event
Inflow = 0.1 cfs @ 12.20 hrs, Volume= 1,052 cf
Primary = 0.1 cfs @ 12.20 hrs, Volume= 1,052 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link DP-2: Offsite to South

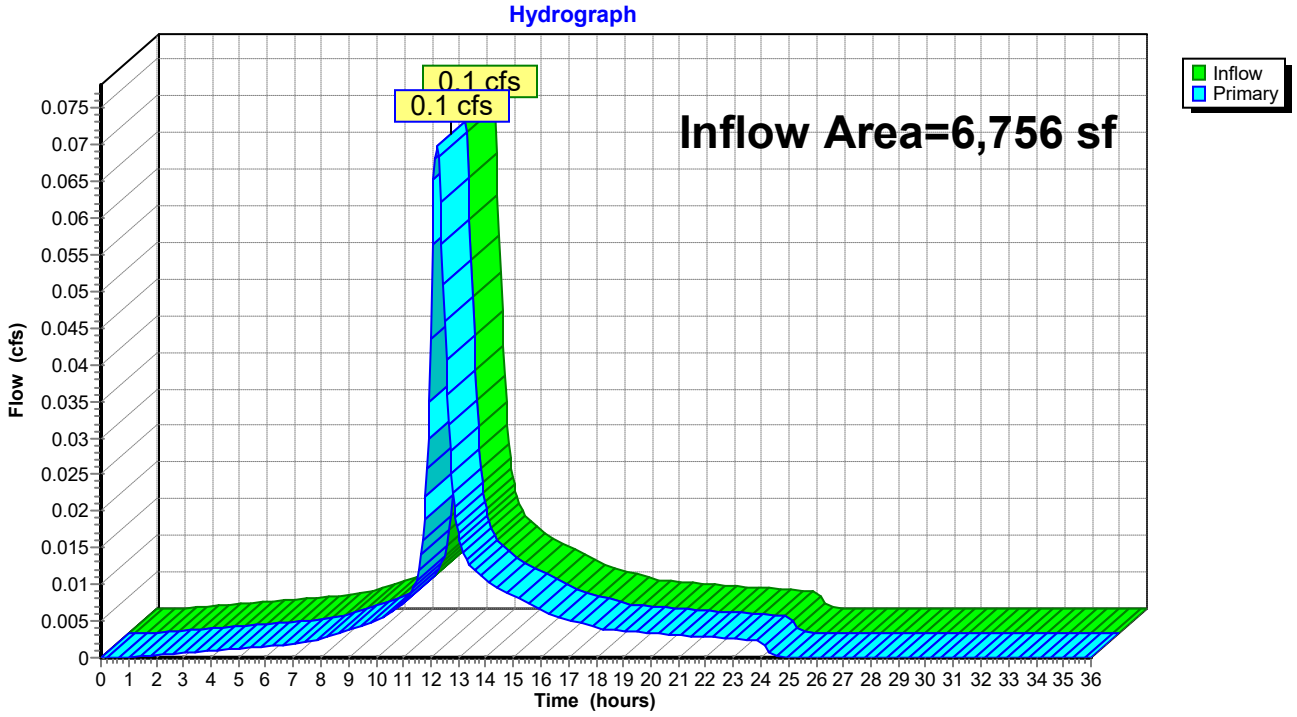


Summary for Link DP-3: Walnut Street

Inflow Area = 6,756 sf, 14.16% Impervious, Inflow Depth = 0.90" for 10-Year event
Inflow = 0.1 cfs @ 12.23 hrs, Volume= 505 cf
Primary = 0.1 cfs @ 12.23 hrs, Volume= 505 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link DP-3: Walnut Street

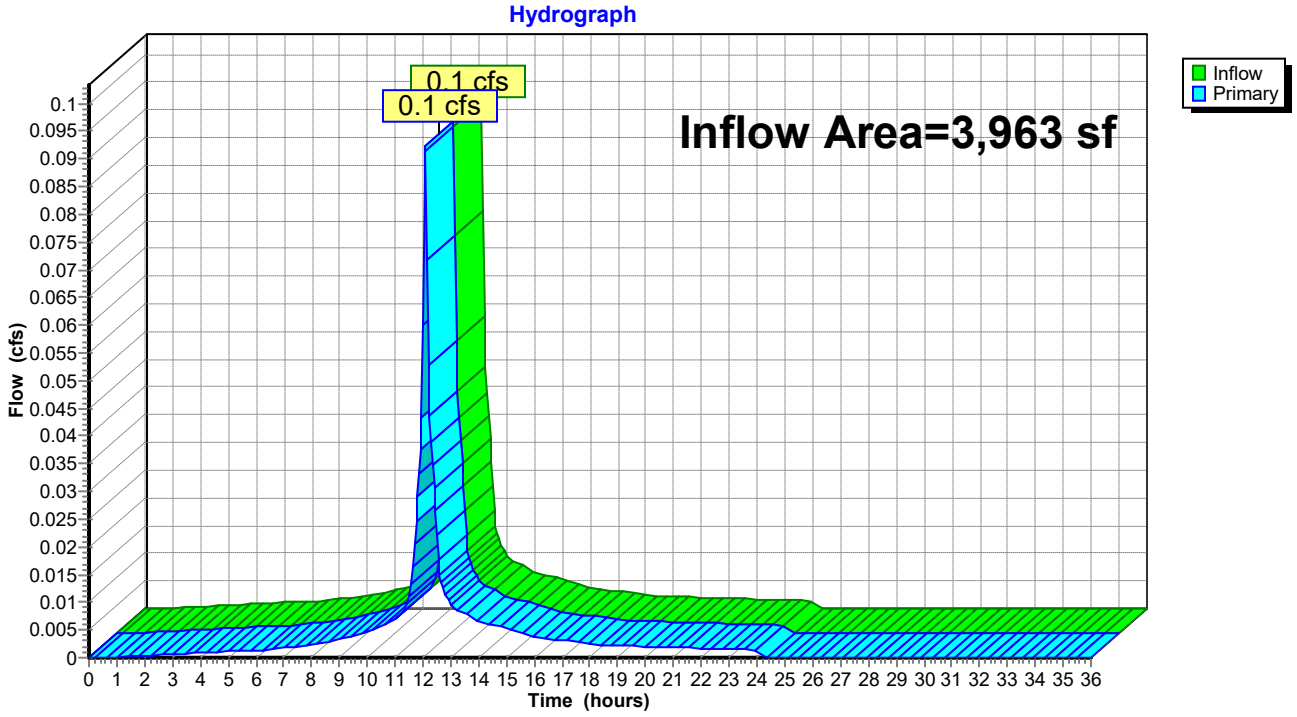


Summary for Link DP-4: Offsite to Northwest

Inflow Area = 3,963 sf, 20.57% Impervious, Inflow Depth = 1.15" for 10-Year event
Inflow = 0.1 cfs @ 12.09 hrs, Volume= 381 cf
Primary = 0.1 cfs @ 12.09 hrs, Volume= 381 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link DP-4: Offsite to Northwest



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES-1: Runoff Area=84,098 sf 11.89% Impervious Runoff Depth=1.76"
Flow Length=469' Tc=10.0 min CN=WQ Runoff=2.4 cfs 12,322 cf

Subcatchment ES-2: Runoff Area=36,222 sf 2.65% Impervious Runoff Depth=1.42"
Flow Length=281' Tc=14.6 min CN=WQ Runoff=0.7 cfs 4,293 cf

Subcatchment ES-3A: Runoff Area=4,834 sf 14.73% Impervious Runoff Depth=2.27"
Flow Length=107' Slope=0.0110 '/' Tc=19.8 min CN=WQ Runoff=0.2 cfs 915 cf

Subcatchment ES-3B: Runoff Area=497 sf 48.79% Impervious Runoff Depth=4.58"
Tc=6.0 min CN=WQ Runoff=0.0 cfs 190 cf

Subcatchment ES-3C: Runoff Area=1,425 sf 0.17% Impervious Runoff Depth=1.29"
Flow Length=39' Slope=0.0103 '/' Tc=9.0 min CN=WQ Runoff=0.0 cfs 153 cf

Subcatchment ES-4: Subcat ES-4 Runoff Area=3,963 sf 20.57% Impervious Runoff Depth=2.51"
Flow Length=71' Slope=0.1296 '/' Tc=6.0 min CN=WQ Runoff=0.2 cfs 828 cf

Link DP-1: Offsite to Northeast Inflow=2.4 cfs 12,322 cf
Primary=2.4 cfs 12,322 cf

Link DP-2: Offsite to South Inflow=0.7 cfs 4,293 cf
Primary=0.7 cfs 4,293 cf

Link DP-3: Walnut Street Inflow=0.2 cfs 1,258 cf
Primary=0.2 cfs 1,258 cf

Link DP-4: Offsite to Northwest Inflow=0.2 cfs 828 cf
Primary=0.2 cfs 828 cf

Total Runoff Area = 131,039 sf Runoff Volume = 18,701 cf Average Runoff Depth = 1.71"
90.29% Pervious = 118,309 sf 9.71% Impervious = 12,730 sf

Summary for Subcatchment ES-1:

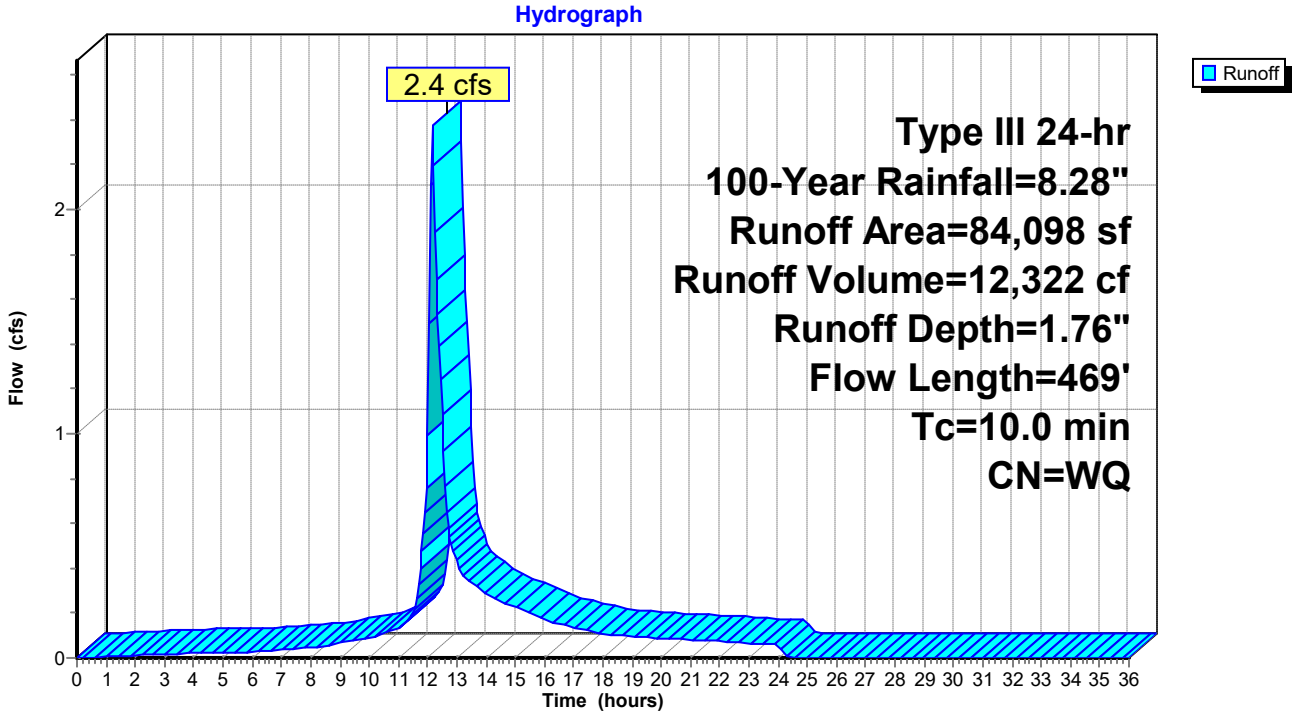
Runoff = 2.4 cfs @ 12.15 hrs, Volume= 12,322 cf, Depth= 1.76"
Routed to Link DP-1 : Offsite to Northeast

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
39,863	39	>75% Grass cover, Good, HSG A
6,325	98	Paved parking, HSG A
3,674	98	Roofs, HSG A
34,236	30	Woods, Good, HSG A
84,098		Weighted Average
74,099	35	88.11% Pervious Area
9,999	98	11.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	29	0.0207	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
0.8	71	0.0289	1.44		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
2.5	185	0.0059	1.24		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.3	184	0.2065	2.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.0	469	Total			

Subcatchment ES-1:



Summary for Subcatchment ES-2:

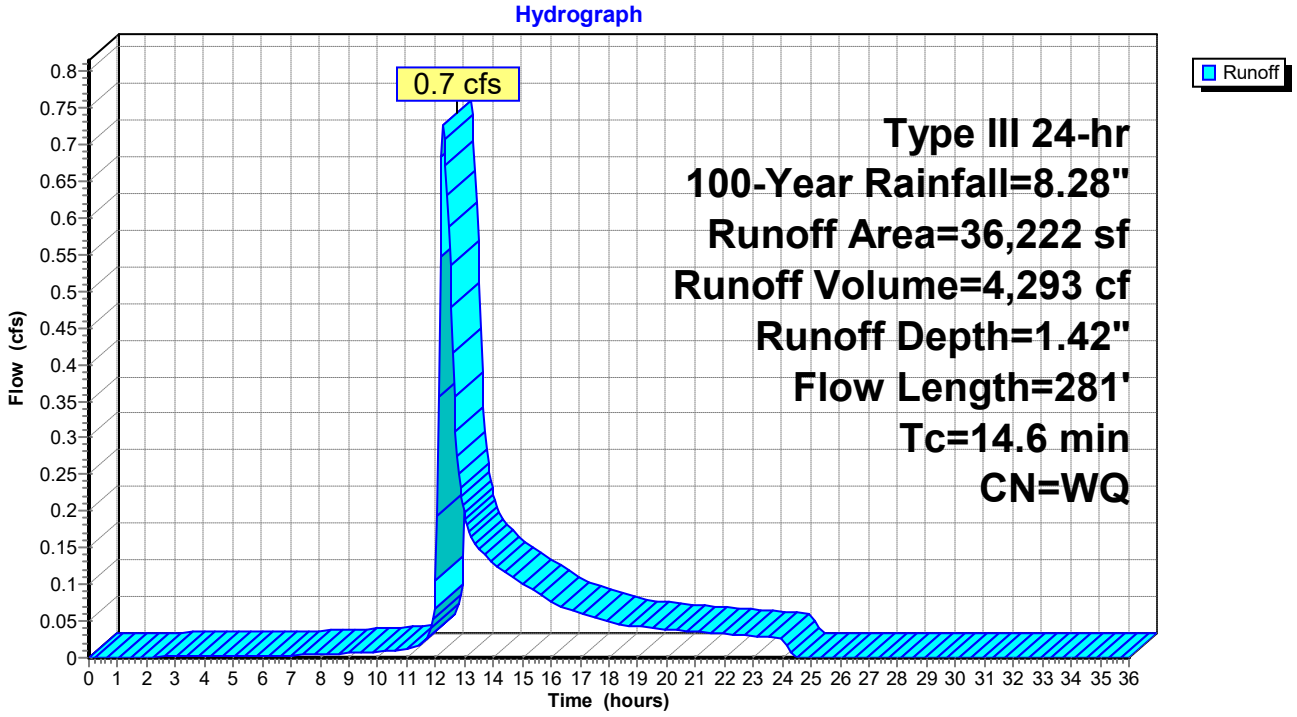
Runoff = 0.7 cfs @ 12.26 hrs, Volume= 4,293 cf, Depth= 1.42"
Routed to Link DP-2 : Offsite to South

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
33,745	39	>75% Grass cover, Good, HSG A
325	98	Paved parking, HSG A
634	98	Roofs, HSG A
1,519	30	Woods, Good, HSG A
36,222		Weighted Average
35,263	39	97.35% Pervious Area
959	98	2.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0260	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
1.3	181	0.0215	2.36		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.6	281	Total			

Subcatchment ES-2:



Summary for Subcatchment ES-3A:

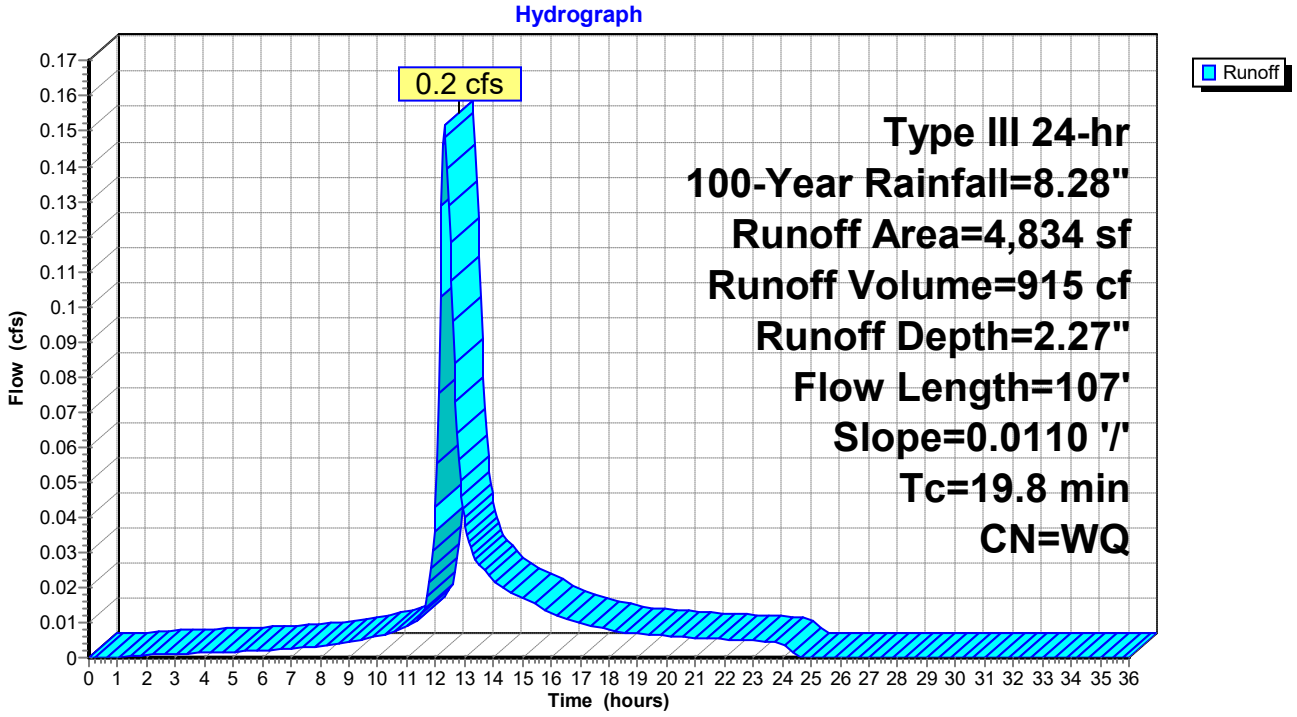
Runoff = 0.2 cfs @ 12.31 hrs, Volume= 915 cf, Depth= 2.27"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
4,122	39	>75% Grass cover, Good, HSG A
149	98	Paved parking, HSG A
562	98	Roofs, HSG A
4,834		Weighted Average
4,122	39	85.27% Pervious Area
712	98	14.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	107	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment ES-3A:



Summary for Subcatchment ES-3B:

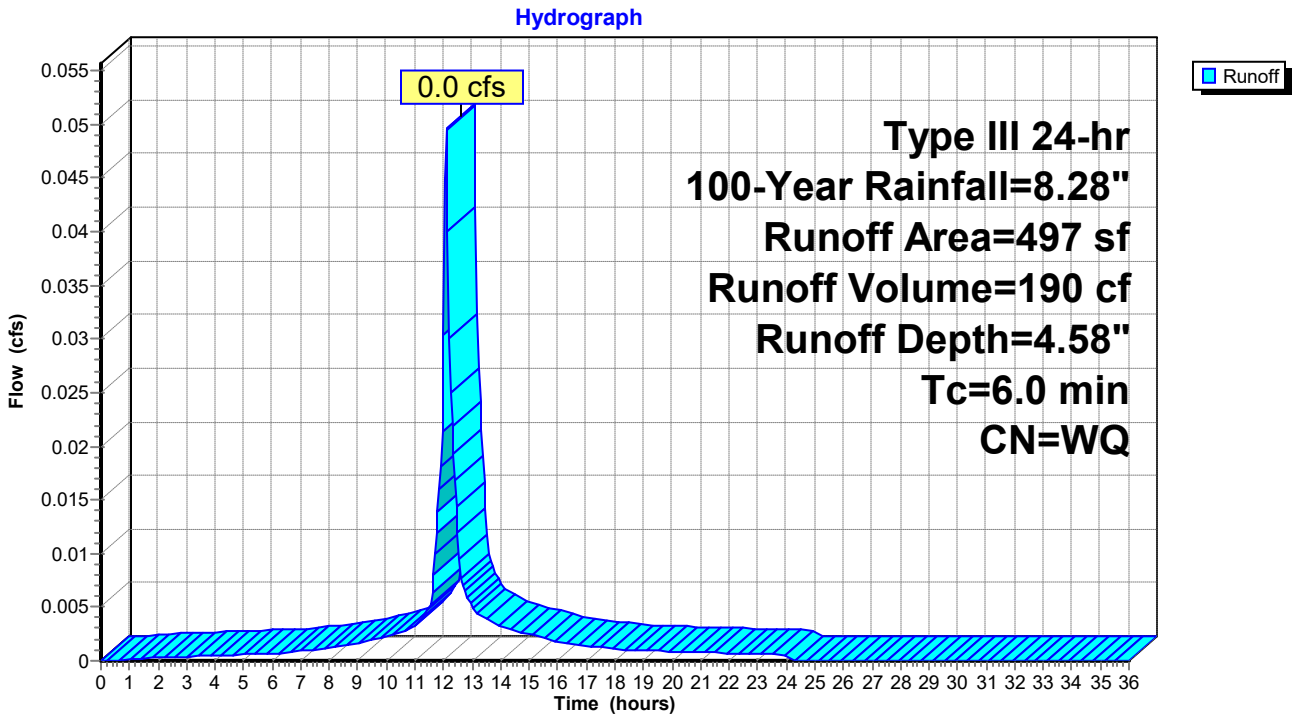
Runoff = 0.0 cfs @ 12.09 hrs, Volume= 190 cf, Depth= 4.58"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
255	39	>75% Grass cover, Good, HSG A
242	98	Roofs, HSG A
497		Weighted Average
255	39	51.21% Pervious Area
242	98	48.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment ES-3B:



Summary for Subcatchment ES-3C:

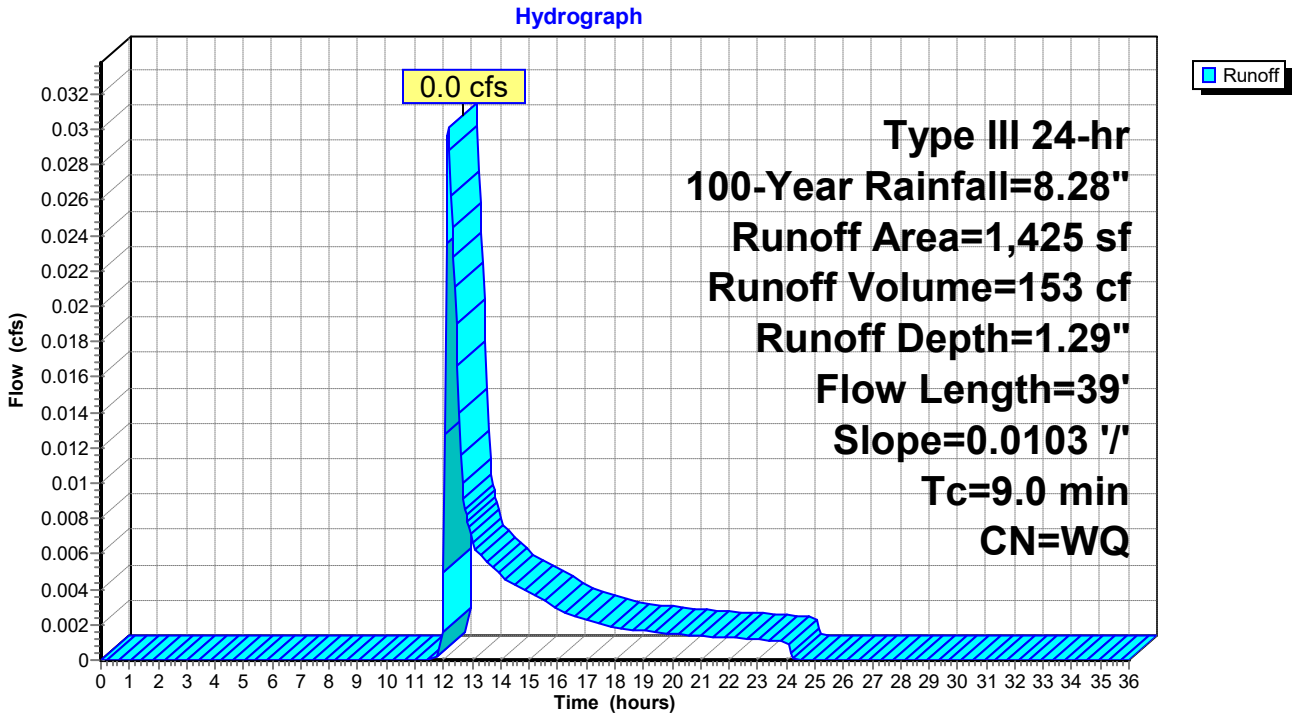
Runoff = 0.0 cfs @ 12.17 hrs, Volume= 153 cf, Depth= 1.29"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
1,422	39	>75% Grass cover, Good, HSG A
2	98	Paved parking, HSG A
1,425		Weighted Average
1,422	39	99.83% Pervious Area
2	98	0.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	39	0.0103	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment ES-3C:



Summary for Subcatchment ES-4: Subcat ES-4

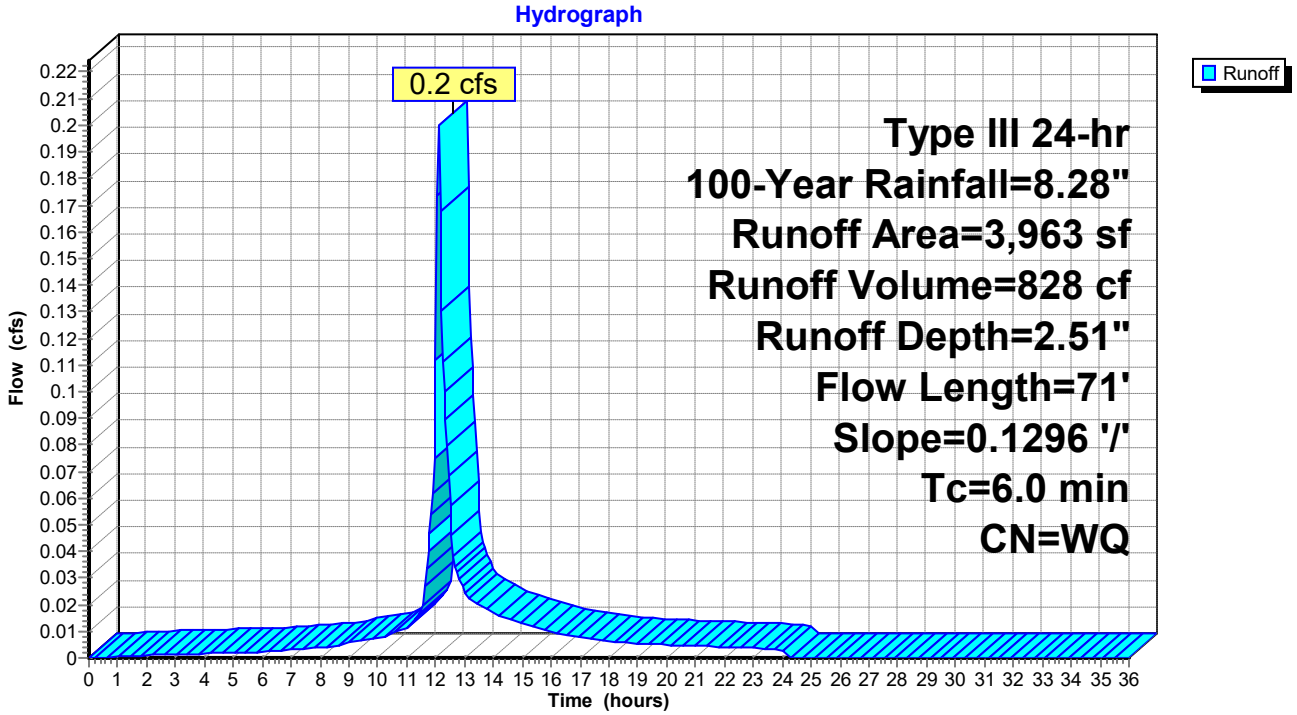
Runoff = 0.2 cfs @ 12.10 hrs, Volume= 828 cf, Depth= 2.51"
Routed to Link DP-4 : Offsite to Northwest

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
2,344	39	>75% Grass cover, Good, HSG A
211	98	Paved parking, HSG A
604	98	Roofs, HSG A
804	30	Woods, Good, HSG A
3,963		Weighted Average
3,148	37	79.43% Pervious Area
815	98	20.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	71	0.1296	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
5.3	71	Total, Increased to minimum Tc = 6.0 min			

Subcatchment ES-4: Subcat ES-4

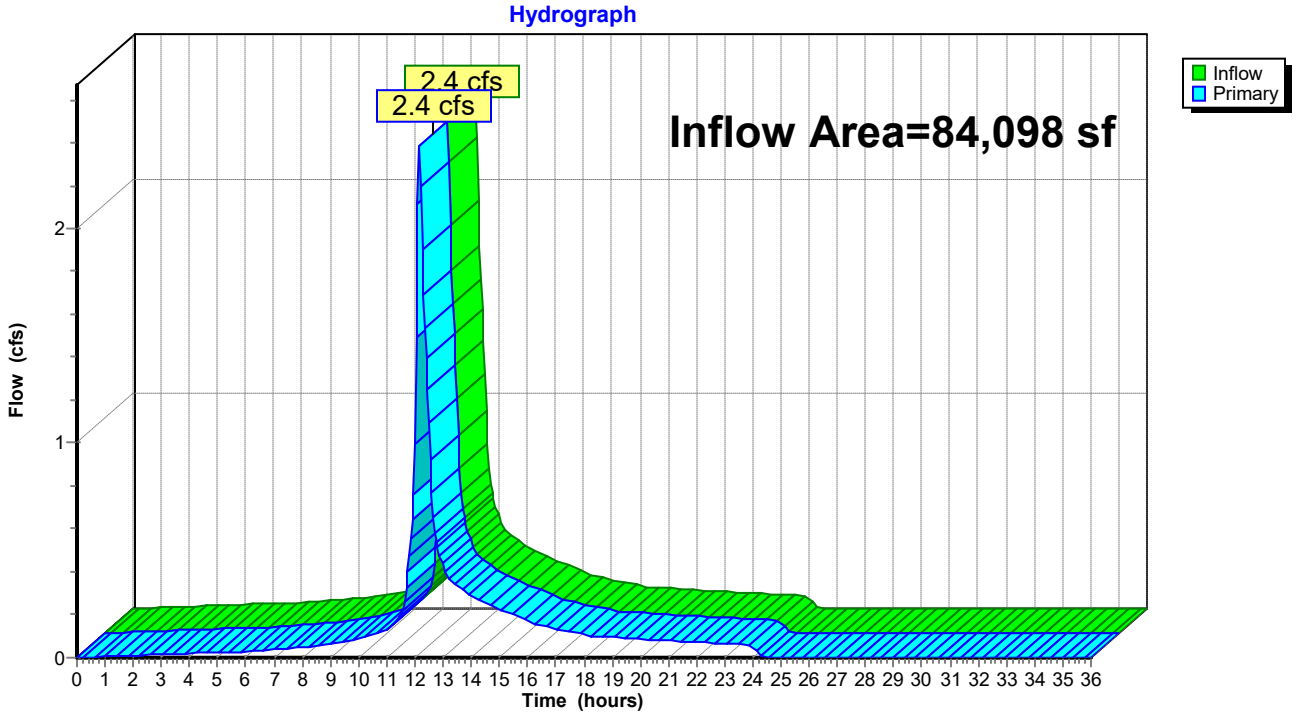


Summary for Link DP-1: Offsite to Northeast

Inflow Area = 84,098 sf, 11.89% Impervious, Inflow Depth = 1.76" for 100-Year event
Inflow = 2.4 cfs @ 12.15 hrs, Volume= 12,322 cf
Primary = 2.4 cfs @ 12.15 hrs, Volume= 12,322 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link DP-1: Offsite to Northeast

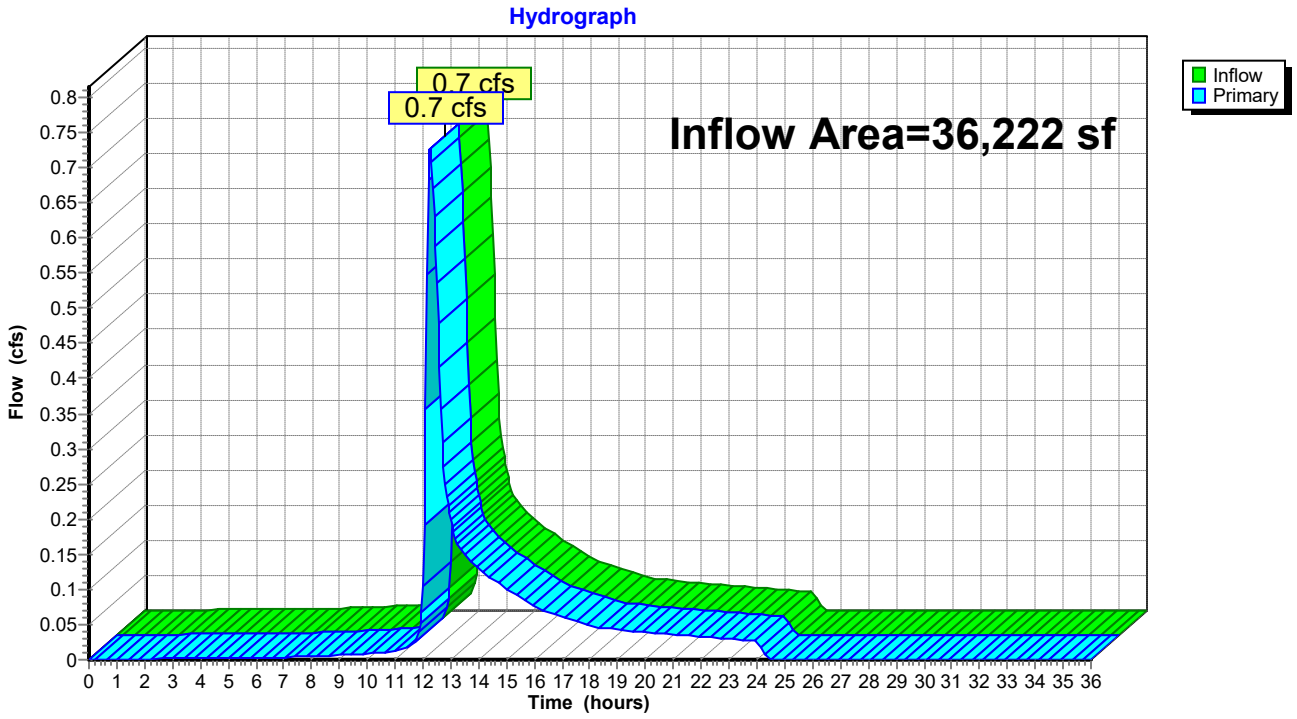


Summary for Link DP-2: Offsite to South

Inflow Area = 36,222 sf, 2.65% Impervious, Inflow Depth = 1.42" for 100-Year event
Inflow = 0.7 cfs @ 12.26 hrs, Volume= 4,293 cf
Primary = 0.7 cfs @ 12.26 hrs, Volume= 4,293 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link DP-2: Offsite to South

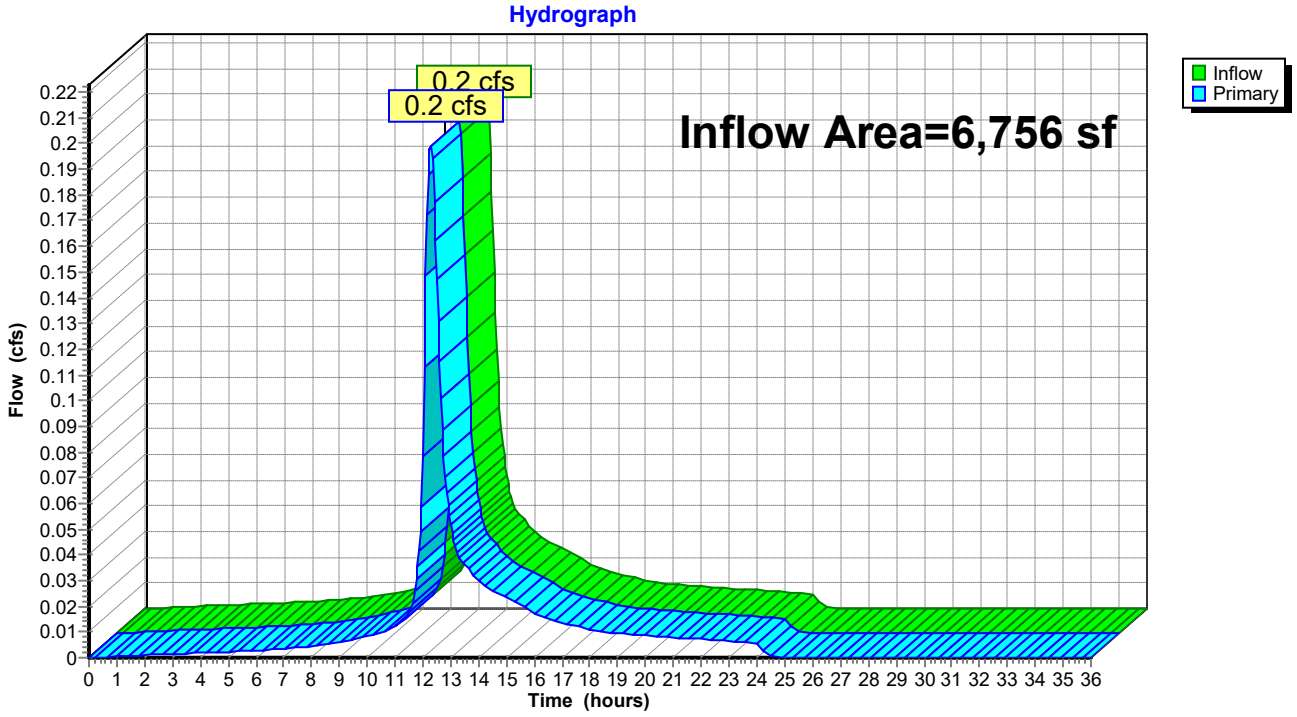


Summary for Link DP-3: Walnut Street

Inflow Area = 6,756 sf, 14.16% Impervious, Inflow Depth = 2.23" for 100-Year event
Inflow = 0.2 cfs @ 12.28 hrs, Volume= 1,258 cf
Primary = 0.2 cfs @ 12.28 hrs, Volume= 1,258 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link DP-3: Walnut Street

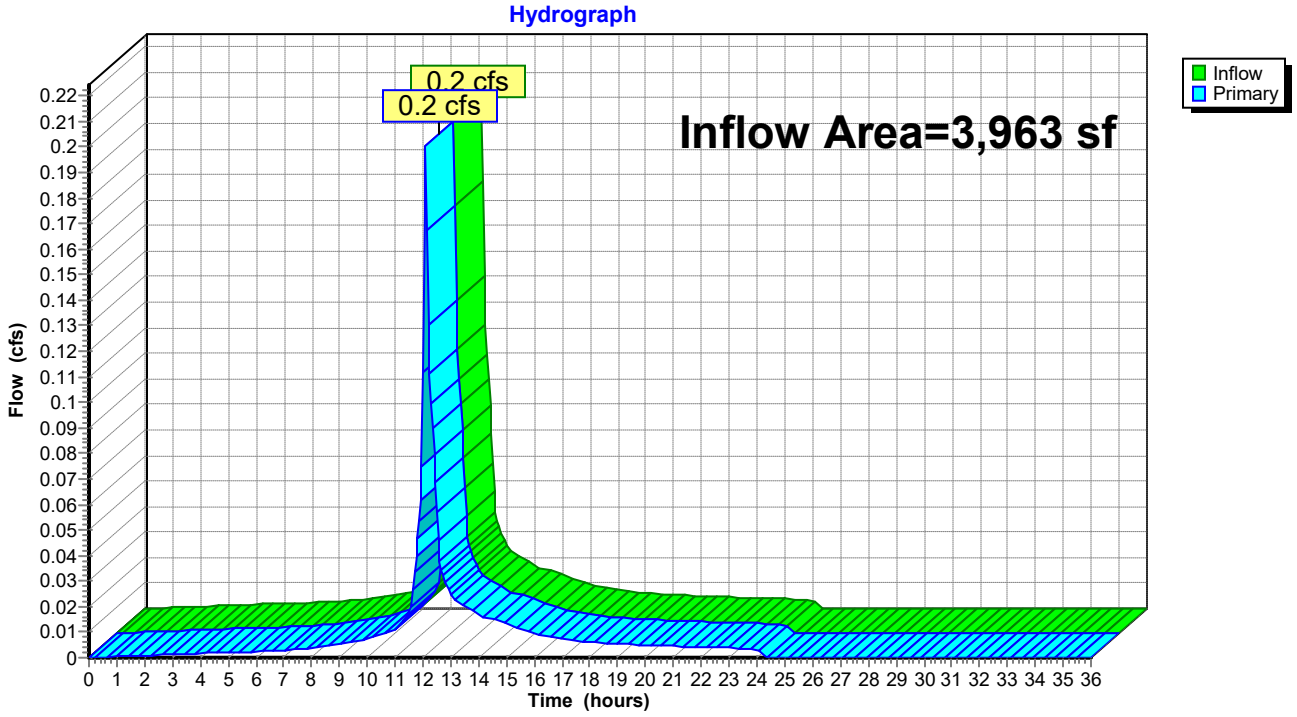


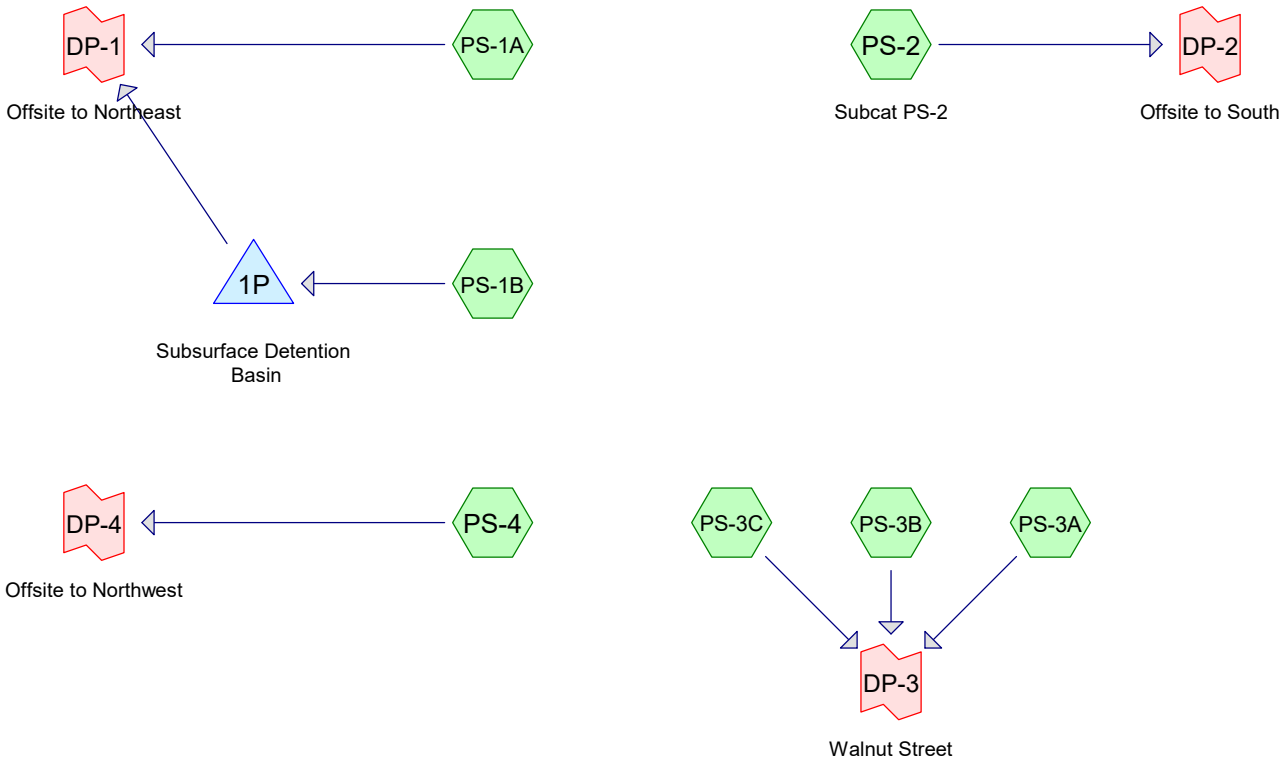
Summary for Link DP-4: Offsite to Northwest

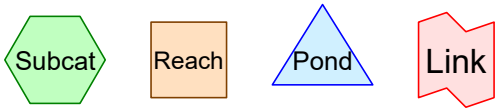
Inflow Area = 3,963 sf, 20.57% Impervious, Inflow Depth = 2.51" for 100-Year event
Inflow = 0.2 cfs @ 12.10 hrs, Volume= 828 cf
Primary = 0.2 cfs @ 12.10 hrs, Volume= 828 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link DP-4: Offsite to Northwest







Routing Diagram for 220627 - POST
Prepared by R Levesque Associates
HydroCAD® 10.20-8a s/n 13073 © 2025 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.19	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.16	2
3	100-Year	Type III 24-hr		Default	24.00	1	8.28	2

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS-1A: Runoff Area=31,504 sf 0.61% Impervious Runoff Depth=0.02"
Flow Length=174' Tc=10.8 min CN=WQ Runoff=0.0 cfs 48 cf

Subcatchment PS-1B: Runoff Area=74,573 sf 48.17% Impervious Runoff Depth=1.42"
Flow Length=217' Tc=6.7 min CN=WQ Runoff=2.5 cfs 8,855 cf

Subcatchment PS-2: Subcat PS-2 Runoff Area=14,243 sf 9.63% Impervious Runoff Depth=0.29"
Flow Length=92' Slope=0.0440 '/' Tc=10.1 min CN=WQ Runoff=0.1 cfs 338 cf

Subcatchment PS-3A: Runoff Area=4,834 sf 14.73% Impervious Runoff Depth=0.44"
Flow Length=107' Slope=0.0110 '/' Tc=19.8 min CN=WQ Runoff=0.0 cfs 176 cf

Subcatchment PS-3B: Runoff Area=497 sf 48.79% Impervious Runoff Depth=1.44"
Tc=6.0 min CN=WQ Runoff=0.0 cfs 60 cf

Subcatchment PS-3C: Runoff Area=1,425 sf 0.17% Impervious Runoff Depth=0.01"
Flow Length=39' Slope=0.0103 '/' Tc=9.0 min CN=WQ Runoff=0.0 cfs 1 cf

Subcatchment PS-4: Runoff Area=3,963 sf 20.57% Impervious Runoff Depth=0.61"
Flow Length=71' Slope=0.1296 '/' Tc=6.0 min CN=WQ Runoff=0.1 cfs 201 cf

Pond 1P: Subsurface Detention Basin Peak Elev=103.16' Storage=2,860 cf Inflow=2.5 cfs 8,855 cf
Outflow=0.5 cfs 8,855 cf

Link DP-1: Offsite to Northeast Inflow=0.5 cfs 8,902 cf
Primary=0.5 cfs 8,902 cf

Link DP-2: Offsite to South Inflow=0.1 cfs 338 cf
Primary=0.1 cfs 338 cf

Link DP-3: Walnut Street Inflow=0.0 cfs 236 cf
Primary=0.0 cfs 236 cf

Link DP-4: Offsite to Northwest Inflow=0.1 cfs 201 cf
Primary=0.1 cfs 201 cf

Total Runoff Area = 131,039 sf Runoff Volume = 9,677 cf Average Runoff Depth = 0.89"
70.04% Pervious = 91,779 sf 29.96% Impervious = 39,260 sf

Summary for Subcatchment PS-1A:

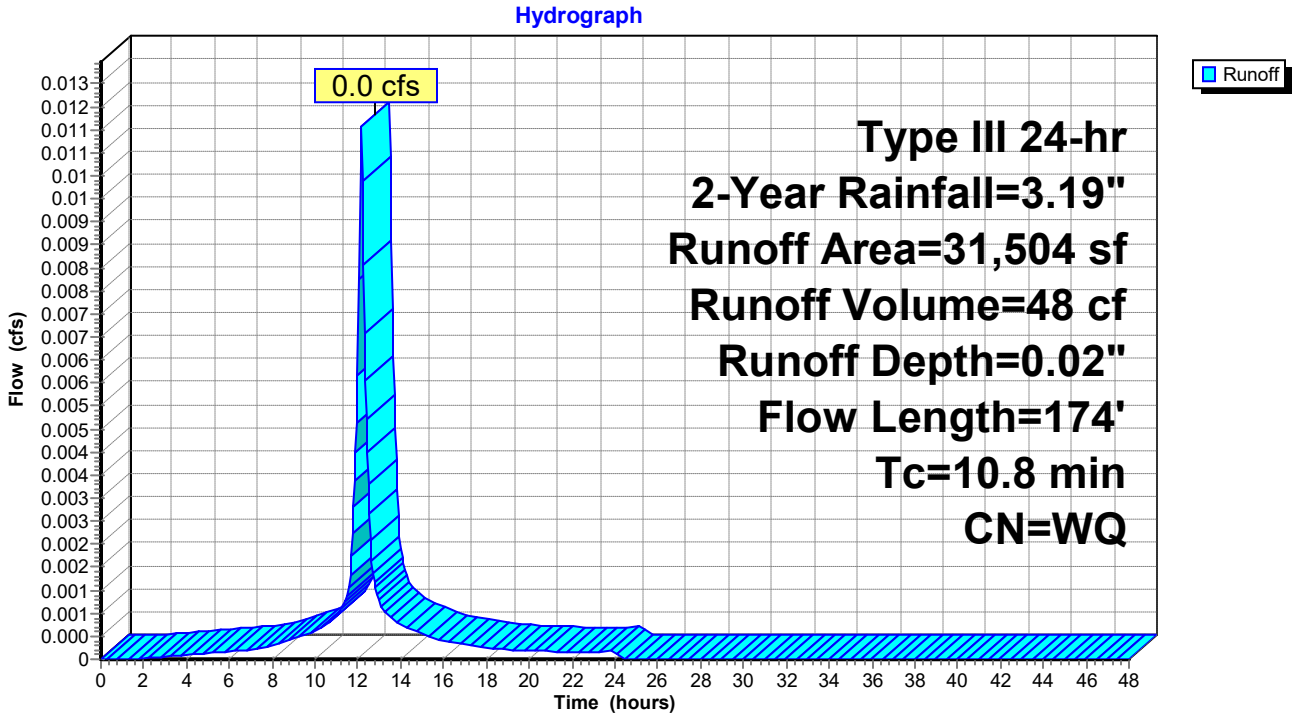
Runoff = 0.0 cfs @ 12.15 hrs, Volume= 48 cf, Depth= 0.02"
Routed to Link DP-1 : Offsite to Northeast

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
10,927	39	>75% Grass cover, Good, HSG A
192	98	Paved parking, HSG A
20,385	30	Woods, Good, HSG A
31,504		Weighted Average
31,312	33	99.39% Pervious Area
192	98	0.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.1500	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
0.7	36	0.0278	0.83		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	38	0.6053	3.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.8	174	Total			

Subcatchment PS-1A:



Summary for Subcatchment PS-1B:

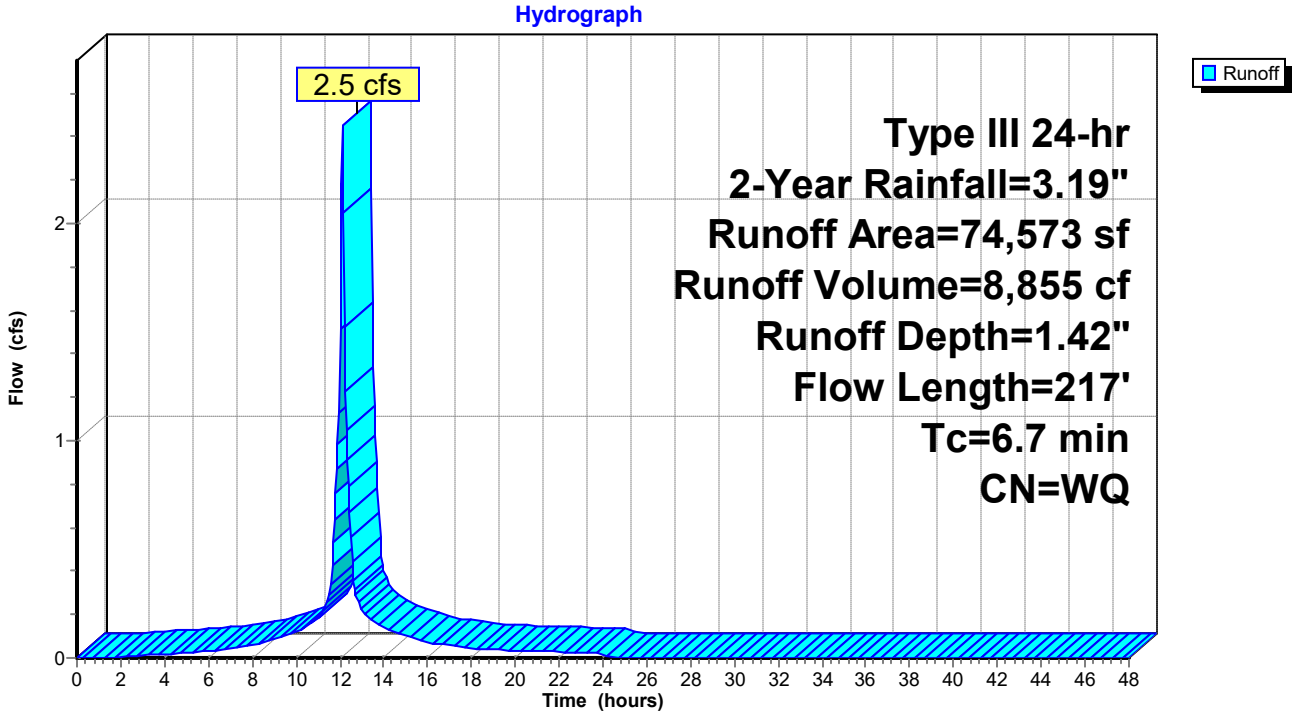
Runoff = 2.5 cfs @ 12.10 hrs, Volume= 8,855 cf, Depth= 1.42"
Routed to Pond 1P : Subsurface Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
37,767	39	>75% Grass cover, Good, HSG A
28,686	98	Paved parking, HSG A
7,238	98	Roofs, HSG A
882	30	Woods, Good, HSG A
74,573		Weighted Average
38,649	39	51.83% Pervious Area
35,924	98	48.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	29	0.0207	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
0.4	25	0.0260	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.8	132	0.0181	2.73		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	31	0.0100	4.54	3.56	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
6.7	217	Total			

Subcatchment PS-1B:



Summary for Subcatchment PS-2: Subcat PS-2

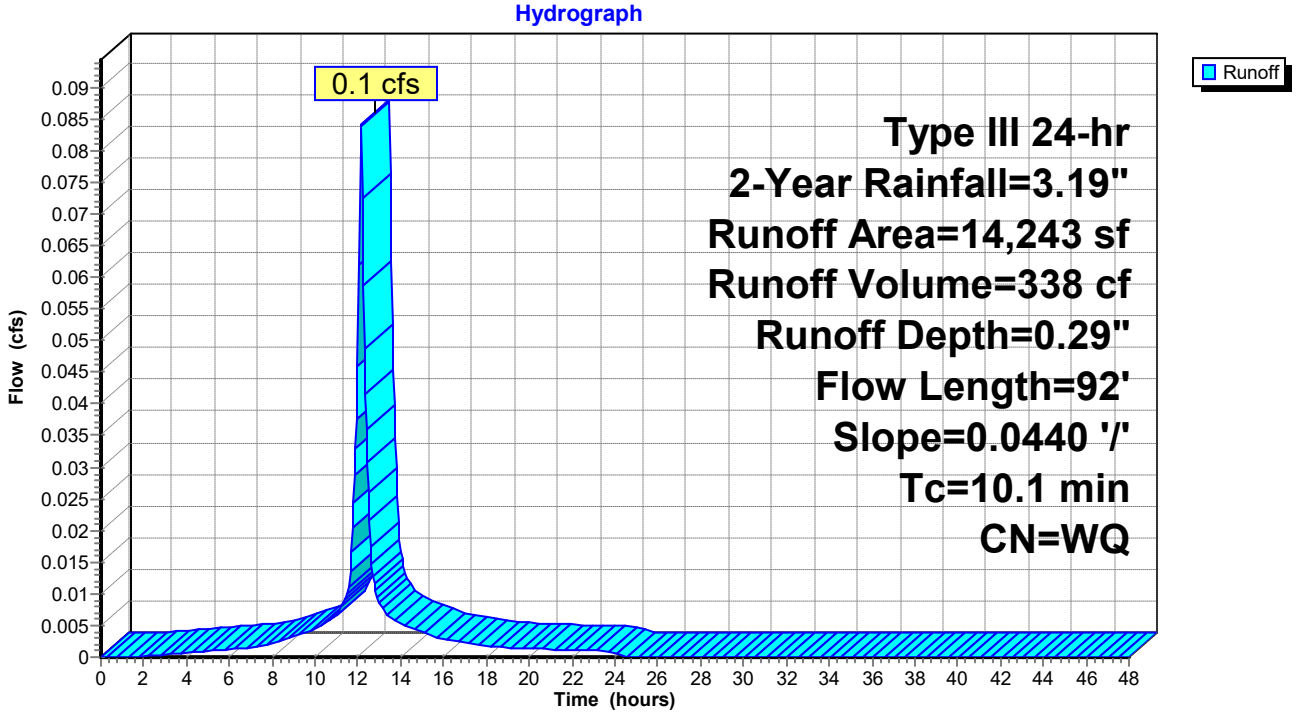
Runoff = 0.1 cfs @ 12.14 hrs, Volume= 338 cf, Depth= 0.29"
Routed to Link DP-2 : Offsite to South

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
11,589	39	>75% Grass cover, Good, HSG A
738	98	Paved parking, HSG A
634	98	Roofs, HSG A
1,282	30	Woods, Good, HSG A
14,243		Weighted Average
12,871	38	90.37% Pervious Area
1,372	98	9.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	92	0.0440	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment PS-2: Subcat PS-2



Summary for Subcatchment PS-3A:

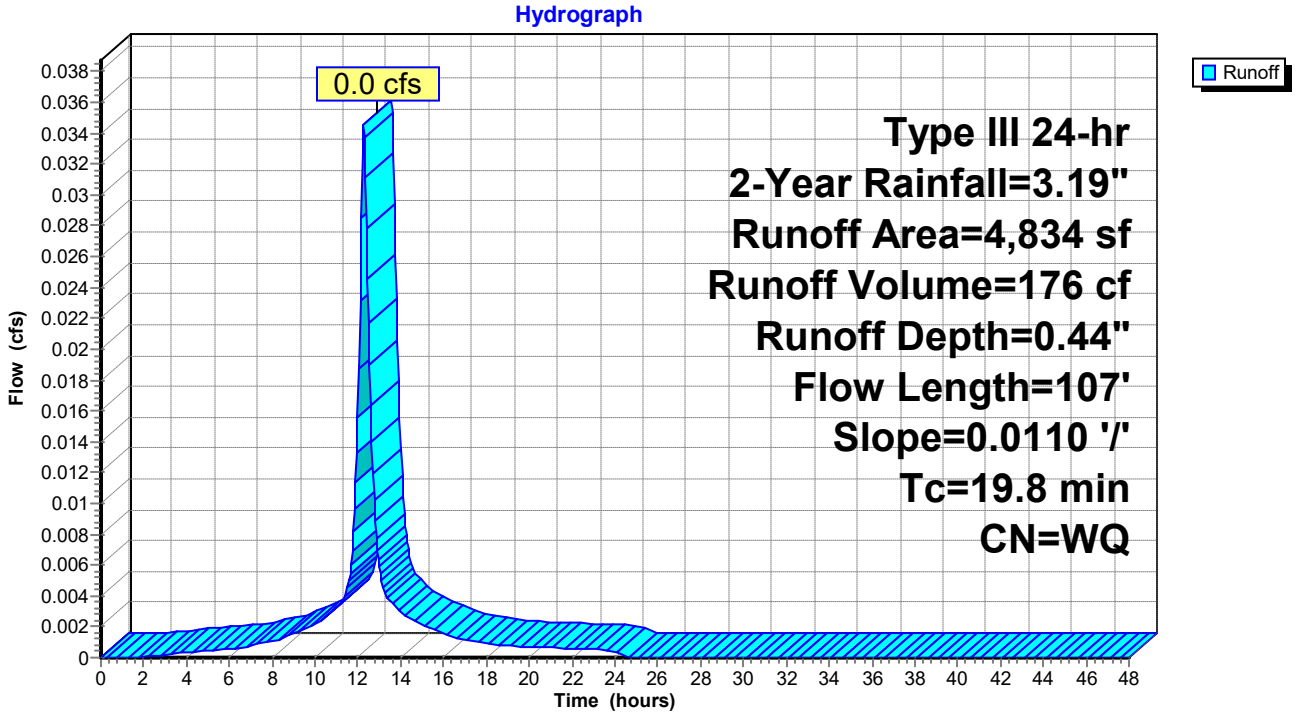
Runoff = 0.0 cfs @ 12.26 hrs, Volume= 176 cf, Depth= 0.44"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
4,122	39	>75% Grass cover, Good, HSG A
149	98	Paved parking, HSG A
562	98	Roofs, HSG A
4,834		Weighted Average
4,122	39	85.27% Pervious Area
712	98	14.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	107	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment PS-3A:



Summary for Subcatchment PS-3B:

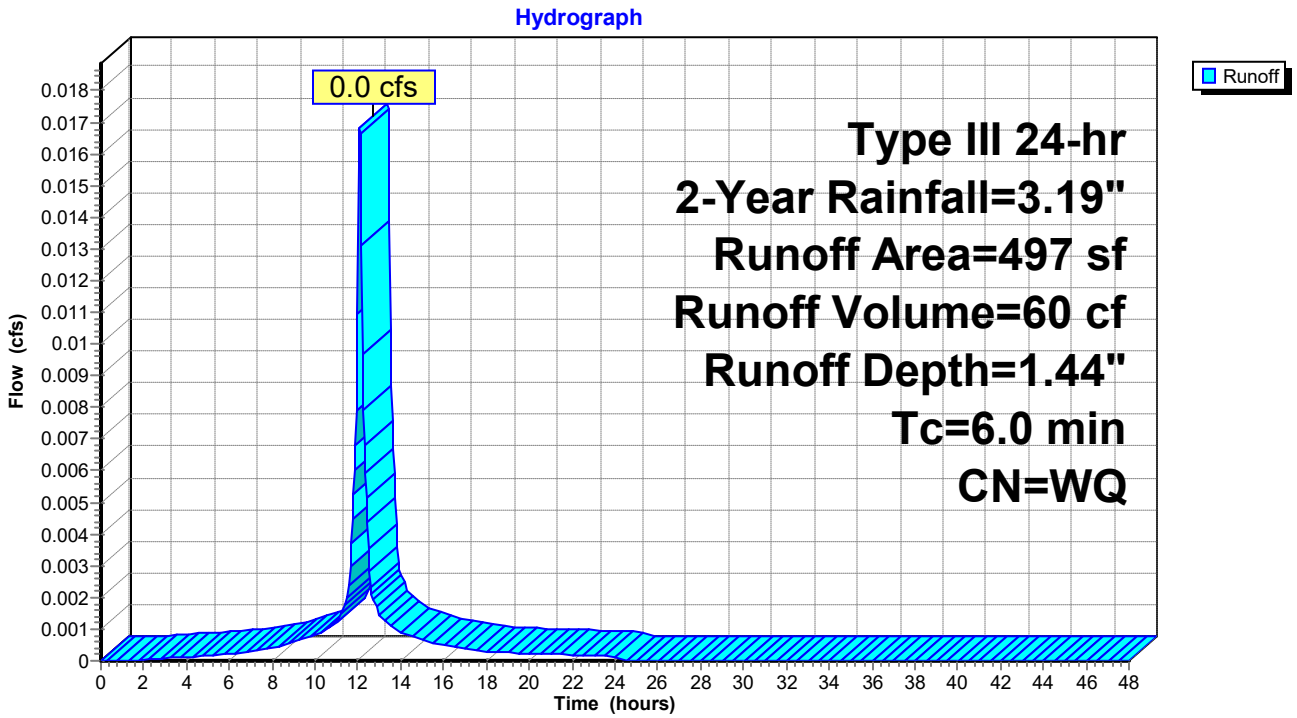
Runoff = 0.0 cfs @ 12.09 hrs, Volume= 60 cf, Depth= 1.44"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
255	39	>75% Grass cover, Good, HSG A
242	98	Roofs, HSG A
497		Weighted Average
255	39	51.21% Pervious Area
242	98	48.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PS-3B:



Summary for Subcatchment PS-3C:

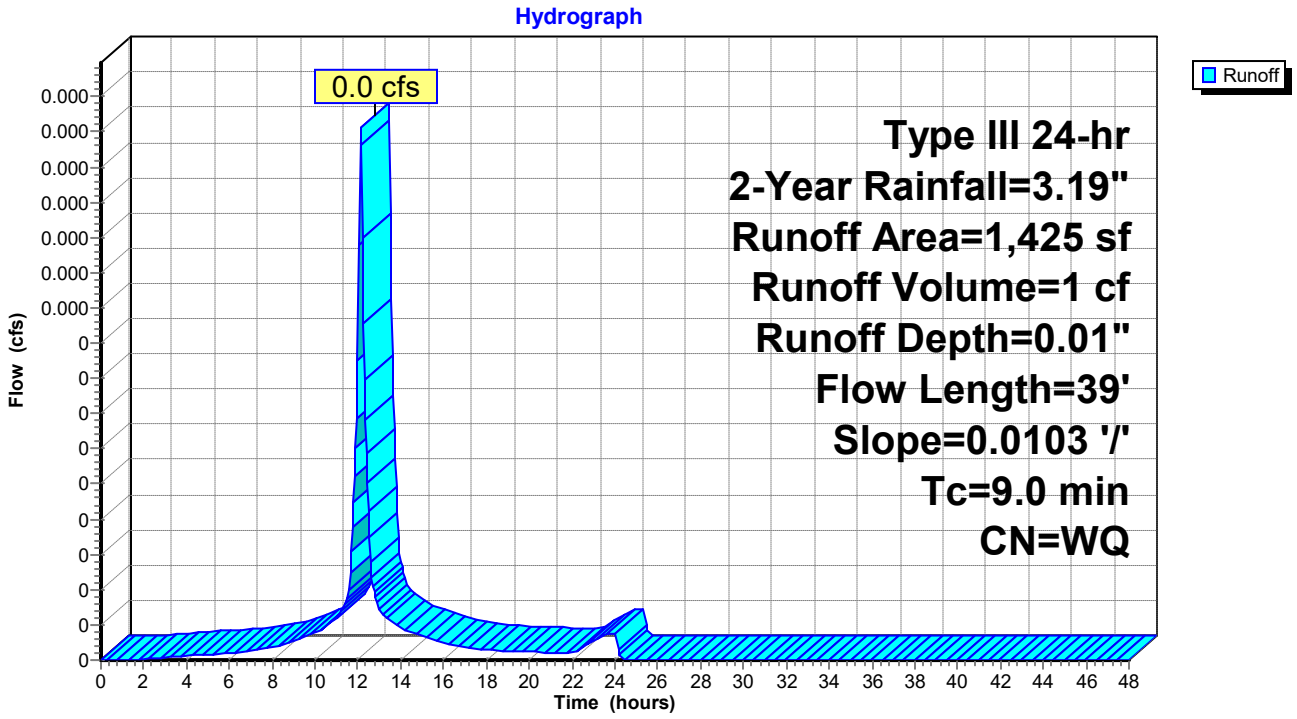
Runoff = 0.0 cfs @ 12.12 hrs, Volume= 1 cf, Depth= 0.01"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
1,422	39	>75% Grass cover, Good, HSG A
2	98	Paved parking, HSG A
1,425		Weighted Average
1,422	39	99.83% Pervious Area
2	98	0.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	39	0.0103	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment PS-3C:



Summary for Subcatchment PS-4:

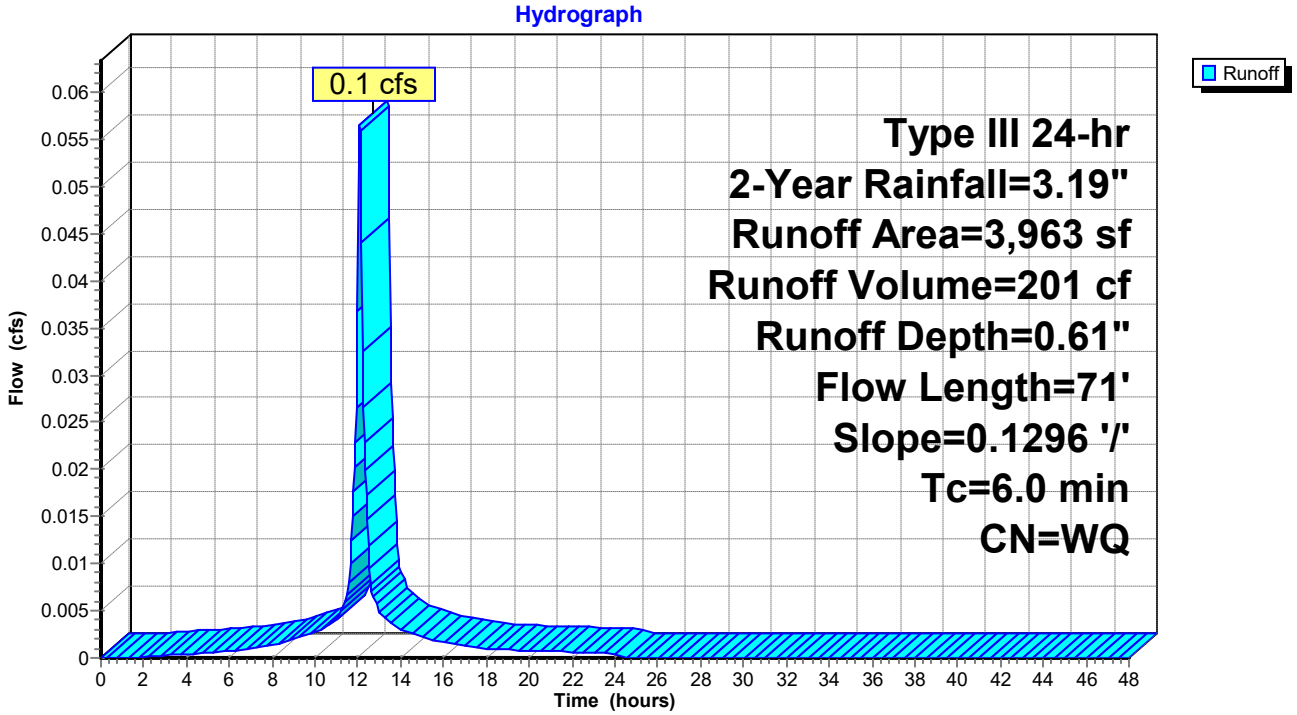
Runoff = 0.1 cfs @ 12.09 hrs, Volume= 201 cf, Depth= 0.61"
Routed to Link DP-4 : Offsite to Northwest

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.19"

Area (sf)	CN	Description
2,563	39	>75% Grass cover, Good, HSG A
211	98	Paved parking, HSG A
604	98	Roofs, HSG A
585	30	Woods, Good, HSG A
3,963		Weighted Average
3,148	37	79.43% Pervious Area
815	98	20.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	71	0.1296	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
5.3	71	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PS-4:



Summary for Pond 1P: Subsurface Detention Basin

Inflow Area = 74,573 sf, 48.17% Impervious, Inflow Depth = 1.42" for 2-Year event
Inflow = 2.5 cfs @ 12.10 hrs, Volume= 8,855 cf
Outflow = 0.5 cfs @ 12.51 hrs, Volume= 8,855 cf, Atten= 78%, Lag= 24.9 min
Primary = 0.5 cfs @ 12.51 hrs, Volume= 8,855 cf
Routed to Link DP-1 : Offsite to Northeast

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 103.16' @ 12.51 hrs Surf.Area= 3,781 sf Storage= 2,860 cf

Plug-Flow detention time= 64.9 min calculated for 8,845 cf (100% of inflow)
Center-of-Mass det. time= 65.3 min (822.4 - 757.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	102.00'	3,453 cf	**55.75'W x 67.82'L x 3.75'H Field A** 14,178 cf Overall - 5,546 cf Embedded = 8,632 cf x 40.0% Voids
#2A	102.50'	5,546 cf	**ADS_StormTech SC-800 +Cap** x 108 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 108 Chambers in 12 Rows Cap Storage= 3.4 cf x 2 x 12 rows = 82.1 cf
		8,999 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	102.00'	**12.0" Round Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 102.00' / 93.00' S= 0.0918 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	102.00'	**4.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	103.25'	**3.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	104.00'	**7.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	105.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.5 cfs @ 12.51 hrs HW=103.16' (Free Discharge)
└**1=Culvert** (Passes 0.5 cfs of 3.8 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 0.5 cfs @ 4.78 fps)
├**3=Orifice/Grate** (Controls 0.0 cfs)
├**4=Orifice/Grate** (Controls 0.0 cfs)
└**5=Sharp-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 1P: Subsurface Detention Basin - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-800 +Cap (ADS StormTech® SC-800 with cap volume)
Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf
Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap
Cap Storage= 3.4 cf x 2 x 12 rows = 82.1 cf

51.0" Wide + 3.0" Spacing = 54.0" C-C Row Spacing

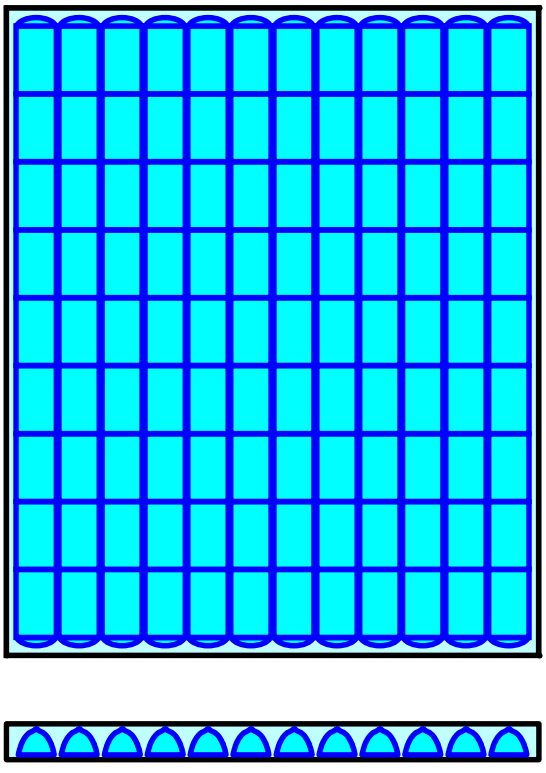
9 Chambers/Row x 7.12' Long +0.88' Cap Length x 2 = 65.82' Row Length +12.0" End Stone x 2 = 67.82' Base Length
12 Rows x 51.0" Wide + 3.0" Spacing x 11 + 12.0" Side Stone x 2 = 55.75' Base Width
6.0" Stone Base + 33.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

108 Chambers x 50.6 cf + 3.4 cf Cap Volume x 2 x 12 Rows = 5,546.0 cf Chamber Storage

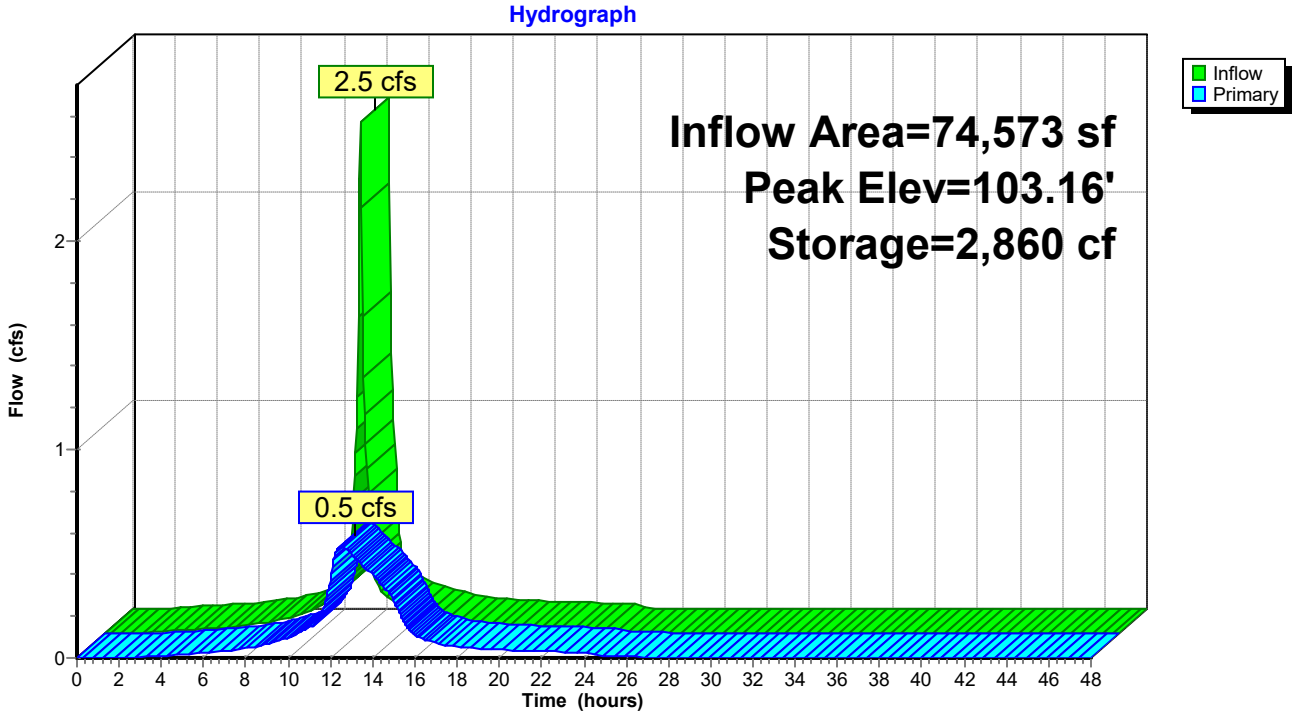
14,177.9 cf Field - 5,546.0 cf Chambers = 8,631.9 cf Stone x 40.0% Voids = 3,452.8 cf Stone Storage

Chamber Storage + Stone Storage = 8,998.8 cf = 0.207 af
Overall Storage Efficiency = 63.5%
Overall System Size = 67.82' x 55.75' x 3.75'

108 Chambers
525.1 cy Field
319.7 cy Stone



Pond 1P: Subsurface Detention Basin

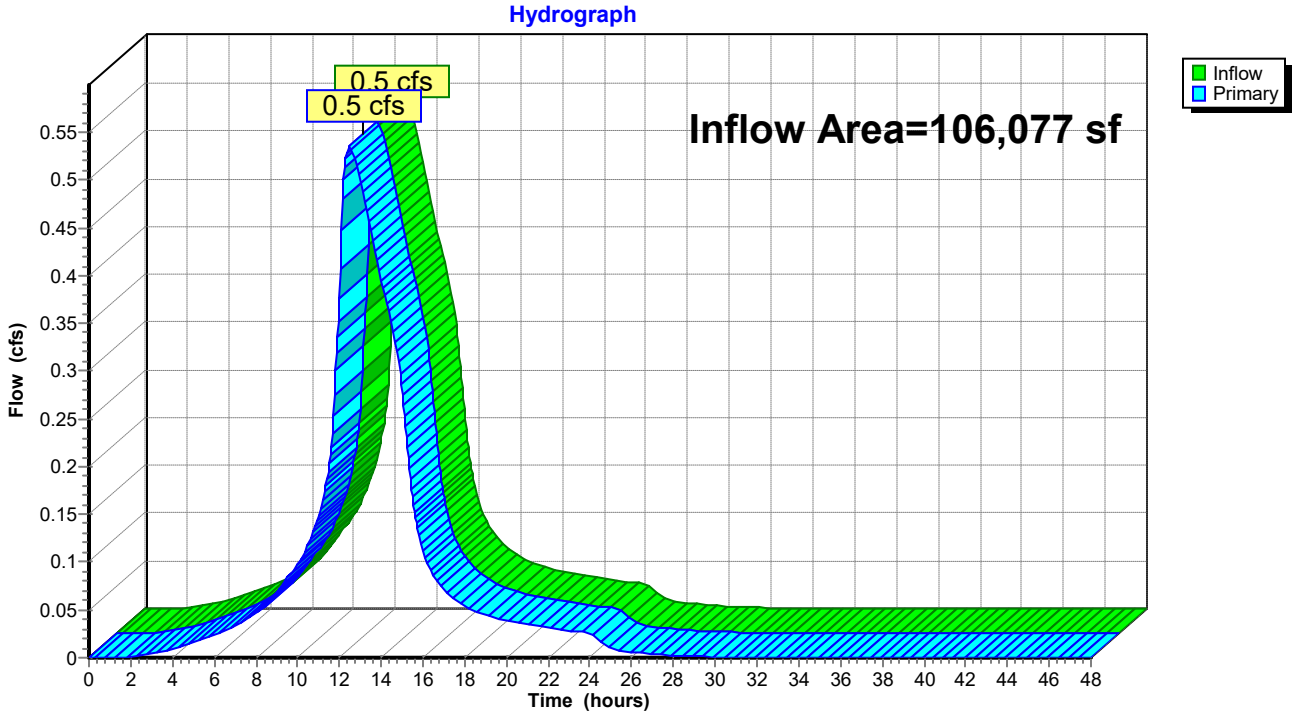


Summary for Link DP-1: Offsite to Northeast

Inflow Area = 106,077 sf, 34.05% Impervious, Inflow Depth = 1.01" for 2-Year event
Inflow = 0.5 cfs @ 12.49 hrs, Volume= 8,902 cf
Primary = 0.5 cfs @ 12.49 hrs, Volume= 8,902 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-1: Offsite to Northeast

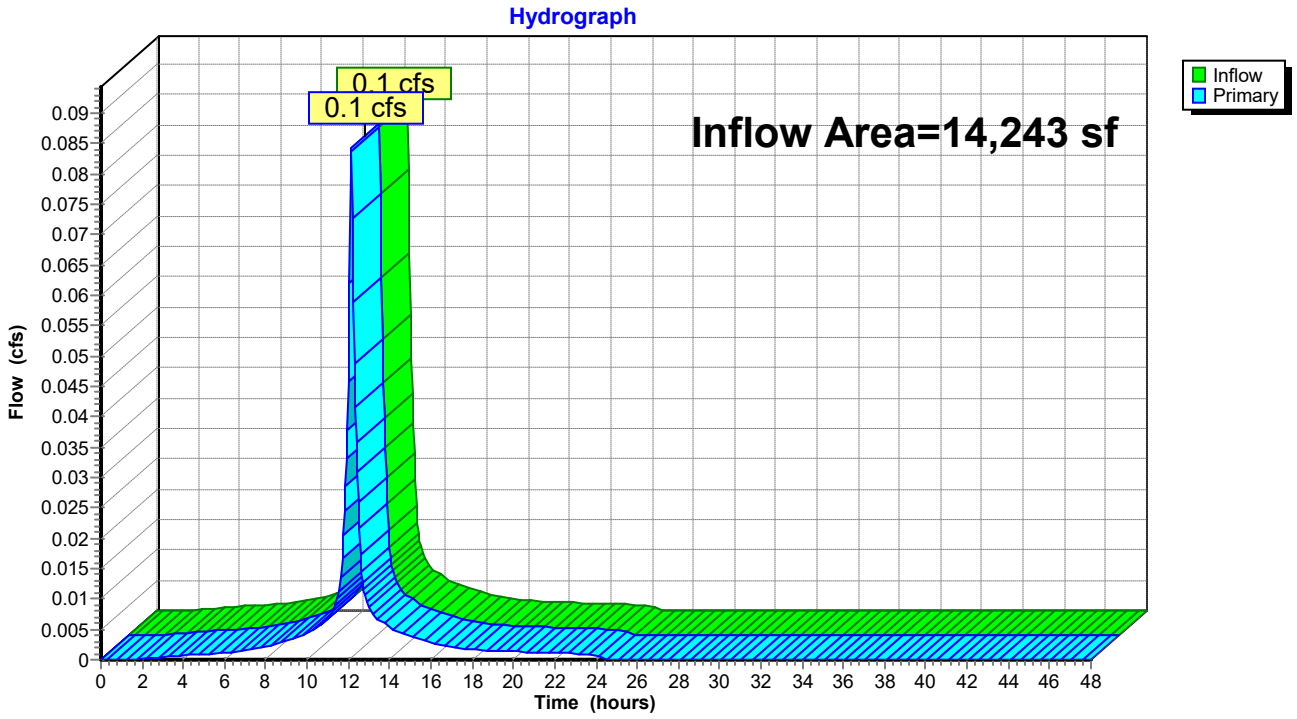


Summary for Link DP-2: Offsite to South

Inflow Area = 14,243 sf, 9.63% Impervious, Inflow Depth = 0.29" for 2-Year event
Inflow = 0.1 cfs @ 12.14 hrs, Volume= 338 cf
Primary = 0.1 cfs @ 12.14 hrs, Volume= 338 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-2: Offsite to South

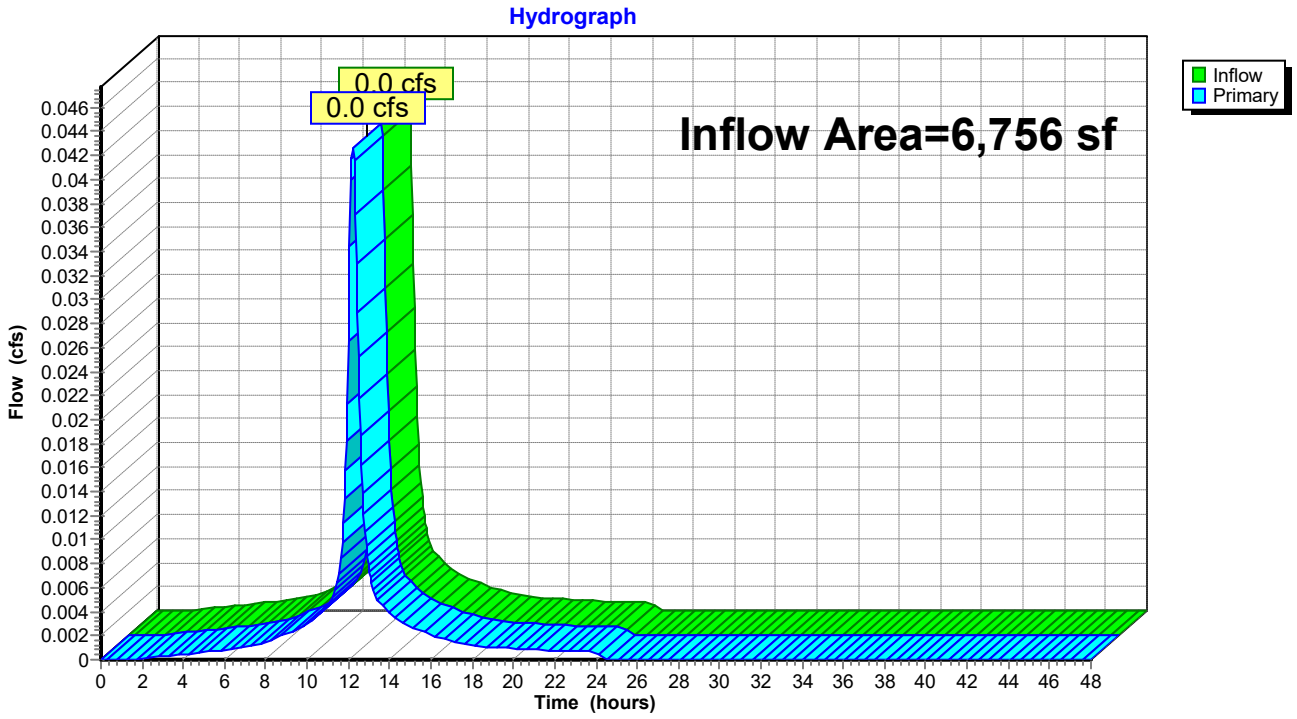


Summary for Link DP-3: Walnut Street

Inflow Area = 6,756 sf, 14.16% Impervious, Inflow Depth = 0.42" for 2-Year event
Inflow = 0.0 cfs @ 12.22 hrs, Volume= 236 cf
Primary = 0.0 cfs @ 12.22 hrs, Volume= 236 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-3: Walnut Street

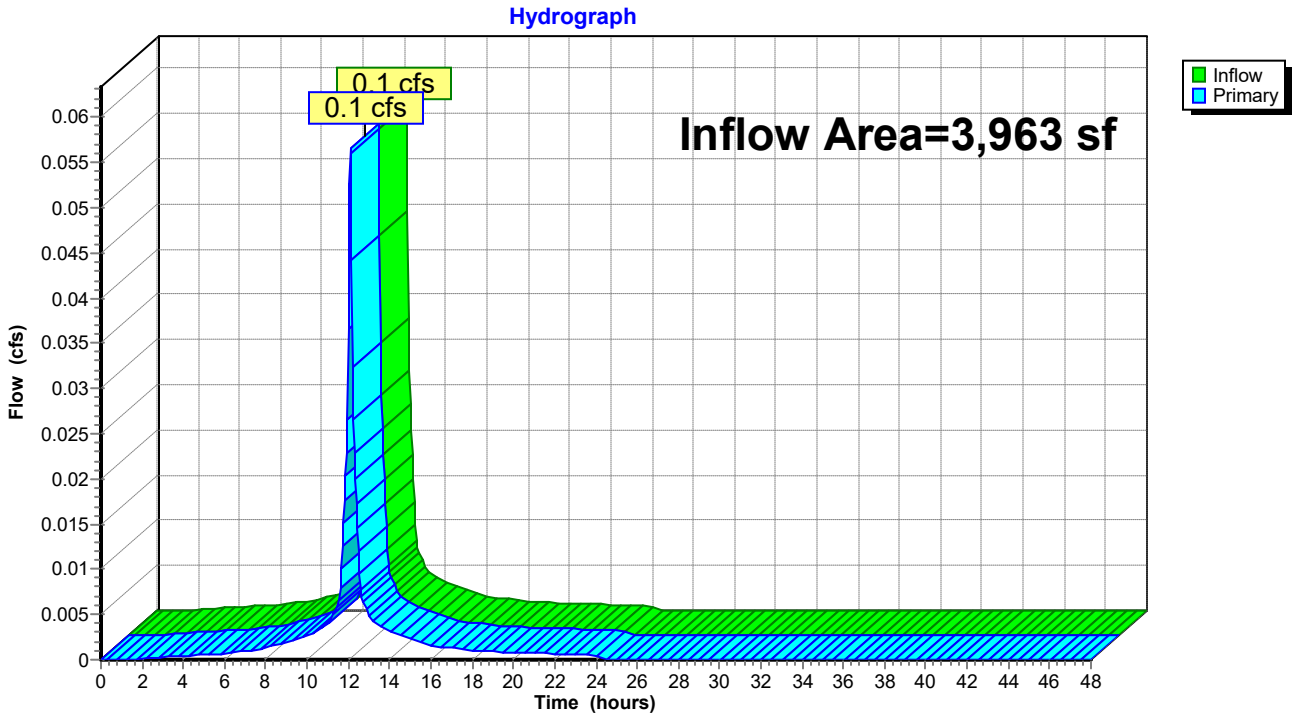


Summary for Link DP-4: Offsite to Northwest

Inflow Area = 3,963 sf, 20.57% Impervious, Inflow Depth = 0.61" for 2-Year event
Inflow = 0.1 cfs @ 12.09 hrs, Volume= 201 cf
Primary = 0.1 cfs @ 12.09 hrs, Volume= 201 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-4: Offsite to Northwest



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS-1A: Runoff Area=31,504 sf 0.61% Impervious Runoff Depth=0.12"
Flow Length=174' Tc=10.8 min CN=WQ Runoff=0.0 cfs 309 cf

Subcatchment PS-1B: Runoff Area=74,573 sf 48.17% Impervious Runoff Depth=2.49"
Flow Length=217' Tc=6.7 min CN=WQ Runoff=4.0 cfs 15,474 cf

Subcatchment PS-2: Subcat PS-2 Runoff Area=14,243 sf 9.63% Impervious Runoff Depth=0.67"
Flow Length=92' Slope=0.0440 '/' Tc=10.1 min CN=WQ Runoff=0.1 cfs 790 cf

Subcatchment PS-3A: Runoff Area=4,834 sf 14.73% Impervious Runoff Depth=0.92"
Flow Length=107' Slope=0.0110 '/' Tc=19.8 min CN=WQ Runoff=0.1 cfs 372 cf

Subcatchment PS-3B: Runoff Area=497 sf 48.79% Impervious Runoff Depth=2.52"
Tc=6.0 min CN=WQ Runoff=0.0 cfs 104 cf

Subcatchment PS-3C: Runoff Area=1,425 sf 0.17% Impervious Runoff Depth=0.24"
Flow Length=39' Slope=0.0103 '/' Tc=9.0 min CN=WQ Runoff=0.0 cfs 29 cf

Subcatchment PS-4: Runoff Area=3,963 sf 20.57% Impervious Runoff Depth=1.17"
Flow Length=71' Slope=0.1296 '/' Tc=6.0 min CN=WQ Runoff=0.1 cfs 385 cf

Pond 1P: Subsurface Detention Basin Peak Elev=103.83' Storage=4,895 cf Inflow=4.0 cfs 15,474 cf
Outflow=0.9 cfs 15,474 cf

Link DP-1: Offsite to Northeast Inflow=0.9 cfs 15,782 cf
Primary=0.9 cfs 15,782 cf

Link DP-2: Offsite to South Inflow=0.1 cfs 790 cf
Primary=0.1 cfs 790 cf

Link DP-3: Walnut Street Inflow=0.1 cfs 505 cf
Primary=0.1 cfs 505 cf

Link DP-4: Offsite to Northwest Inflow=0.1 cfs 385 cf
Primary=0.1 cfs 385 cf

Total Runoff Area = 131,039 sf Runoff Volume = 17,462 cf Average Runoff Depth = 1.60"
70.04% Pervious = 91,779 sf 29.96% Impervious = 39,260 sf

Summary for Subcatchment PS-1A:

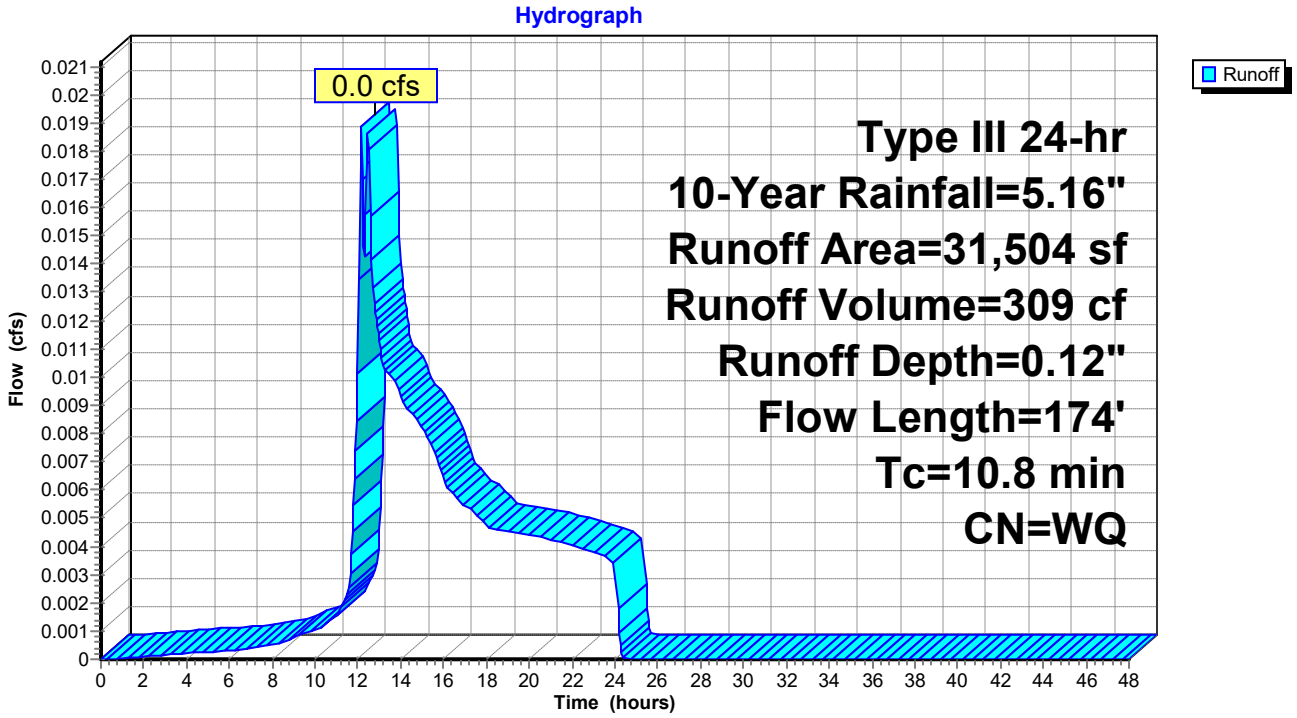
Runoff = 0.0 cfs @ 12.15 hrs, Volume= 309 cf, Depth= 0.12"
Routed to Link DP-1 : Offsite to Northeast

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
10,927	39	>75% Grass cover, Good, HSG A
192	98	Paved parking, HSG A
20,385	30	Woods, Good, HSG A
31,504		Weighted Average
31,312	33	99.39% Pervious Area
192	98	0.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.1500	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
0.7	36	0.0278	0.83		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	38	0.6053	3.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.8	174	Total			

Subcatchment PS-1A:



Summary for Subcatchment PS-1B:

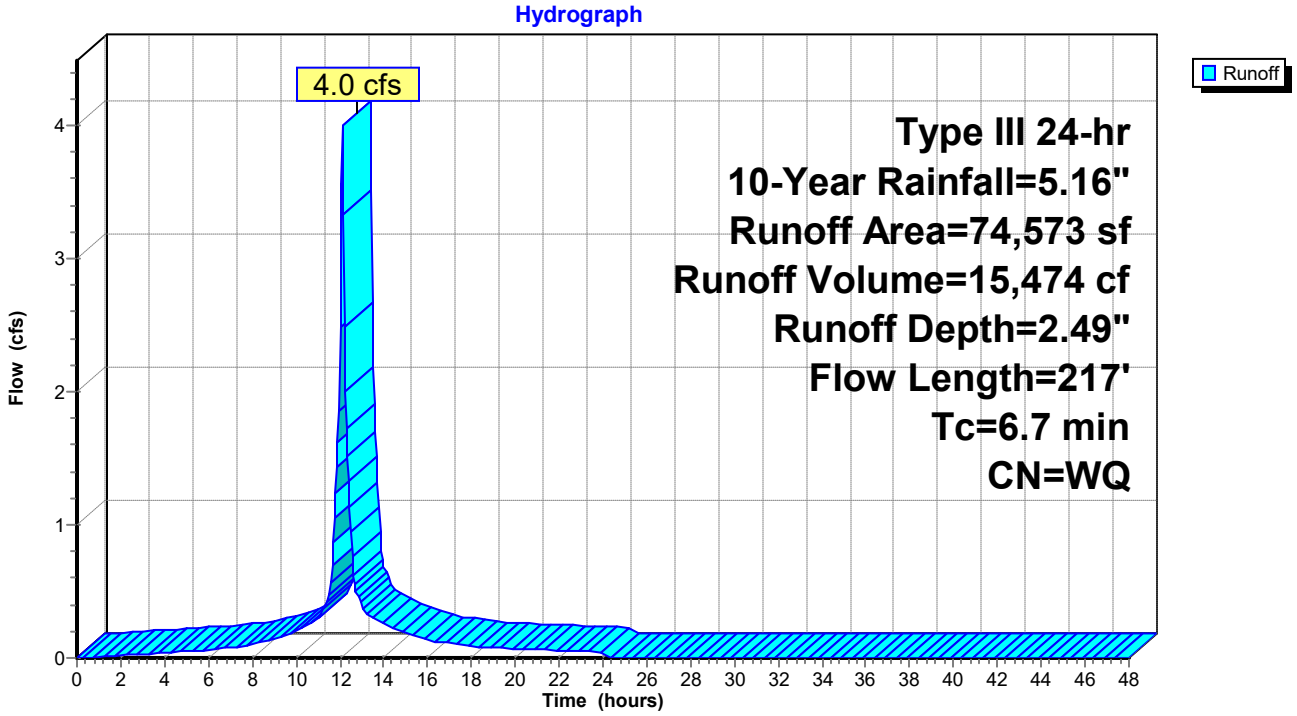
Runoff = 4.0 cfs @ 12.10 hrs, Volume= 15,474 cf, Depth= 2.49"
Routed to Pond 1P : Subsurface Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
37,767	39	>75% Grass cover, Good, HSG A
28,686	98	Paved parking, HSG A
7,238	98	Roofs, HSG A
882	30	Woods, Good, HSG A
74,573		Weighted Average
38,649	39	51.83% Pervious Area
35,924	98	48.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	29	0.0207	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
0.4	25	0.0260	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.8	132	0.0181	2.73		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	31	0.0100	4.54	3.56	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
6.7	217	Total			

Subcatchment PS-1B:



Summary for Subcatchment PS-2: Subcat PS-2

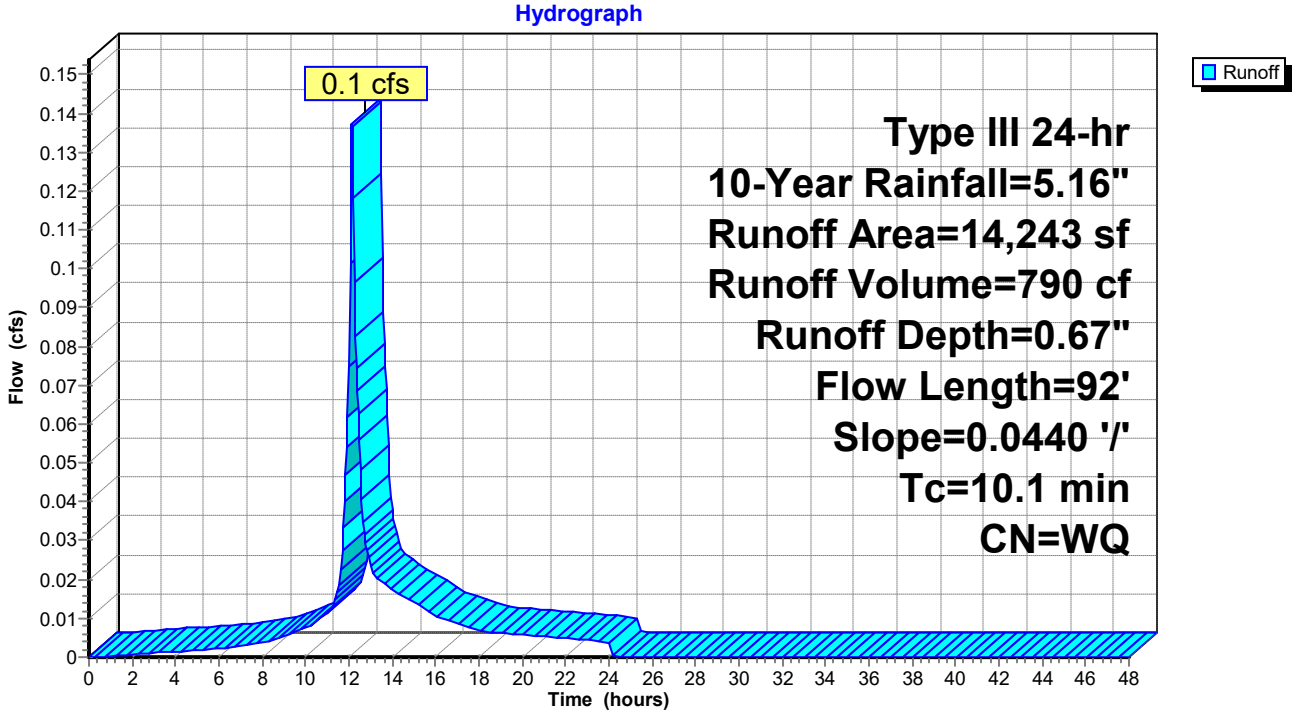
Runoff = 0.1 cfs @ 12.14 hrs, Volume= 790 cf, Depth= 0.67"
Routed to Link DP-2 : Offsite to South

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
11,589	39	>75% Grass cover, Good, HSG A
738	98	Paved parking, HSG A
634	98	Roofs, HSG A
1,282	30	Woods, Good, HSG A
14,243		Weighted Average
12,871	38	90.37% Pervious Area
1,372	98	9.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	92	0.0440	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment PS-2: Subcat PS-2



Summary for Subcatchment PS-3A:

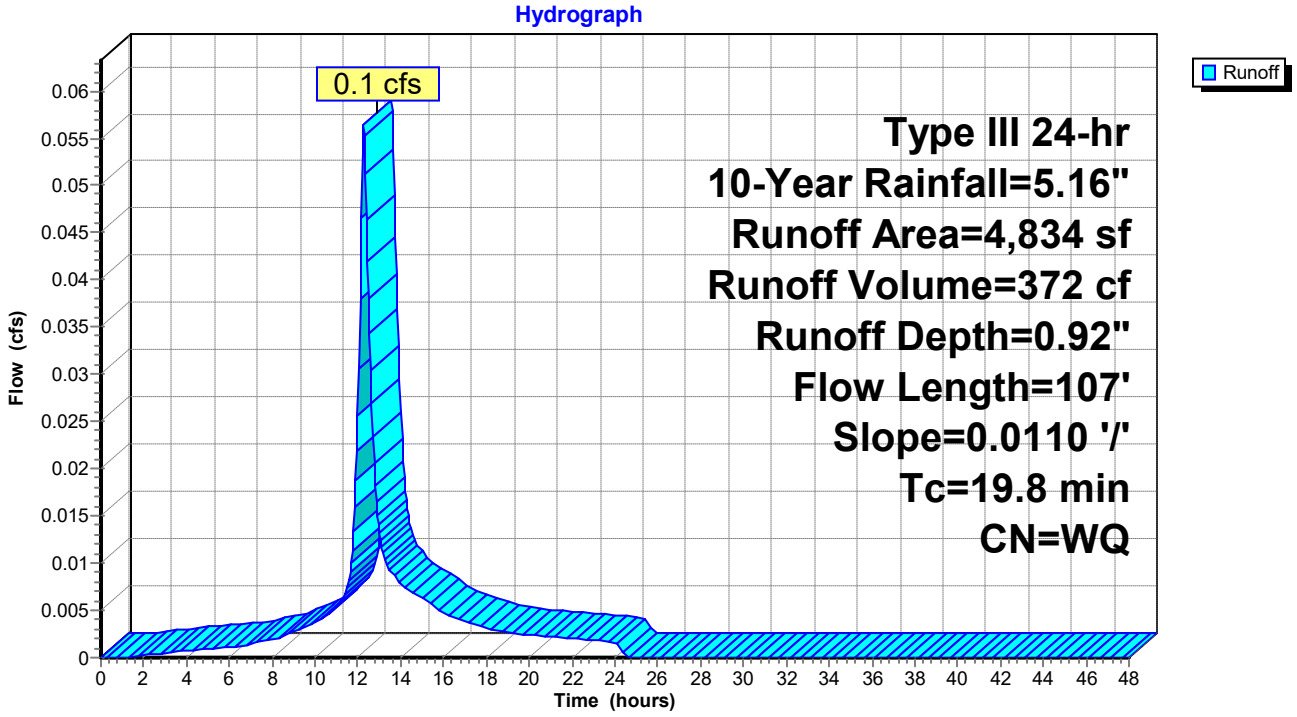
Runoff = 0.1 cfs @ 12.26 hrs, Volume= 372 cf, Depth= 0.92"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
4,122	39	>75% Grass cover, Good, HSG A
149	98	Paved parking, HSG A
562	98	Roofs, HSG A
4,834		Weighted Average
4,122	39	85.27% Pervious Area
712	98	14.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	107	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment PS-3A:



Summary for Subcatchment PS-3B:

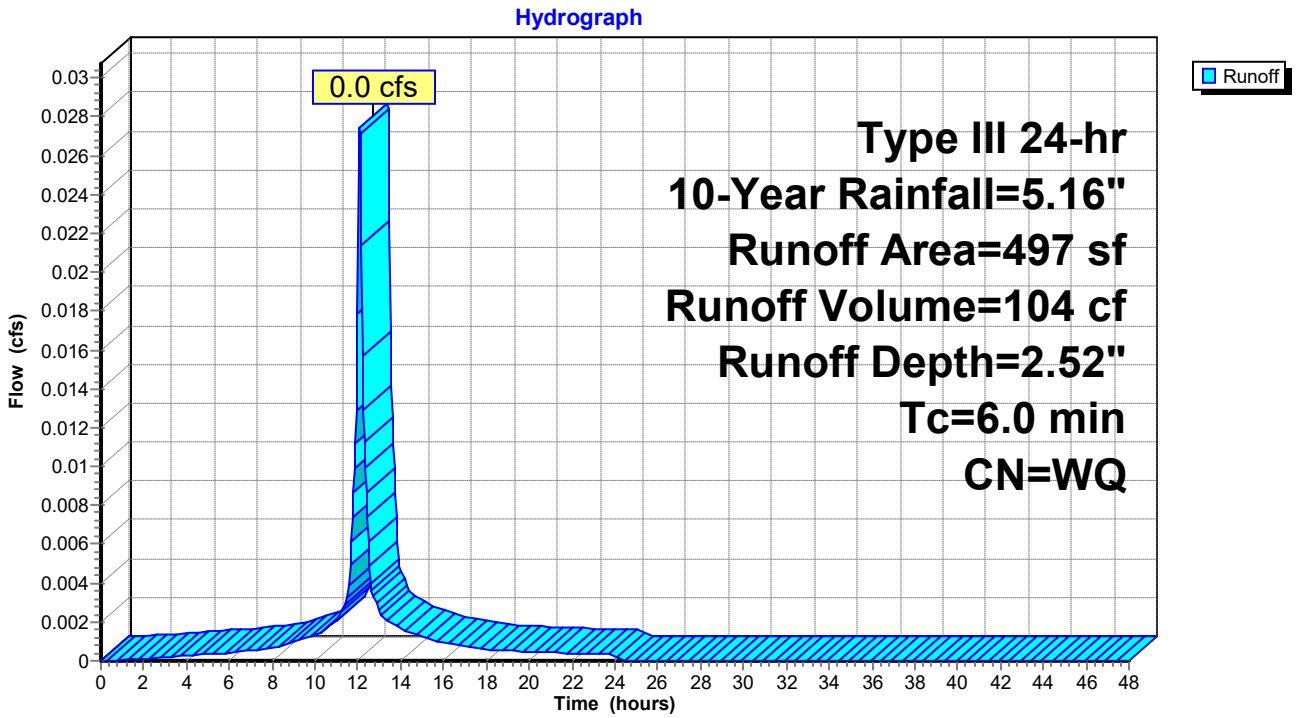
Runoff = 0.0 cfs @ 12.09 hrs, Volume= 104 cf, Depth= 2.52"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
255	39	>75% Grass cover, Good, HSG A
242	98	Roofs, HSG A
497		Weighted Average
255	39	51.21% Pervious Area
242	98	48.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PS-3B:



Summary for Subcatchment PS-3C:

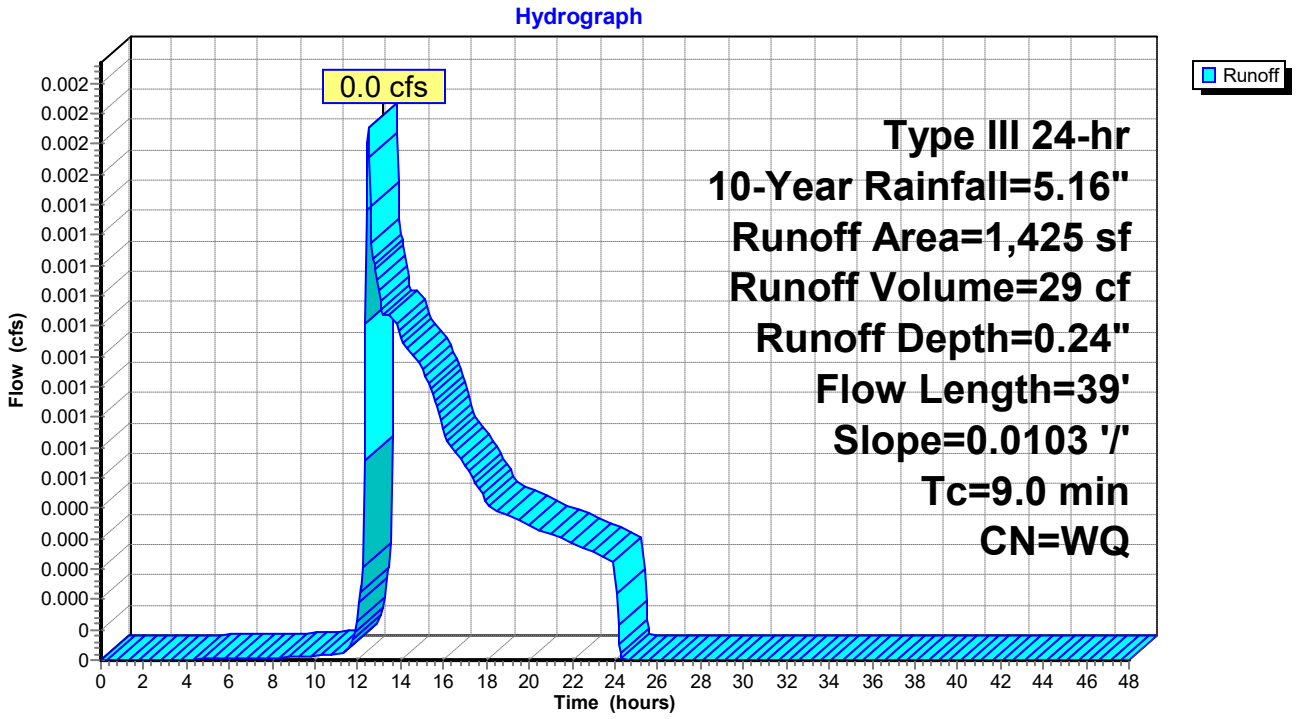
Runoff = 0.0 cfs @ 12.49 hrs, Volume= 29 cf, Depth= 0.24"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
1,422	39	>75% Grass cover, Good, HSG A
2	98	Paved parking, HSG A
1,425		Weighted Average
1,422	39	99.83% Pervious Area
2	98	0.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	39	0.0103	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment PS-3C:



Summary for Subcatchment PS-4:

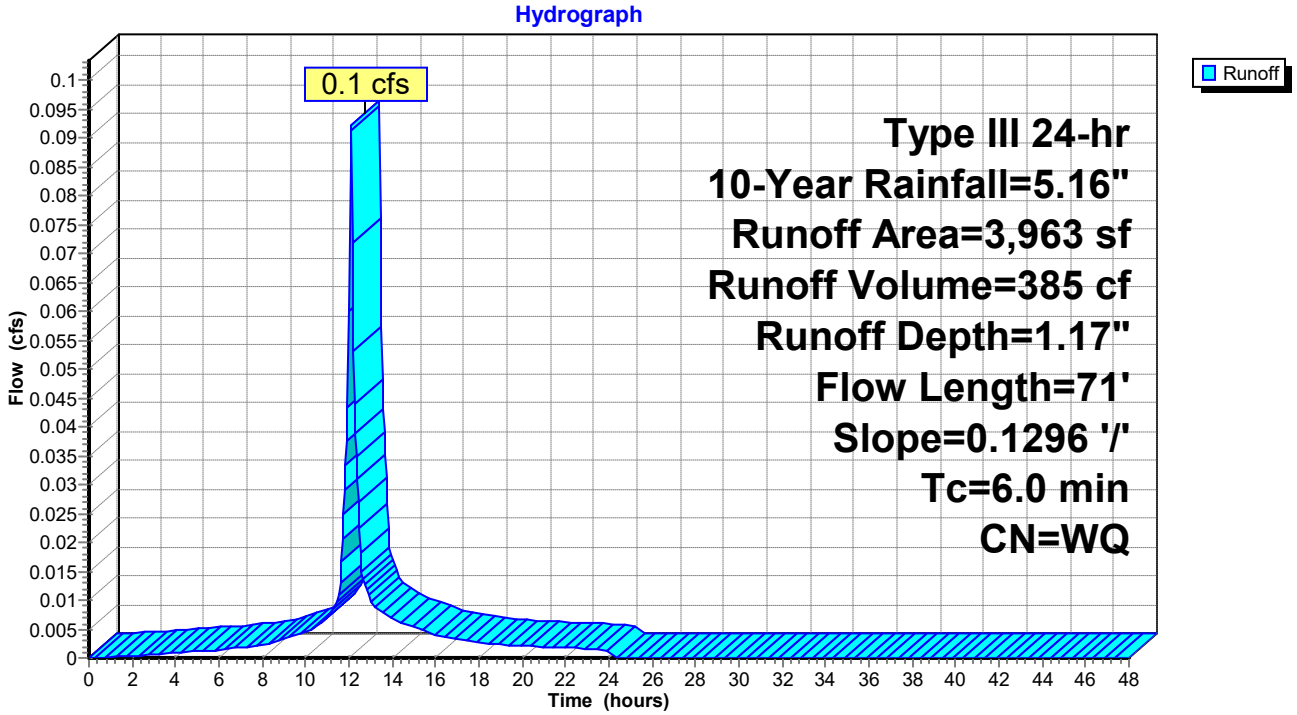
Runoff = 0.1 cfs @ 12.09 hrs, Volume= 385 cf, Depth= 1.17"
Routed to Link DP-4 : Offsite to Northwest

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.16"

Area (sf)	CN	Description
2,563	39	>75% Grass cover, Good, HSG A
211	98	Paved parking, HSG A
604	98	Roofs, HSG A
585	30	Woods, Good, HSG A
3,963		Weighted Average
3,148	37	79.43% Pervious Area
815	98	20.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	71	0.1296	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
5.3	71	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PS-4:



Summary for Pond 1P: Subsurface Detention Basin

Inflow Area = 74,573 sf, 48.17% Impervious, Inflow Depth = 2.49" for 10-Year event
Inflow = 4.0 cfs @ 12.10 hrs, Volume= 15,474 cf
Outflow = 0.9 cfs @ 12.51 hrs, Volume= 15,474 cf, Atten= 78%, Lag= 25.1 min
Primary = 0.9 cfs @ 12.51 hrs, Volume= 15,474 cf
Routed to Link DP-1 : Offsite to Northeast

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 103.83' @ 12.51 hrs Surf.Area= 3,781 sf Storage= 4,895 cf

Plug-Flow detention time= 70.3 min calculated for 15,457 cf (100% of inflow)
Center-of-Mass det. time= 70.6 min (830.8 - 760.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	102.00'	3,453 cf	**55.75'W x 67.82'L x 3.75'H Field A** 14,178 cf Overall - 5,546 cf Embedded = 8,632 cf x 40.0% Voids
#2A	102.50'	5,546 cf	**ADS_StormTech SC-800 +Cap** x 108 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 108 Chambers in 12 Rows Cap Storage= 3.4 cf x 2 x 12 rows = 82.1 cf
		8,999 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	102.00'	**12.0" Round Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 102.00' / 93.00' S= 0.0918 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	102.00'	**4.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	103.25'	**3.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	104.00'	**7.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	105.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.9 cfs @ 12.51 hrs HW=103.83' (Free Discharge)
└**1=Culvert** (Passes 0.9 cfs of 5.5 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 0.7 cfs @ 6.21 fps)
├**3=Orifice/Grate** (Orifice Controls 0.2 cfs @ 3.24 fps)
├**4=Orifice/Grate** (Controls 0.0 cfs)
└**5=Sharp-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 1P: Subsurface Detention Basin - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-800 +Cap (ADS StormTech® SC-800 with cap volume)
Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf
Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap
Cap Storage= 3.4 cf x 2 x 12 rows = 82.1 cf

51.0" Wide + 3.0" Spacing = 54.0" C-C Row Spacing

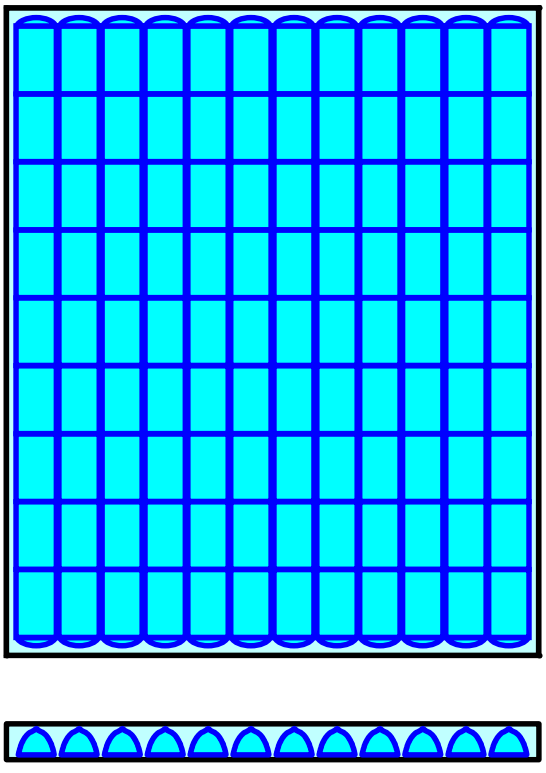
9 Chambers/Row x 7.12' Long +0.88' Cap Length x 2 = 65.82' Row Length +12.0" End Stone x 2 = 67.82' Base Length
12 Rows x 51.0" Wide + 3.0" Spacing x 11 + 12.0" Side Stone x 2 = 55.75' Base Width
6.0" Stone Base + 33.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

108 Chambers x 50.6 cf + 3.4 cf Cap Volume x 2 x 12 Rows = 5,546.0 cf Chamber Storage

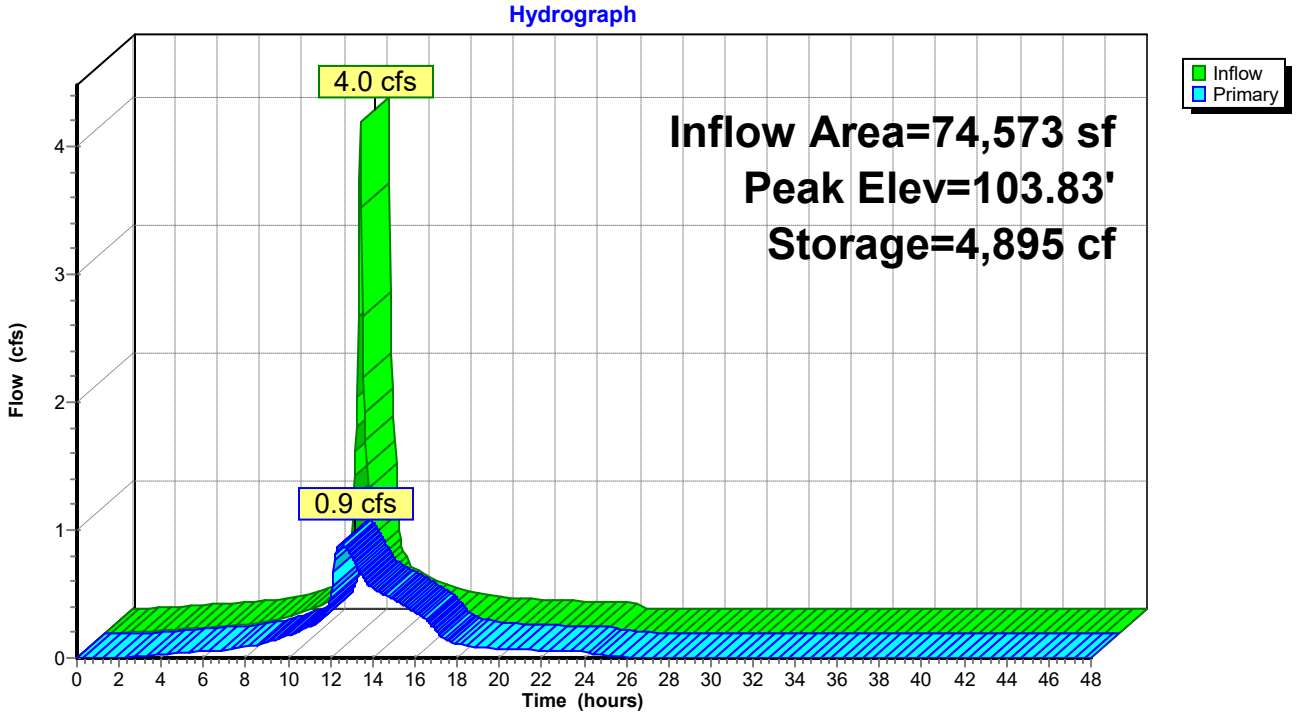
14,177.9 cf Field - 5,546.0 cf Chambers = 8,631.9 cf Stone x 40.0% Voids = 3,452.8 cf Stone Storage

Chamber Storage + Stone Storage = 8,998.8 cf = 0.207 af
Overall Storage Efficiency = 63.5%
Overall System Size = 67.82' x 55.75' x 3.75'

108 Chambers
525.1 cy Field
319.7 cy Stone



Pond 1P: Subsurface Detention Basin

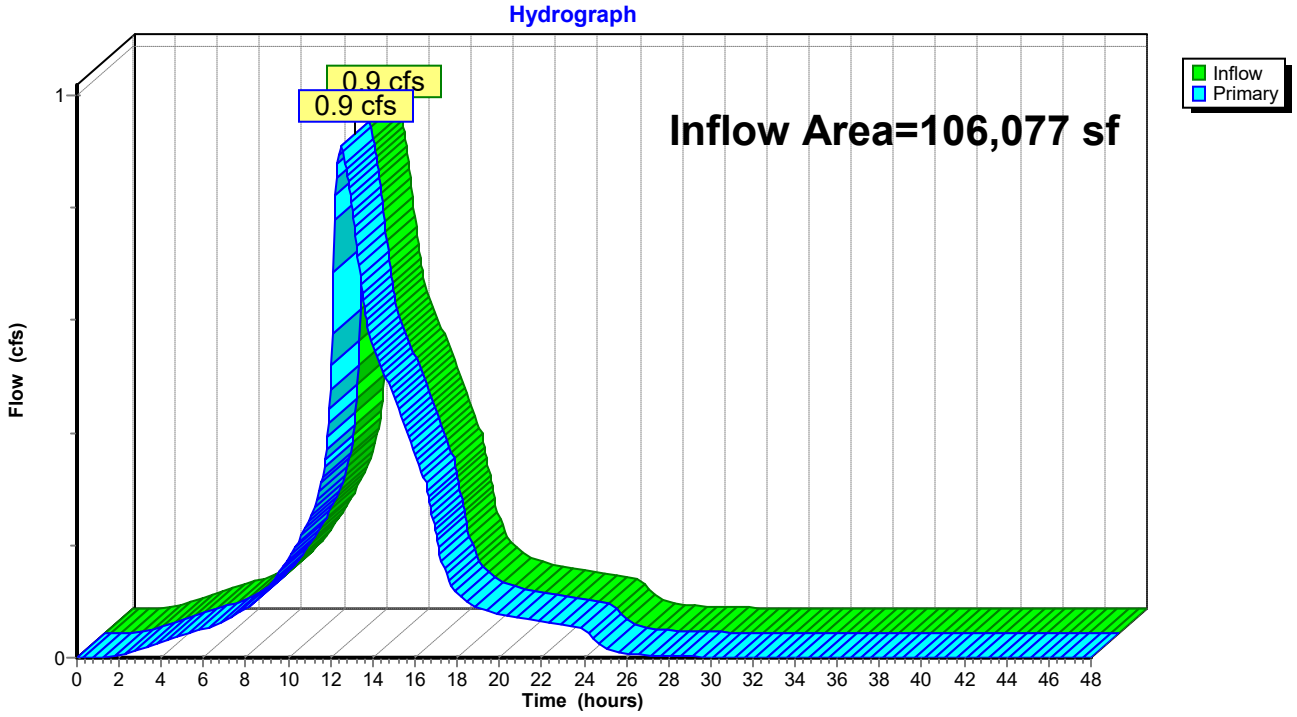


Summary for Link DP-1: Offsite to Northeast

Inflow Area = 106,077 sf, 34.05% Impervious, Inflow Depth = 1.79" for 10-Year event
Inflow = 0.9 cfs @ 12.51 hrs, Volume= 15,782 cf
Primary = 0.9 cfs @ 12.51 hrs, Volume= 15,782 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-1: Offsite to Northeast

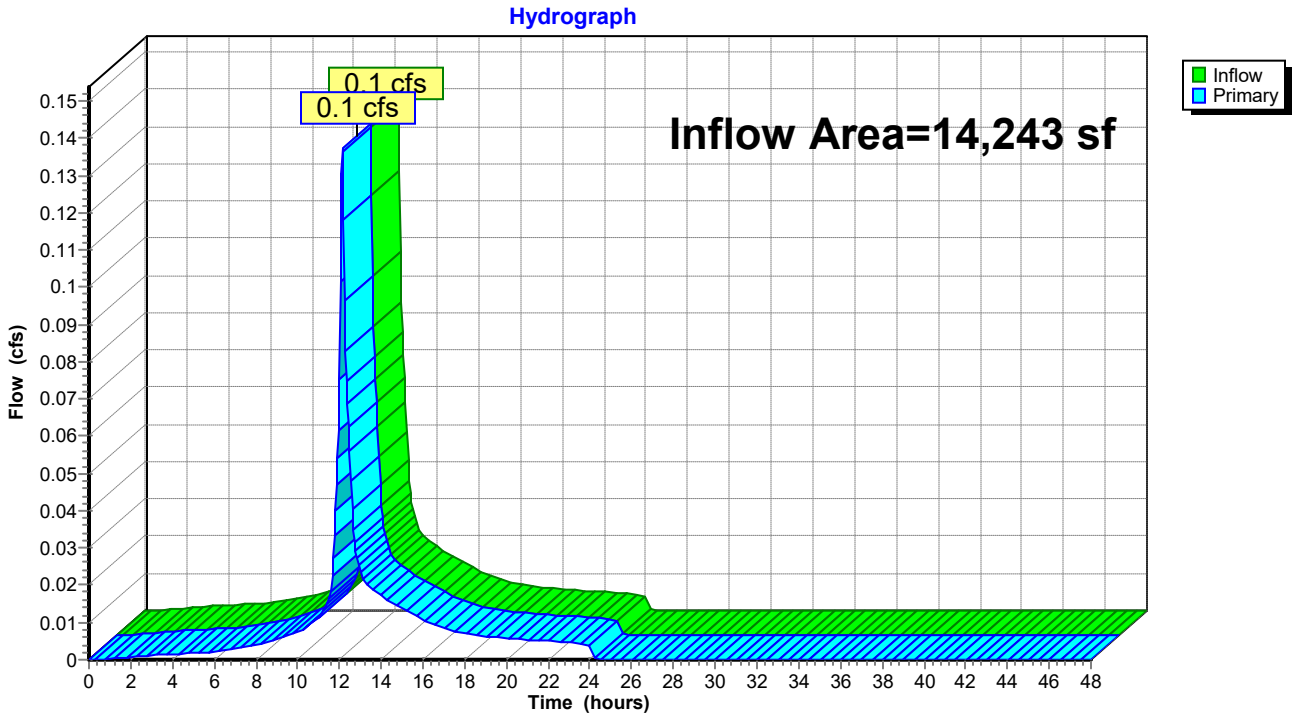


Summary for Link DP-2: Offsite to South

Inflow Area = 14,243 sf, 9.63% Impervious, Inflow Depth = 0.67" for 10-Year event
Inflow = 0.1 cfs @ 12.14 hrs, Volume= 790 cf
Primary = 0.1 cfs @ 12.14 hrs, Volume= 790 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-2: Offsite to South

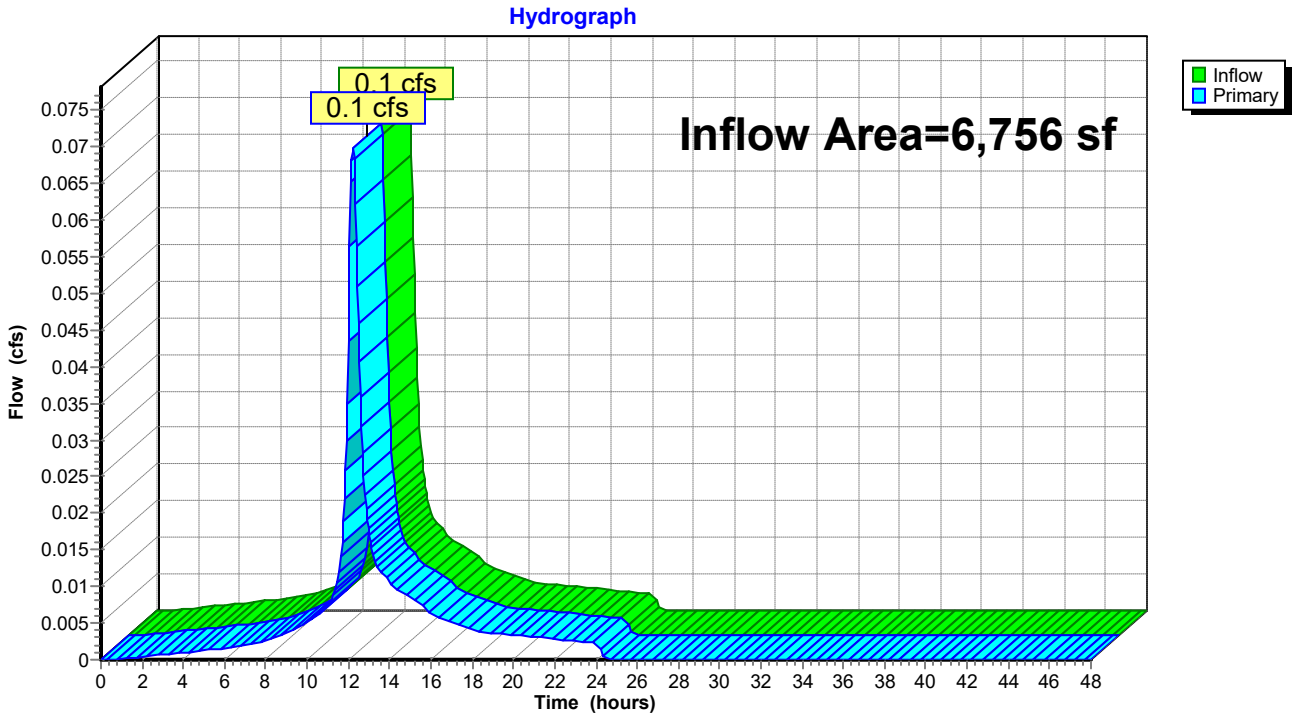


Summary for Link DP-3: Walnut Street

Inflow Area = 6,756 sf, 14.16% Impervious, Inflow Depth = 0.90" for 10-Year event
Inflow = 0.1 cfs @ 12.23 hrs, Volume= 505 cf
Primary = 0.1 cfs @ 12.23 hrs, Volume= 505 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-3: Walnut Street

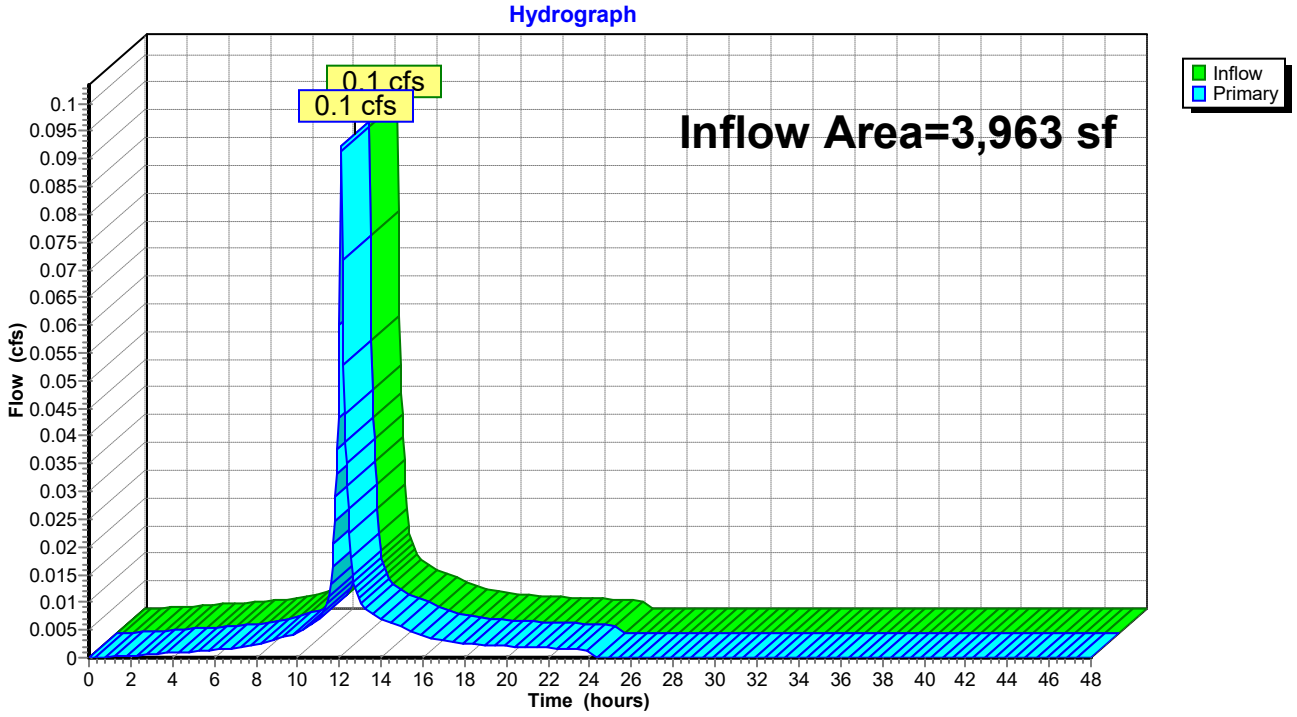


Summary for Link DP-4: Offsite to Northwest

Inflow Area = 3,963 sf, 20.57% Impervious, Inflow Depth = 1.17" for 10-Year event
Inflow = 0.1 cfs @ 12.09 hrs, Volume= 385 cf
Primary = 0.1 cfs @ 12.09 hrs, Volume= 385 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-4: Offsite to Northwest



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS-1A: Runoff Area=31,504 sf 0.61% Impervious Runoff Depth=0.81"
Flow Length=174' Tc=10.8 min CN=WQ Runoff=0.3 cfs 2,114 cf

Subcatchment PS-1B: Runoff Area=74,573 sf 48.17% Impervious Runoff Depth=4.53"
Flow Length=217' Tc=6.7 min CN=WQ Runoff=7.2 cfs 28,122 cf

Subcatchment PS-2: Subcat PS-2 Runoff Area=14,243 sf 9.63% Impervious Runoff Depth=1.86"
Flow Length=92' Slope=0.0440 '/' Tc=10.1 min CN=WQ Runoff=0.4 cfs 2,204 cf

Subcatchment PS-3A: Runoff Area=4,834 sf 14.73% Impervious Runoff Depth=2.27"
Flow Length=107' Slope=0.0110 '/' Tc=19.8 min CN=WQ Runoff=0.2 cfs 915 cf

Subcatchment PS-3B: Runoff Area=497 sf 48.79% Impervious Runoff Depth=4.58"
Tc=6.0 min CN=WQ Runoff=0.0 cfs 190 cf

Subcatchment PS-3C: Runoff Area=1,425 sf 0.17% Impervious Runoff Depth=1.29"
Flow Length=39' Slope=0.0103 '/' Tc=9.0 min CN=WQ Runoff=0.0 cfs 153 cf

Subcatchment PS-4: Runoff Area=3,963 sf 20.57% Impervious Runoff Depth=2.55"
Flow Length=71' Slope=0.1296 '/' Tc=6.0 min CN=WQ Runoff=0.2 cfs 842 cf

Pond 1P: Subsurface Detention Basin Peak Elev=105.38' Storage=8,440 cf Inflow=7.2 cfs 28,122 cf
Outflow=2.2 cfs 28,122 cf

Link DP-1: Offsite to Northeast Inflow=2.4 cfs 30,236 cf
Primary=2.4 cfs 30,236 cf

Link DP-2: Offsite to South Inflow=0.4 cfs 2,204 cf
Primary=0.4 cfs 2,204 cf

Link DP-3: Walnut Street Inflow=0.2 cfs 1,258 cf
Primary=0.2 cfs 1,258 cf

Link DP-4: Offsite to Northwest Inflow=0.2 cfs 842 cf
Primary=0.2 cfs 842 cf

Total Runoff Area = 131,039 sf Runoff Volume = 34,540 cf Average Runoff Depth = 3.16"
70.04% Pervious = 91,779 sf 29.96% Impervious = 39,260 sf

Summary for Subcatchment PS-1A:

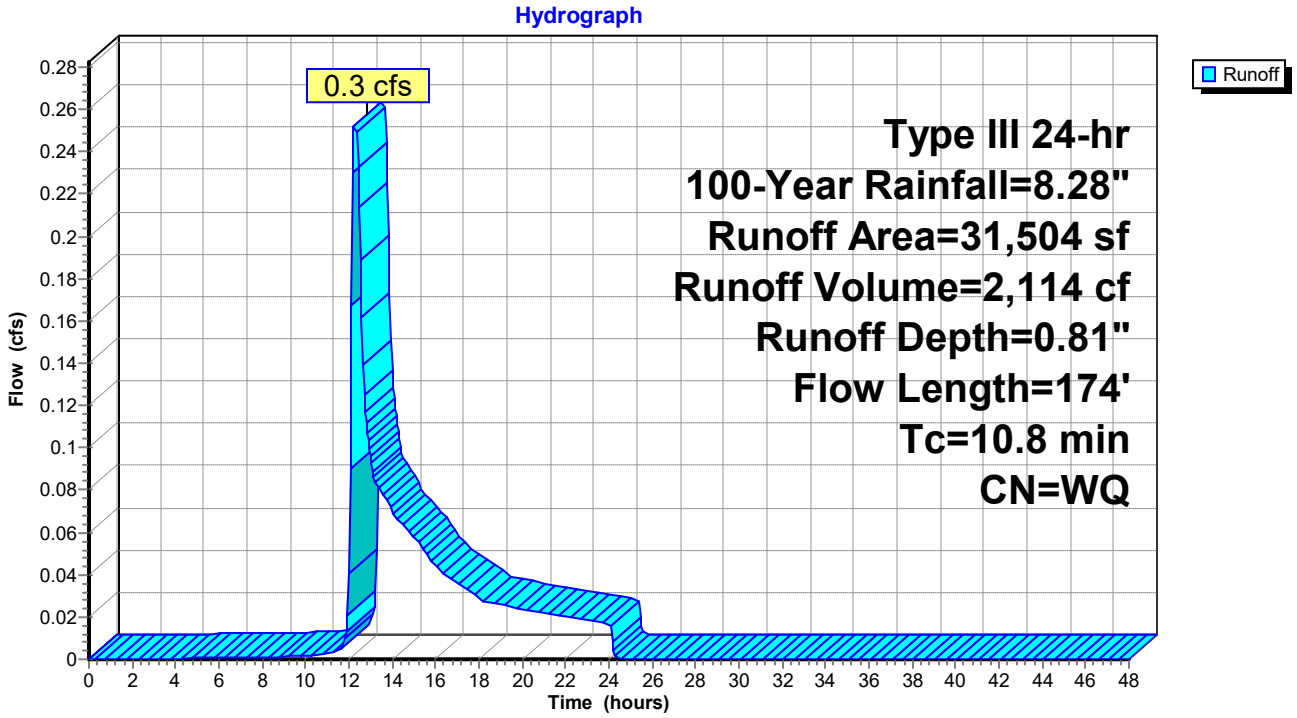
Runoff = 0.3 cfs @ 12.20 hrs, Volume= 2,114 cf, Depth= 0.81"
Routed to Link DP-1 : Offsite to Northeast

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
10,927	39	>75% Grass cover, Good, HSG A
192	98	Paved parking, HSG A
20,385	30	Woods, Good, HSG A
31,504		Weighted Average
31,312	33	99.39% Pervious Area
192	98	0.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.1500	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
0.7	36	0.0278	0.83		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	38	0.6053	3.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.8	174	Total			

Subcatchment PS-1A:



Summary for Subcatchment PS-1B:

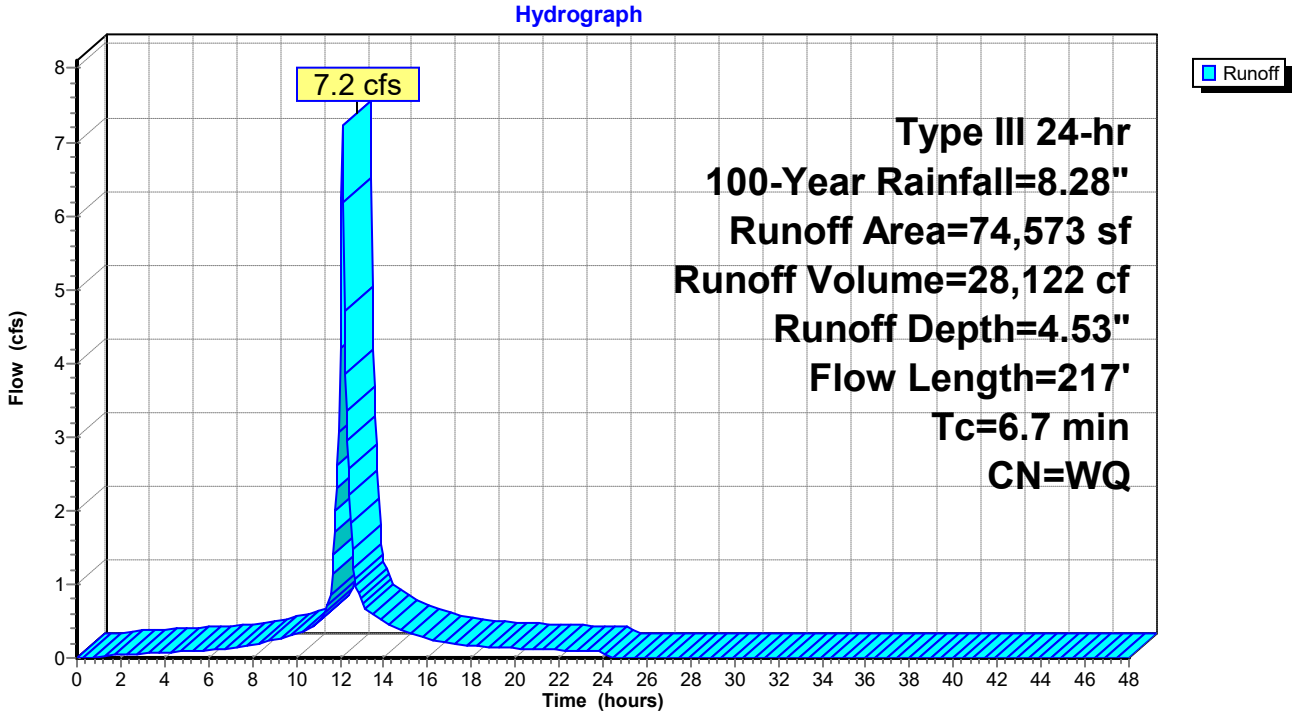
Runoff = 7.2 cfs @ 12.10 hrs, Volume= 28,122 cf, Depth= 4.53"
Routed to Pond 1P : Subsurface Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
37,767	39	>75% Grass cover, Good, HSG A
28,686	98	Paved parking, HSG A
7,238	98	Roofs, HSG A
882	30	Woods, Good, HSG A
74,573		Weighted Average
38,649	39	51.83% Pervious Area
35,924	98	48.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	29	0.0207	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
0.4	25	0.0260	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.8	132	0.0181	2.73		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	31	0.0100	4.54	3.56	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
6.7	217	Total			

Subcatchment PS-1B:



Summary for Subcatchment PS-2: Subcat PS-2

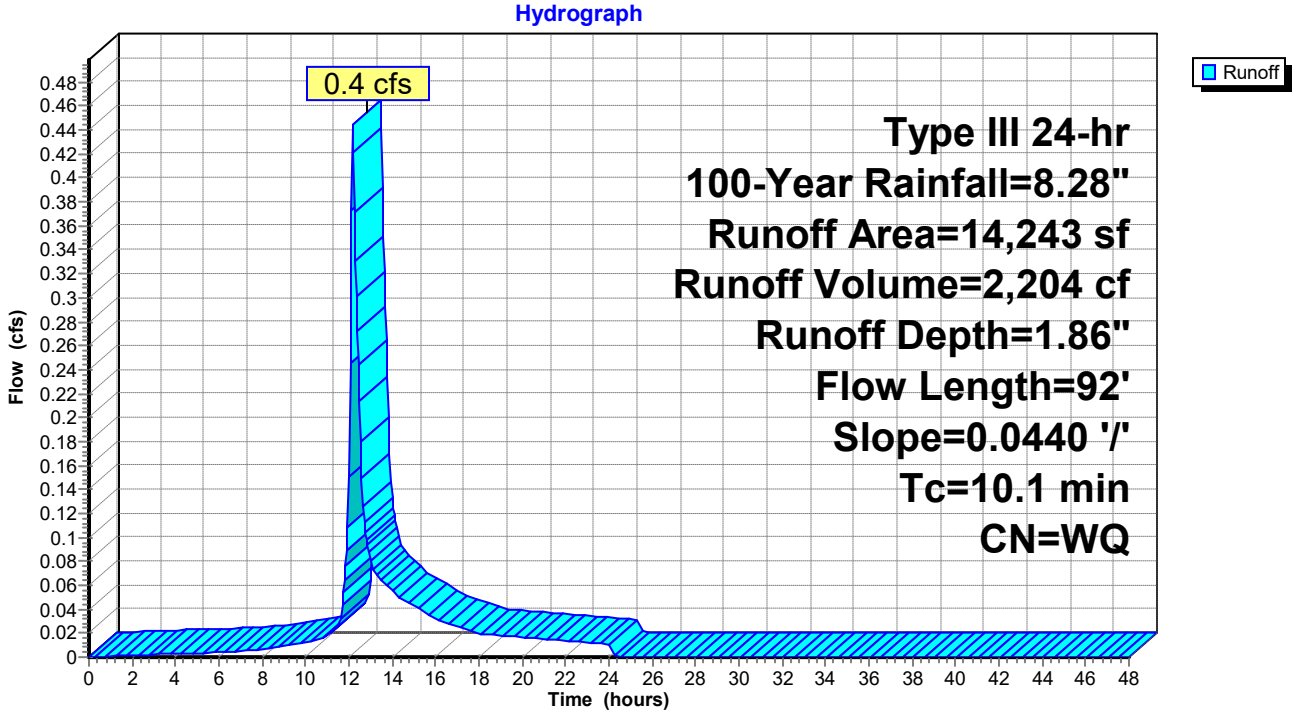
Runoff = 0.4 cfs @ 12.16 hrs, Volume= 2,204 cf, Depth= 1.86"
Routed to Link DP-2 : Offsite to South

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
11,589	39	>75% Grass cover, Good, HSG A
738	98	Paved parking, HSG A
634	98	Roofs, HSG A
1,282	30	Woods, Good, HSG A
14,243		Weighted Average
12,871	38	90.37% Pervious Area
1,372	98	9.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	92	0.0440	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment PS-2: Subcat PS-2



Summary for Subcatchment PS-3A:

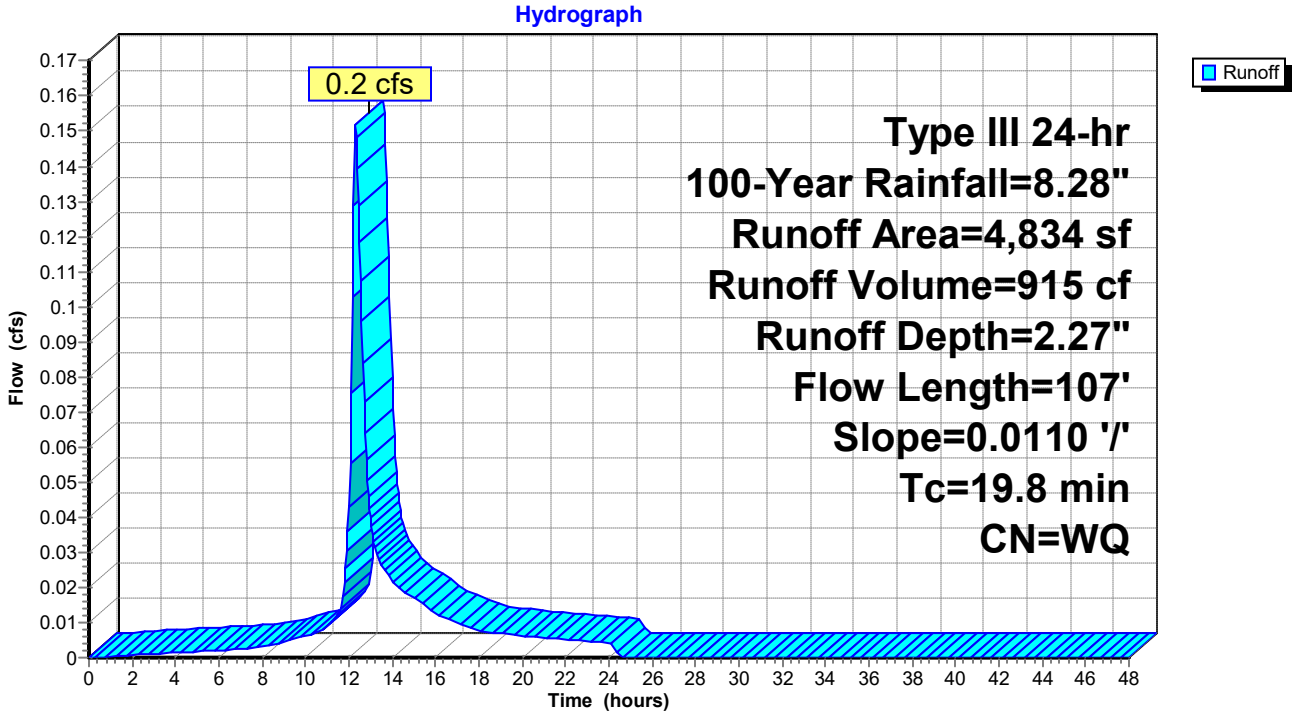
Runoff = 0.2 cfs @ 12.31 hrs, Volume= 915 cf, Depth= 2.27"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
4,122	39	>75% Grass cover, Good, HSG A
149	98	Paved parking, HSG A
562	98	Roofs, HSG A
4,834		Weighted Average
4,122	39	85.27% Pervious Area
712	98	14.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	107	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment PS-3A:



Summary for Subcatchment PS-3B:

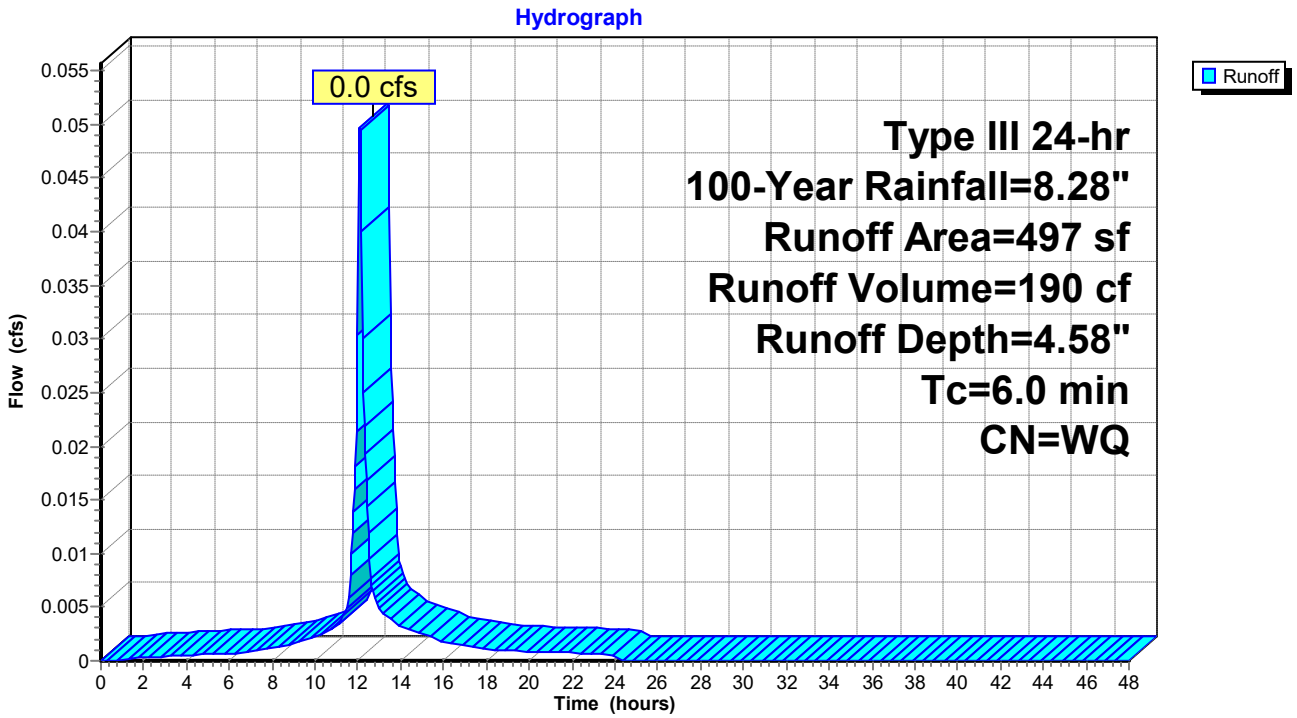
Runoff = 0.0 cfs @ 12.09 hrs, Volume= 190 cf, Depth= 4.58"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
255	39	>75% Grass cover, Good, HSG A
242	98	Roofs, HSG A
497		Weighted Average
255	39	51.21% Pervious Area
242	98	48.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PS-3B:



Summary for Subcatchment PS-3C:

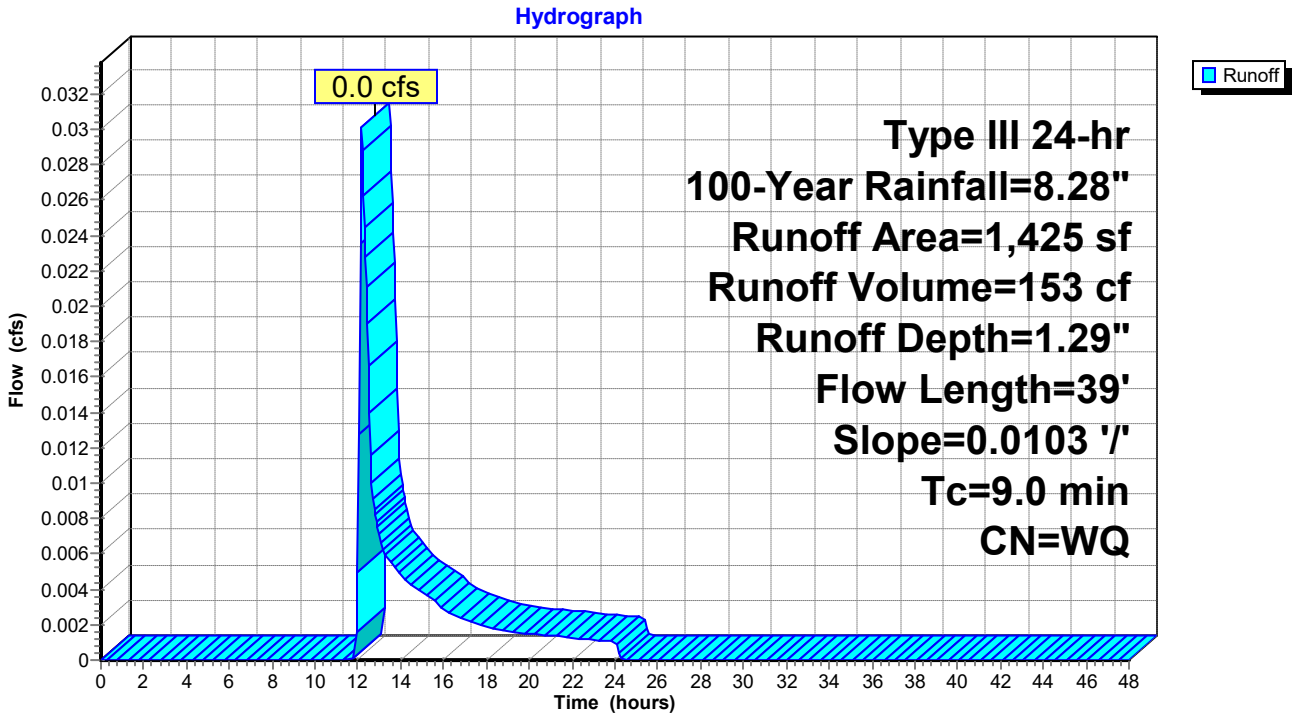
Runoff = 0.0 cfs @ 12.17 hrs, Volume= 153 cf, Depth= 1.29"
Routed to Link DP-3 : Walnut Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
1,422	39	>75% Grass cover, Good, HSG A
2	98	Paved parking, HSG A
1,425		Weighted Average
1,422	39	99.83% Pervious Area
2	98	0.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	39	0.0103	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"

Subcatchment PS-3C:



Summary for Subcatchment PS-4:

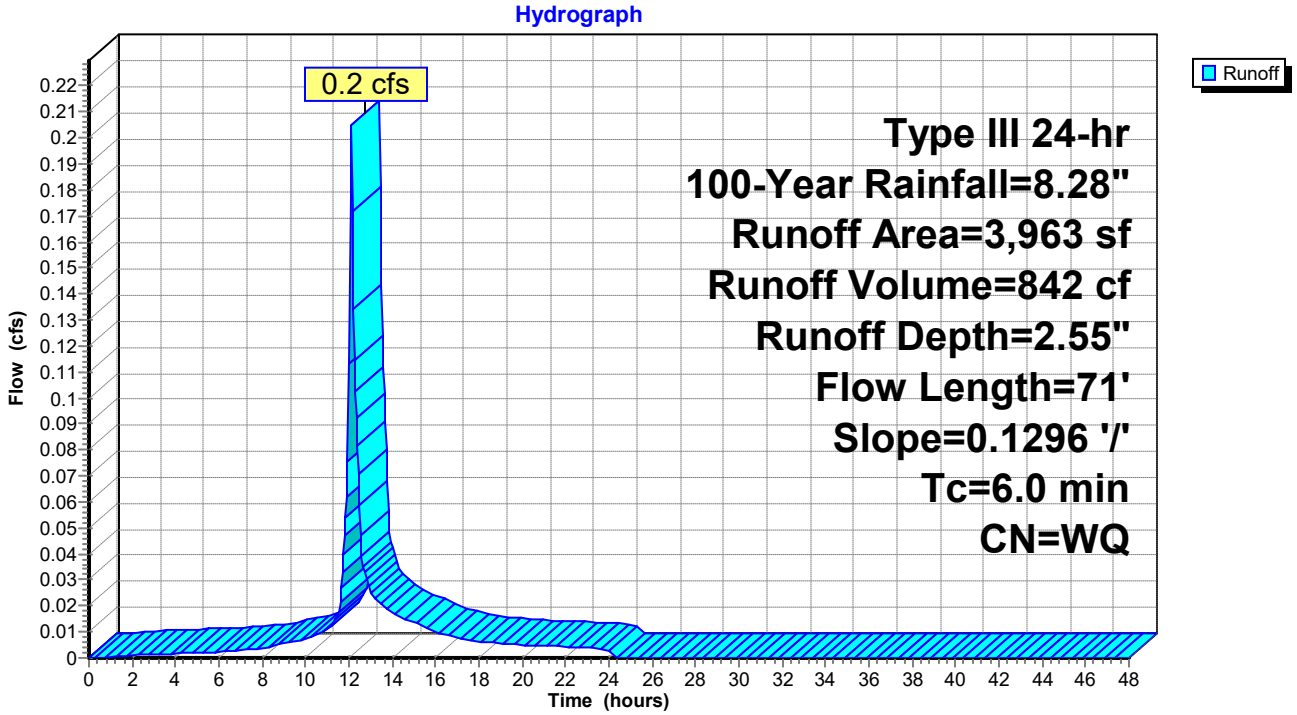
Runoff = 0.2 cfs @ 12.10 hrs, Volume= 842 cf, Depth= 2.55"
Routed to Link DP-4 : Offsite to Northwest

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
2,563	39	>75% Grass cover, Good, HSG A
211	98	Paved parking, HSG A
604	98	Roofs, HSG A
585	30	Woods, Good, HSG A
3,963		Weighted Average
3,148	37	79.43% Pervious Area
815	98	20.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	71	0.1296	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
5.3	71	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PS-4:



Summary for Pond 1P: Subsurface Detention Basin

Inflow Area = 74,573 sf, 48.17% Impervious, Inflow Depth = 4.53" for 100-Year event
Inflow = 7.2 cfs @ 12.10 hrs, Volume= 28,122 cf
Outflow = 2.2 cfs @ 12.46 hrs, Volume= 28,122 cf, Atten= 70%, Lag= 21.4 min
Primary = 2.2 cfs @ 12.46 hrs, Volume= 28,122 cf
Routed to Link DP-1 : Offsite to Northeast

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 105.38' @ 12.46 hrs Surf.Area= 3,781 sf Storage= 8,440 cf

Plug-Flow detention time= 69.7 min calculated for 28,122 cf (100% of inflow)
Center-of-Mass det. time= 69.2 min (834.8 - 765.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	102.00'	3,453 cf	**55.75'W x 67.82'L x 3.75'H Field A** 14,178 cf Overall - 5,546 cf Embedded = 8,632 cf x 40.0% Voids
#2A	102.50'	5,546 cf	**ADS_StormTech SC-800 +Cap** x 108 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 108 Chambers in 12 Rows Cap Storage= 3.4 cf x 2 x 12 rows = 82.1 cf
		8,999 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	102.00'	**12.0" Round Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 102.00' / 93.00' S= 0.0918 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	102.00'	**4.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	103.25'	**3.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	104.00'	**7.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	105.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.2 cfs @ 12.46 hrs HW=105.38' (Free Discharge)
└**1=Culvert** (Passes 2.2 cfs of 8.0 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 1.0 cfs @ 8.63 fps)
├**3=Orifice/Grate** (Orifice Controls 0.4 cfs @ 6.81 fps)
├**4=Orifice/Grate** (Orifice Controls 0.8 cfs @ 5.39 fps)
└**5=Sharp-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 1P: Subsurface Detention Basin - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-800 +Cap (ADS StormTech® SC-800 with cap volume)
Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf
Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap
Cap Storage= 3.4 cf x 2 x 12 rows = 82.1 cf

51.0" Wide + 3.0" Spacing = 54.0" C-C Row Spacing

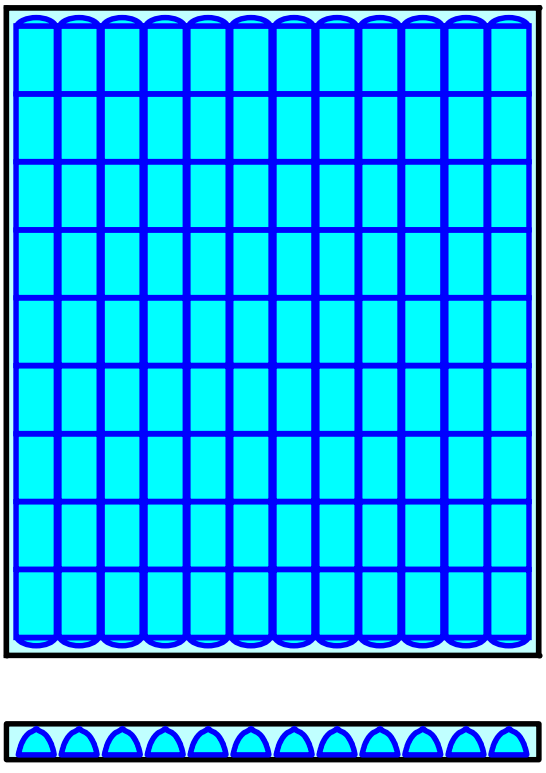
9 Chambers/Row x 7.12' Long +0.88' Cap Length x 2 = 65.82' Row Length +12.0" End Stone x 2 = 67.82' Base Length
12 Rows x 51.0" Wide + 3.0" Spacing x 11 + 12.0" Side Stone x 2 = 55.75' Base Width
6.0" Stone Base + 33.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

108 Chambers x 50.6 cf + 3.4 cf Cap Volume x 2 x 12 Rows = 5,546.0 cf Chamber Storage

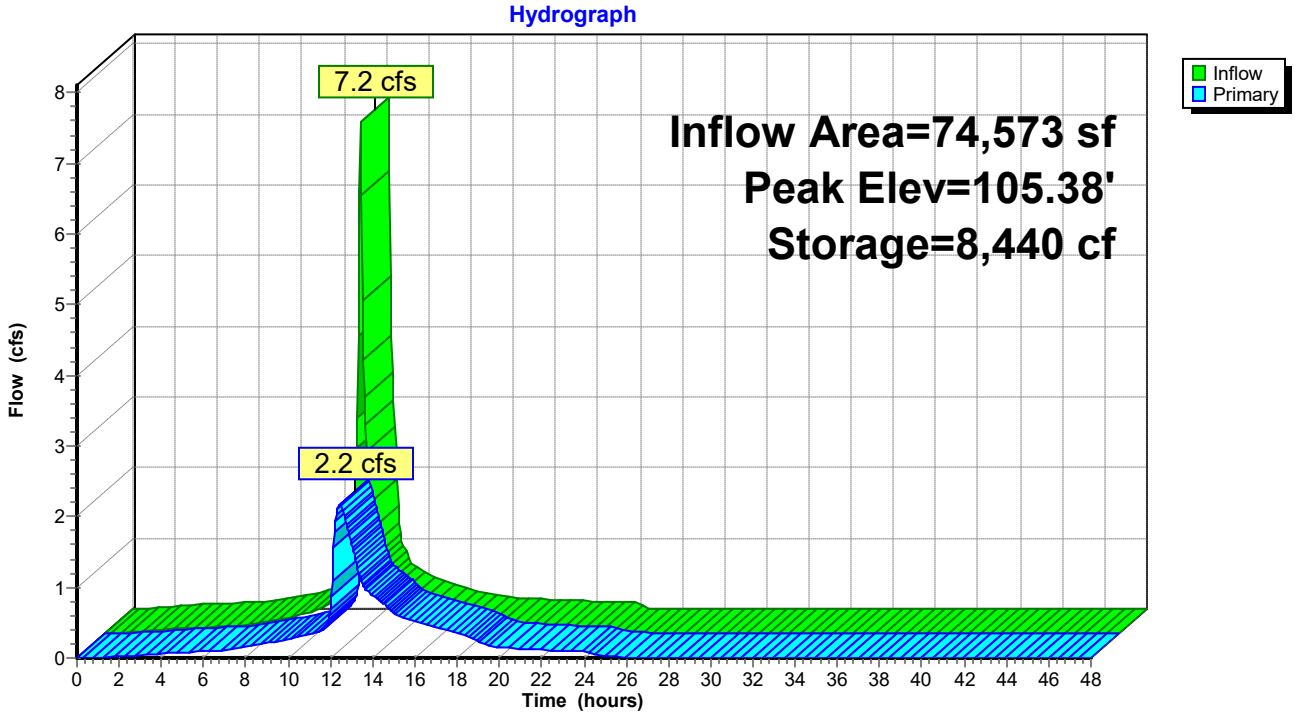
14,177.9 cf Field - 5,546.0 cf Chambers = 8,631.9 cf Stone x 40.0% Voids = 3,452.8 cf Stone Storage

Chamber Storage + Stone Storage = 8,998.8 cf = 0.207 af
Overall Storage Efficiency = 63.5%
Overall System Size = 67.82' x 55.75' x 3.75'

108 Chambers
525.1 cy Field
319.7 cy Stone



Pond 1P: Subsurface Detention Basin

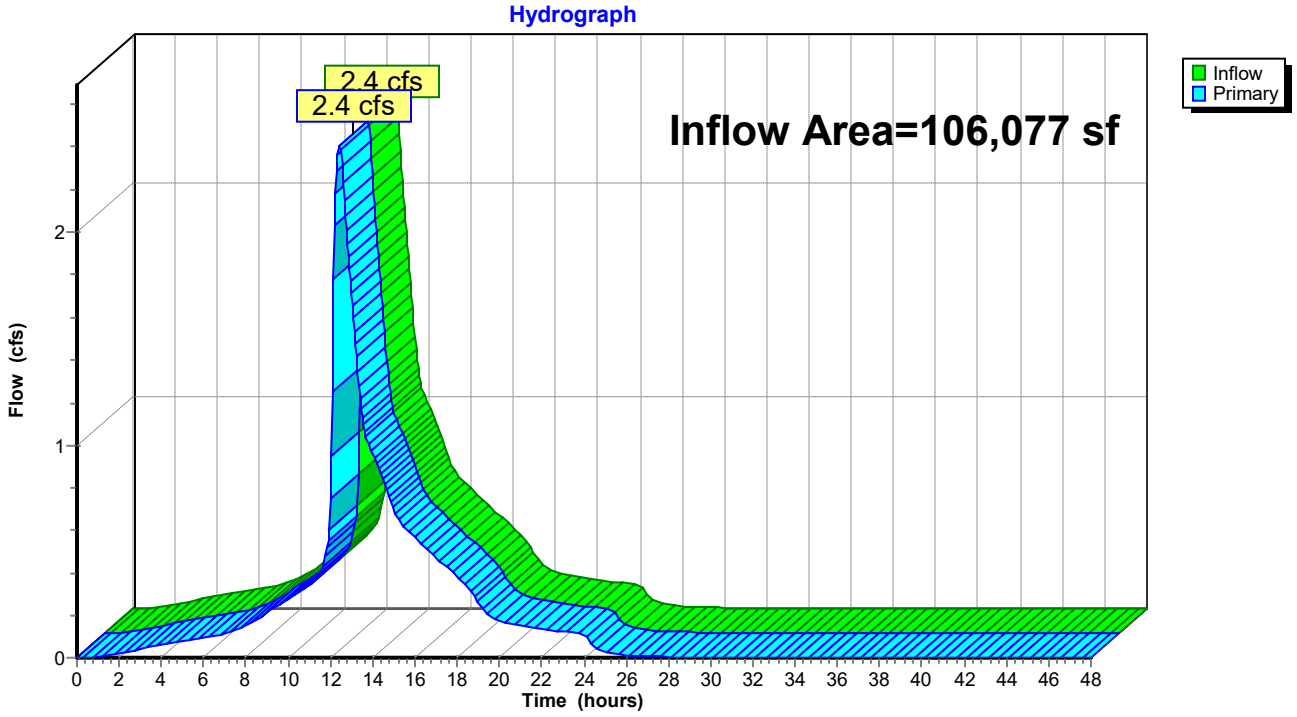


Summary for Link DP-1: Offsite to Northeast

Inflow Area = 106,077 sf, 34.05% Impervious, Inflow Depth = 3.42" for 100-Year event
Inflow = 2.4 cfs @ 12.43 hrs, Volume= 30,236 cf
Primary = 2.4 cfs @ 12.43 hrs, Volume= 30,236 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-1: Offsite to Northeast

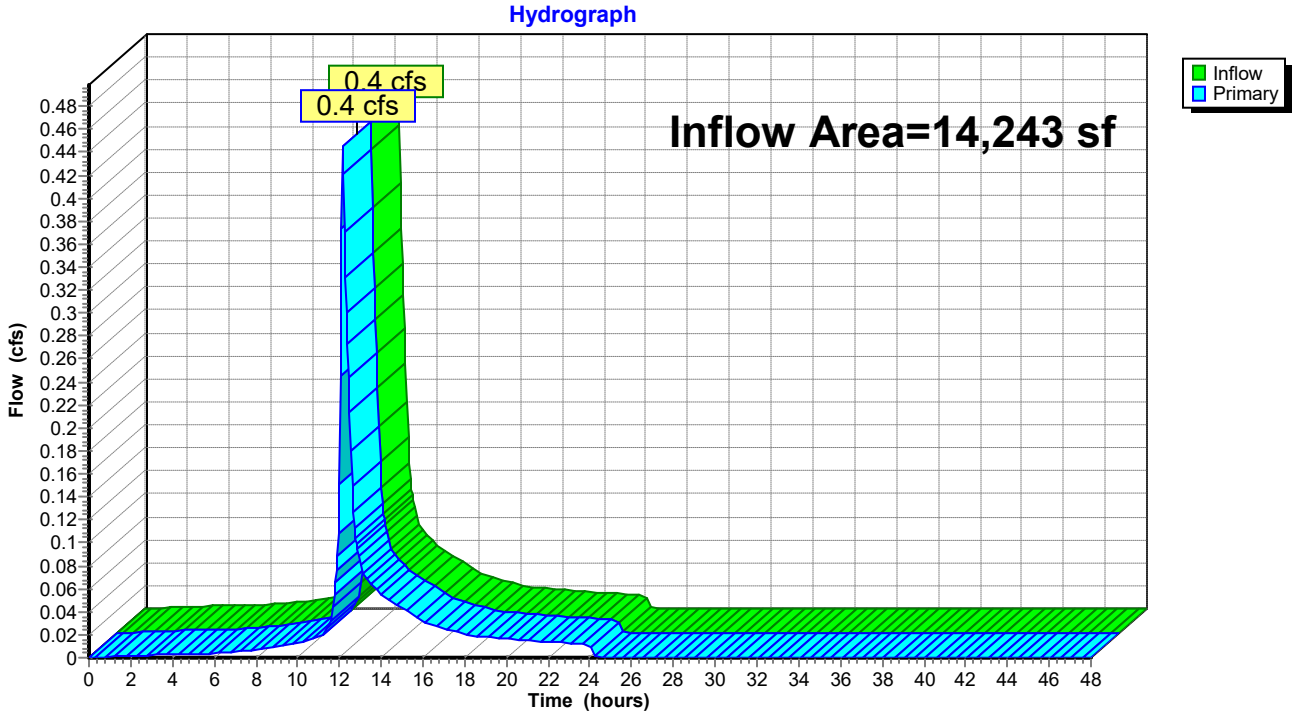


Summary for Link DP-2: Offsite to South

Inflow Area = 14,243 sf, 9.63% Impervious, Inflow Depth = 1.86" for 100-Year event
Inflow = 0.4 cfs @ 12.16 hrs, Volume= 2,204 cf
Primary = 0.4 cfs @ 12.16 hrs, Volume= 2,204 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-2: Offsite to South

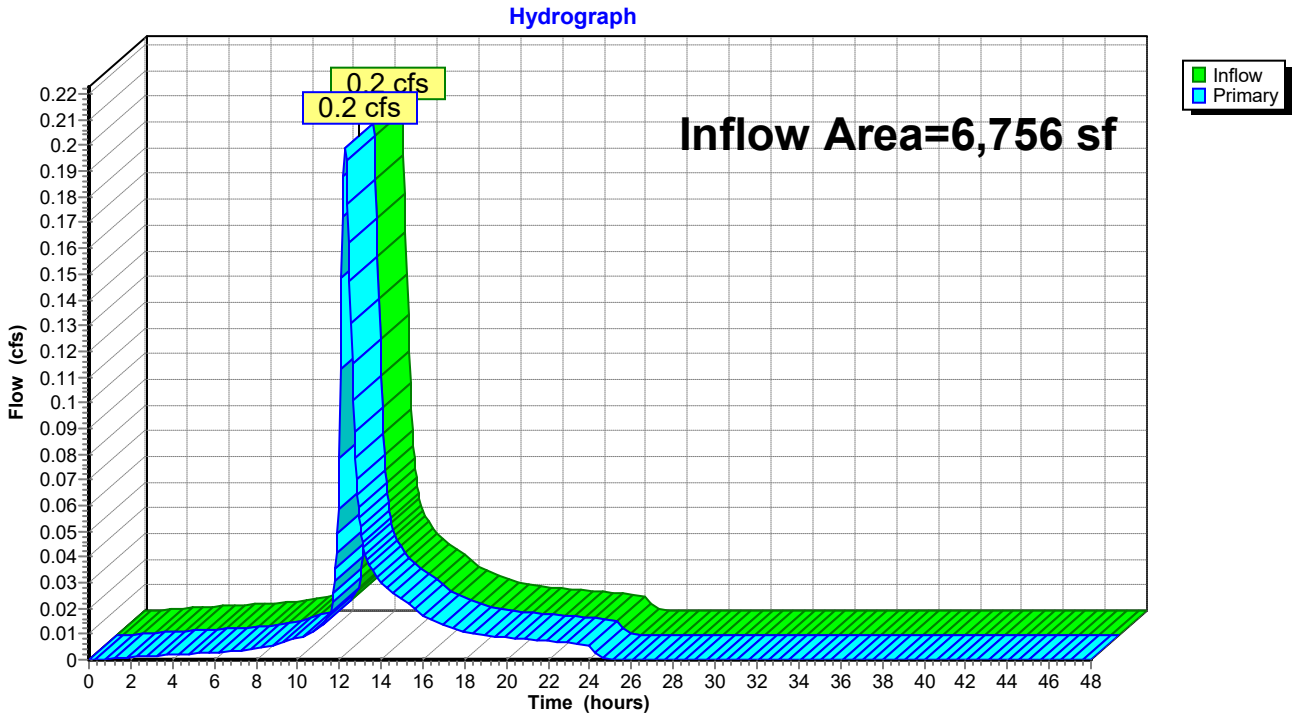


Summary for Link DP-3: Walnut Street

Inflow Area = 6,756 sf, 14.16% Impervious, Inflow Depth = 2.23" for 100-Year event
Inflow = 0.2 cfs @ 12.28 hrs, Volume= 1,258 cf
Primary = 0.2 cfs @ 12.28 hrs, Volume= 1,258 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-3: Walnut Street

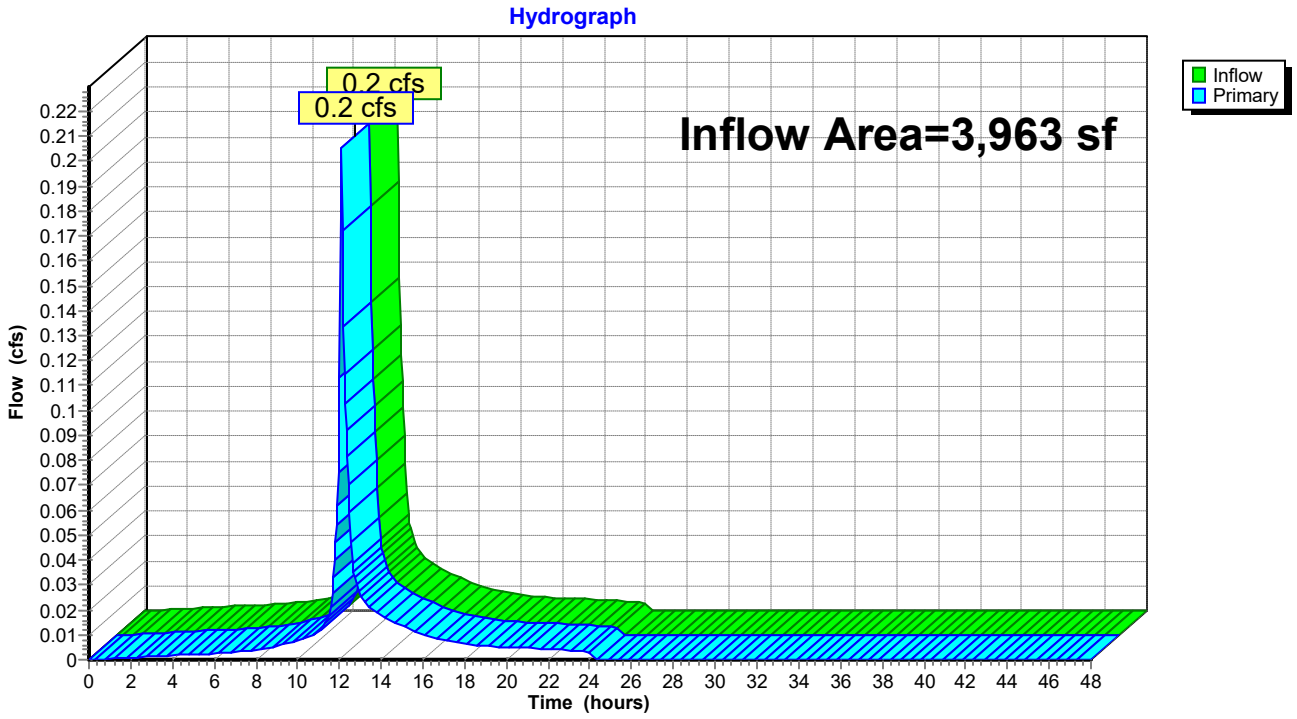


Summary for Link DP-4: Offsite to Northwest

Inflow Area = 3,963 sf, 20.57% Impervious, Inflow Depth = 2.55" for 100-Year event
Inflow = 0.2 cfs @ 12.10 hrs, Volume= 842 cf
Primary = 0.2 cfs @ 12.10 hrs, Volume= 842 cf, Atten= 0%, Lag= 0.0 min

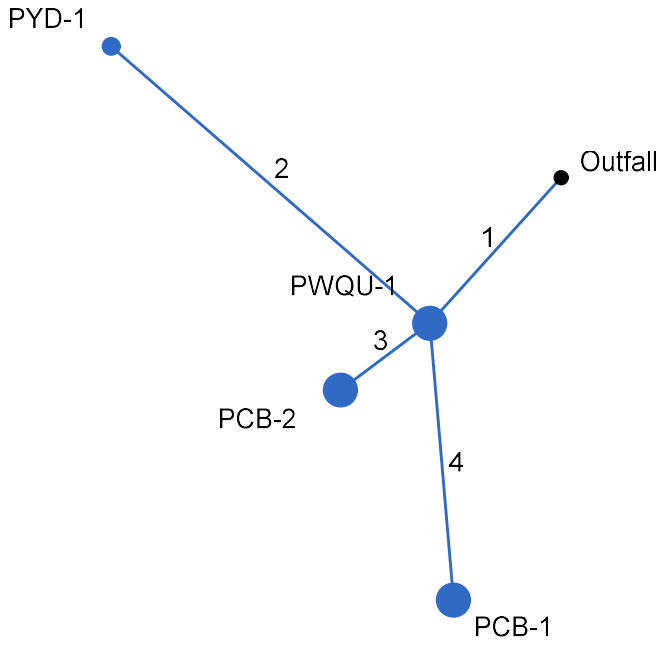
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-4: Offsite to Northwest



Appendix D: Hydraulic Analysis

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



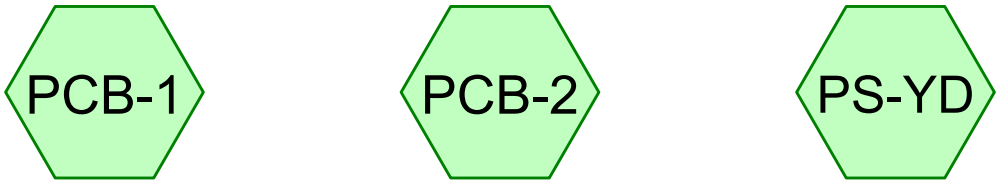
Project File: PR-STORM.stm	Number of lines: 4	Date: 1/27/2026

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	22.362	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	7.00	7.82	8.95	12	4.83	103.00	104.08	103.99	105.05	108.04	107.67	P-D-PIPE-(2)
2	1	49.061	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	1.60	1.21	4.58	8	1.00	104.18	104.67	105.05	105.92	107.67	106.65	P-D-PIPE-(19)
3	1	13.127	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.00	5.29	3.39	12	2.21	104.18	104.47	105.05	105.07	107.67	107.47	P-D-PIPE-(1)
4	1	29.126	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.40	3.55	4.90	12	1.00	104.18	104.47	105.05	105.26	107.67	107.44	P-D-PIPE-(4)

Project File: PR-STORM.stm | Number of lines: 4 | Run Date: 1/27/2026

NOTES:Known Qs only ; c = cir e = ellip b = box



Subcat Reach Pond Link

Routing Diagram for 220627 - INLET
Prepared by R Levesque Associates
HydroCAD® 10.20-8a s/n 13073 © 2025 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	100-Year	Type III 24-hr		Default	24.00	1	8.28	2

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PCB-1: Runoff Area=29,959 sf 56.64% Impervious Runoff Depth=5.10"
Tc=6.0 min CN=WQ Runoff=3.4 cfs 12,735 cf

Subcatchment PCB-2: Runoff Area=12,952 sf 84.26% Impervious Runoff Depth=6.97"
Tc=6.0 min CN=WQ Runoff=2.0 cfs 7,518 cf

Subcatchment PS-YD: Runoff Area=26,516 sf 26.49% Impervious Runoff Depth=3.04"
Flow Length=153' Tc=8.3 min CN=WQ Runoff=1.6 cfs 6,712 cf

Total Runoff Area = 69,427 sf Runoff Volume = 26,966 cf Average Runoff Depth = 4.66"
49.72% Pervious = 34,520 sf 50.28% Impervious = 34,908 sf

Summary for Subcatchment PCB-1:

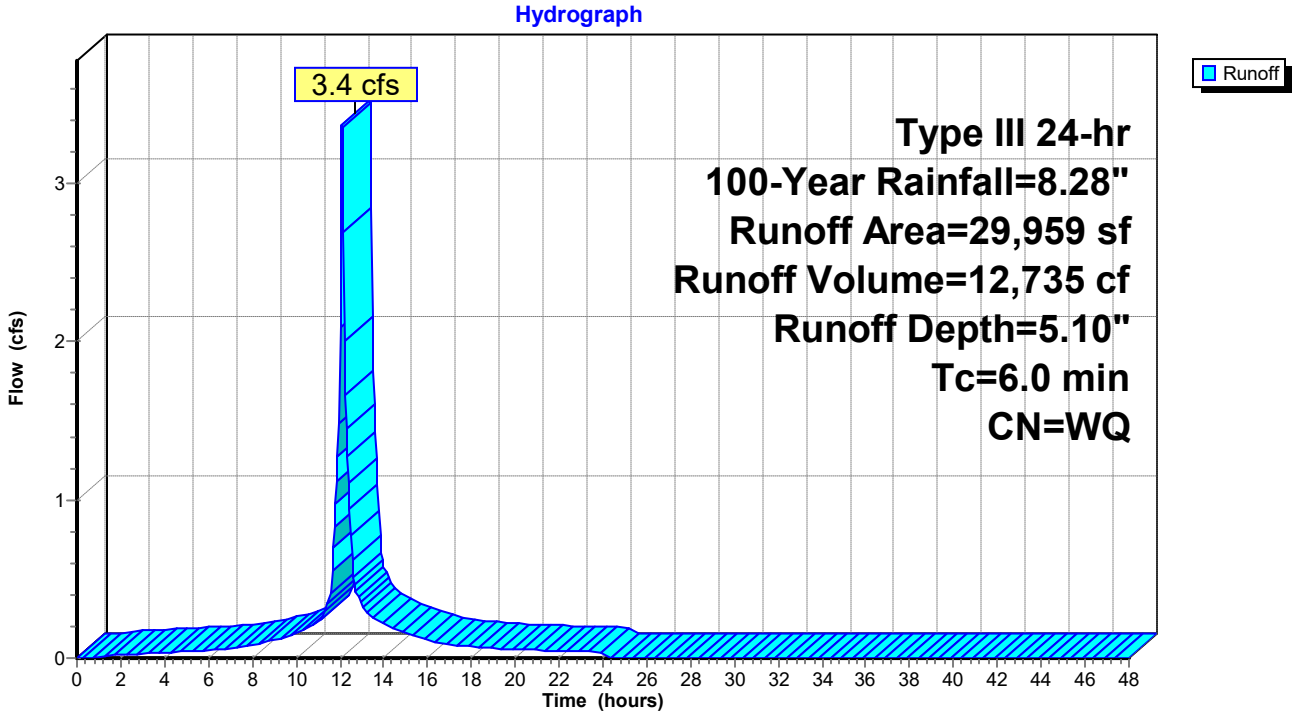
Runoff = 3.4 cfs @ 12.09 hrs, Volume= 12,735 cf, Depth= 5.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
12,748	39	>75% Grass cover, Good, HSG A
13,598	98	Paved parking, HSG A
3,371	98	Roofs, HSG A
241	30	Woods, Good, HSG A
29,959		Weighted Average
12,989	39	43.36% Pervious Area
16,970	98	56.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PCB-1:



Summary for Subcatchment PCB-2:

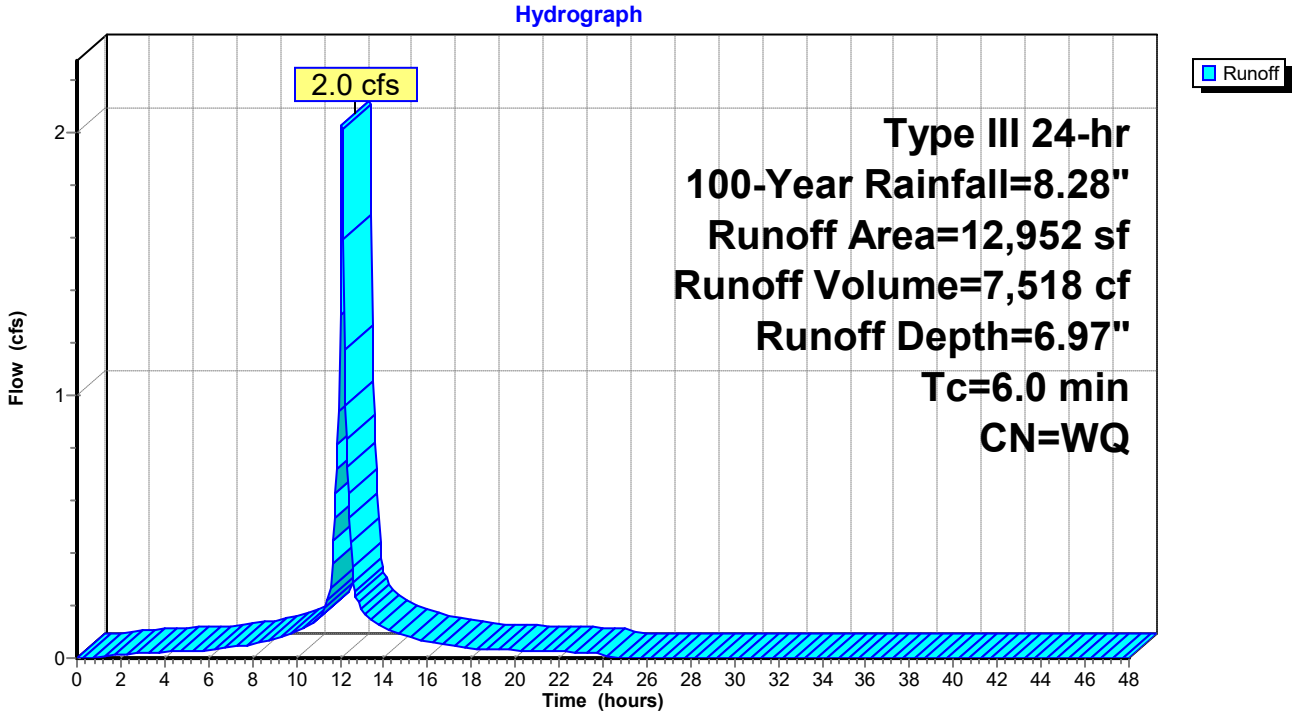
Runoff = 2.0 cfs @ 12.09 hrs, Volume= 7,518 cf, Depth= 6.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
1,872	39	>75% Grass cover, Good, HSG A
9,726	98	Paved parking, HSG A
1,188	98	Roofs, HSG A
166	30	Woods, Good, HSG A
12,952		Weighted Average
2,038	38	15.74% Pervious Area
10,914	98	84.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PCB-2:



Summary for Subcatchment PS-YD:

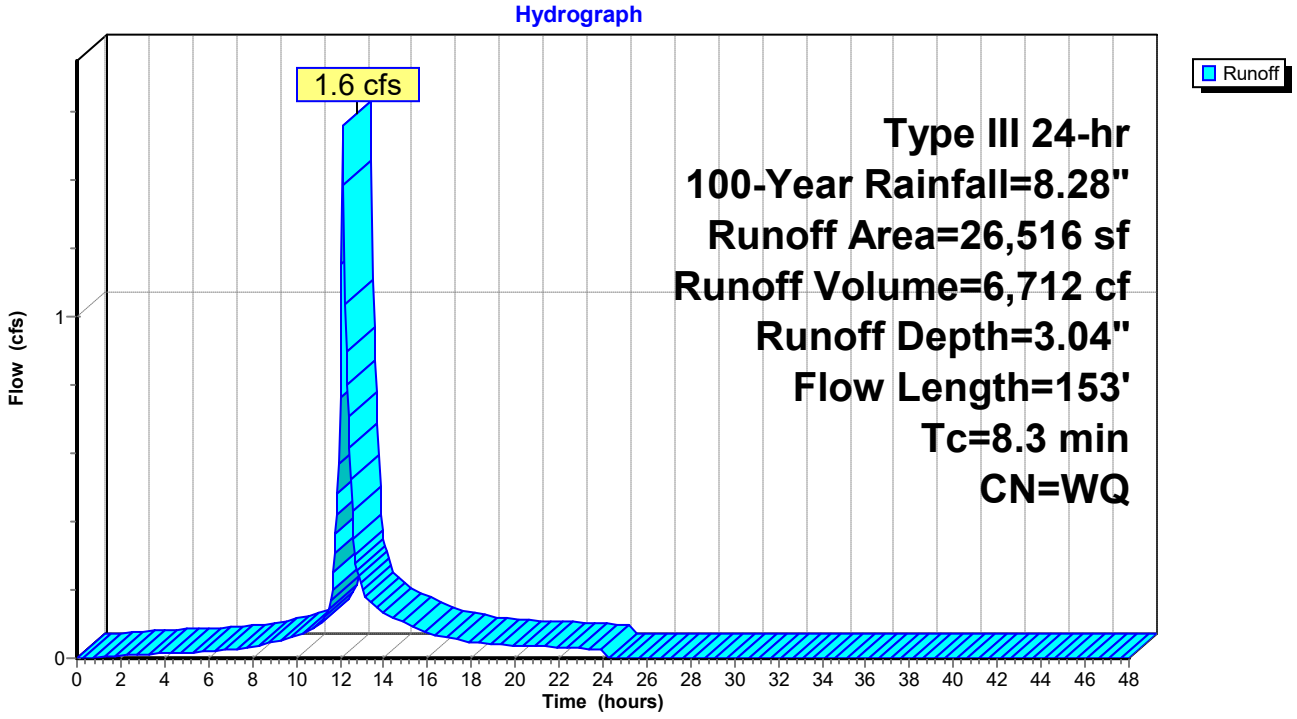
Runoff = 1.6 cfs @ 12.12 hrs, Volume= 6,712 cf, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.28"

Area (sf)	CN	Description
18,470	39	>75% Grass cover, Good, HSG A
4,345	98	Paved parking, HSG A
2,679	98	Roofs, HSG A
1,022	30	Woods, Good, HSG A
26,516		Weighted Average
19,493	39	73.51% Pervious Area
7,024	98	26.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	57	0.0350	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.00"
0.8	96	0.0156	2.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.3	153	Total			

Subcatchment PS-YD:



Appendix E: MassDEP Calculations

- Impervious Area Calculations
- Water Quality Flow Rate Calculation – PWQU-1
- Water Quality Conversion Table
- TSS Removal Worksheet
- Barracuda Max Info Sheet

Standard 3: Recharge Calculations

Impervious Area Calculations

Existing Total Impervious Area

Sub-Catchment	Roof (sf)	Other Impervious (sf)	Sum (sf)
ES-1	3674	6325	9,999
ES-2	634	325	959
ES-3A	562	149	711
ES-3B	242	0	242
ES-3C	0	2	2
ES-4	604	211	815
			12,728

Proposed Total Impervious Area

Sub-Catchment	Roof (sf)	Other Impervious (sf)	Sum (sf)	
PS-1A	0	192	192	
PS-1B	7238	28686	35924	Tributary to Basin
PS-2	634	738	1372	
PS-3A	562	149	711	
PS-3B	242	0	242	
PS-3C	0	2	2	
PS-4	604	211	815	
			39,258	

Summary Table

Total Existing Impervious Area	12,728	SF
Total Proposed Impervious Area	39,258	SF
Total New Impervious Area	26,530	SF
Total Impervious Area Tributary to Basin	35,924	SF

Standard 4: Water Quality - PWQU-I

Water Quality Volume Conversion to Flow Rate

Note: Required water quality volume based on 0.5-inch of runoff

$Q = (qu)\ (A)\ (WQV)$

where: Q = peak flow rate associated with first 0.5-inch of runoff (c.f.s.)

qu = unit peak discharge (csm/in) - value taken from table based on t_c

A = impervious surface drainage area (sq. mi.)

WQV = water quality volume in watershed inches

Proposed Water Quality Unit (PWQU-1)

t_c =	0.100	hrs	
qu =	752	csm/in	(from table)
A =	0.00129	sq. mi.*	
WQV =	0.5	inch **	

$Q_{0.5}$ = 0.48 c.f.s

The Baracuda Max Model S4 provides treatment of flows up to 1.52 c.f.s.

* Only inlcudes impervious area tributary to PWQU-1

** Water quality depth shall equal 1-inch for discharges within a Zone II or Interim Wellhead Protection Area, to or near another critical area, runoff from a LUHPPL, or exfiltration to soils with infiltration rate greater than 2.4-inches/hour or greater; 1/2-inch for discharges near to to other areas

Figure 2: For First ½-inch of Runoff, Table of qu values for Ia/P Curve = 0.0.058, listed by tc, for Type III Storm Distribution

Tc (Hours)	qu (csm/in)
0.01	821
0.03	821
0.05	813
0.067	794
0.083	773
0.1	752
0.116	733
0.133	713
0.15	694
0.167	677
0.183	662
0.2	646
0.217	632
0.233	619
0.25	606
0.3	572
0.333	552
0.35	542
0.4	516
0.416	508
0.5	472
0.583	443
0.6	437
0.667	417
0.7	408
0.8	383
0.9	361
1	342
1.1	325
1.2	311
1.3	297
1.4	285
1.5	274
1.6	264
1.7	254
1.8	246
1.9	238
2	230
2.1	223
2.2	217
2.3	211
2.4	205
2.5	200
2.6	194
2.7	190
2.8	185
2.9	181
3	176
3.1	173
3.2	169
3.3	165
3.4	162
3.5	158
3.6	155
3.7	152
3.8	149
3.9	147
4	144
4.1	141
4.2	139
4.3	136
4.4	134
4.5	132
4.6	130
4.7	128
4.8	126
4.9	124
5	122
5.1	120
5.2	118
5.3	116
5.4	115
5.5	113
5.6	112
5.7	110
5.8	109
5.9	107
6	106
6.1	104
6.2	103
6.3	102
6.4	100
6.5	99
6.6	98
6.7	97
6.8	96
6.9	94
7	93
7.1	92
7.2	91
7.3	90
7.4	89
7.5	88
7.6	87
7.7	86
7.8	85
7.9	84
8	84
8.1	83
8.2	82
8.3	81
8.4	80
8.5	79
8.6	79
8.7	78
8.8	77
8.9	76
9	76
9.1	75
9.2	74
9.3	74
9.4	73
9.5	72
9.6	72
9.7	71
9.8	70
9.9	70
10	69

TSS Removal Form - Surface Infiltration Basin

Total TSS Removal

BMP	TSS Removal Rate	Starting TSS Load	Amount Removed	Remaining Load
Deep-Sump Hooded Catch Basins	0.25	1.00	0.25	0.75
Propietary Sdimentation Device	0.80	0.75	0.60	0.15

Total TSS Removal = 85%

Barracuda® Max

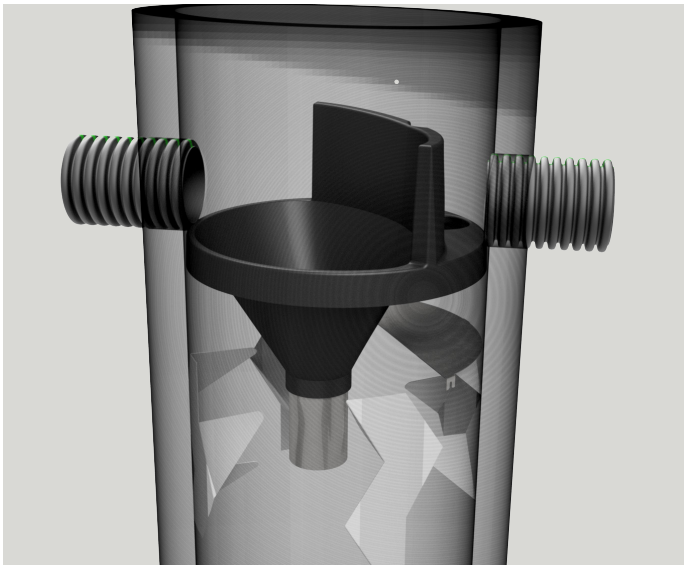
The Barracuda Max is market-changing stormwater quality technology. This high-performance vortex hydrodynamic separator is designed to remove total suspended solids in order to protect our precious receiving waters. The Barracuda Max is also an outstanding value that offers multiple pipe configurations, and quick installation. The “Max” version of the Barracuda is built on the base platform of the original ADS Barracuda with improved removal efficiencies and installation components.

Features

- Single manhole design
- No elevation loss between the inlet and outlet
- Variable inlet/outlet angle configurations (not just 180 degree orientation)
- Internal bypass for inline installation (where applicable)
- Revolutionary, patent pending “teeth” mitigate turbulence in the sump area to prevent resuspension of captured contaminants
- Available with grated drop inlet configuration
- Available with trash and/or oil capture add-ons

Benefits

- Internal components are in stock for quick delivery
- The S3, S4, S6, and S8 can be installed in a standard 36” (900 mm), 48” (1200 m), 72” (1800 m), and 96” (2400 m) precast manhole, respectively
- The S3 & S4 can be provided factory installed within a 36” (900 mm) and 48” (1200 mm) ADS HP manhole and delivered to the jobsite
- The Barracuda Max “teeth” and deflector plate apparatus are fabricated and designed for quick and easy field assembly
- Designed for easy maintenance using a vacuum truck or similar equipment.
- Inspection and maintenance are performed from the surface with no confined space entry





ADS™

Barrucuda Specification

Materials and Design

- Concrete Structures: Designed for H-20 traffic loading and applicable soil loads or as otherwise determined by a Licensed Professional Engineer. The materials and structural design of the devices shall be per ASTM C857 and ASTM C858.
- 36” (900 mm) and 48” (1200 mm) HP Manhole Structures: Made from an impact modified copolymer polypropylene meeting the material requirements of ASTM F2764. The eccentric cone reducer shall be manufactured from polyethylene material meeting ASTM D3350 cell class 213320C. Gaskets shall be made of material meeting the requirements of ASTM F477.
- Separator internals shall be substantially constructed of stainless steel, polyethylene or other thermoplastic material approved by the manufacturer.

Performance

- The stormwater treatment unit shall be an inline unit capable of conveying 100% of the design peak flow. If peak flow rates exceed maximum hydraulic rate, the unit shall be installed offline.
- The Barracuda Max unit shall be designed to remove at least 80% of the suspended solids on an annual aggregate removal basis. Said removal shall be based on full-scale third party testing using OK-110 media gradation or equivalent and 300 mg/L influent concentration. Said full scale testing shall have included sediment capture based on actual total mass collected by the stormwater treatment unit.

  - OR -

  The Barracuda Max unit shall be designed to remove at least 50% of TSS using a media mix with d_{50}=75 micron and 200 mg/L influent concentration.

  - OR -

  The Barracuda Max unit shall be designed to remove at least 50% of TSS per current NJDEP/NJCAT HDS protocol.
- The stormwater treatment unit internals shall consist of (1) separator cone assembly, and (1) sump assembly, which includes the “teeth”.

Barracuda Max Model	Manhole Diameter	OK-110 (80% removal)	Pretreatment for Infiltration[1]
S3	36” (900 mm)	0.86 CFS (24.1 L/s)	1.65 CFS (46.7 L/s)
S4	48” (1200 mm)	1.52 CFS (43.0 L/s)	2.94 CFS (83.3 L/s)
S6	72” (1800 mm)	3.42 CFS (96.8 L/s)	6.62 CFS (187.5 L/s)
S8	96” (2400 mm)	6.08 CFS (172.2 L/s)	11.76 CFS (333.0 L/s)

* Peak bypass flows are dependent on final design

[1] 50% removal of OK-110.

Installation

Installation of the stormwater treatment unit(s) shall be performed per manufacturer’s installation instructions. Such instructions can be obtained by calling Advanced Drainage Systems at 800-821-6710 or by logging on to www.adspipe.com.

ADS “Terms and Conditions of Sale” are available on the website, www.ads-pipe.com . The ADS logo, Barracuda logo, and the Green Stripe are registered trademarks of Advanced Drainage Systems, Inc.
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Appendix F: Construction Period Erosion Control Plan

Construction Period Erosion Control Plan

Proposed Residential Subdivision

Project Location:

Old River Street, 27 Walnut Street & 17 High Street
Agawam, Massachusetts 01001
(Parcel IDs: J17-1-3, J17-1-1 & J17-1-5)

Submitted To:

Town of Agawam Planning Board
1000 Suffield Street
Agawam, Massachusetts 01001

Applicant & Property Owner:

Calabrese Construction, LLC
c/o Mr. Charles Calabrese
7 Brewster Road
West Springfield, Massachusetts 01089

RLA Project File No. 220627

January 30, 2026

R LEVESQUE ASSOCIATES, INC
A LAND PLANNING SERVICES COMPANY
40 School Street · Westfield, MA 01085
p 413.568.0985 · f 413.568.0986 · www.rlaland.com

The project shall implement a construction period erosion control plan. The following provides descriptions and guidelines to ensure that the areas surrounding the project site will be protected from excessive sedimentation and runoff during construction.

1.1 Construction Period Pollution Prevention And Erosion Control Measures

1.1.1 Preconstruction Notifications And Meetings

Prior to the start of construction, the contractor shall call together a pre-construction meeting including a representative from the Town, the design engineer, contractor, and any pertinent persons that should be in attendance. These requirements shall be the responsibility of the Contractor to arrange, attend, and document.

1.1.2 Sediment Barrier And Work Limit

Before installation of the sediment barriers, the location shall be staked in the field for review and approval by the owner or their representative. To facilitate sediment barrier installation, woody vegetation may then be removed and any required trench may be cut by machine, provided all other ground cover is left intact. No excavation, grading, filling, or removal of vegetative ground cover shall begin until sediment barriers have been installed as shown on the plans and have been inspected by the owner or their representative.

1.1.3 Silt Fence

The bottom of the fence shall be trenched into the ground a minimum of 6" and back-filled with compacted soil. Where trenching is not feasible, silt fence skirt shall be covered with compacted soil or crushed stone. The top of the fabric shall be stretched as tightly as is practical, with intermediate stakes added to correct excessive sags. Stakes shall be driven at least 12" into the ground. Splices between sections shall be made by rolling end stakes together one complete turn and driving into the ground together.

1.1.4 Straw Bales

Straw bales may be used as temporary and moveable control measures, temporary check dams, or as reinforcement for silt fence in areas of concentrated runoff or high fills. Bales shall be tightly butted and staked 12" into the ground. Where used without silt fence in front, the bales shall be trenched 4" into the ground, back-filled with compacted soil, and the spaces between bales shall be chinked with loose hay.

1.1.5 Filter Sock (Filtrexx Or Equivalent)

In areas of expected sheet flow, filter sock may be placed directly on the ground without trenching or stakes. In areas of expected concentrated flow, mulch or crushed stone shall be placed along the up-slope face to control and filter underflow. Additional layers of Filter Sock may be required for adequate freeboard. The filter sock shall be staked at 10 feet on-center or in cases where they cannot be staked, utilize heavy concrete blocks to hold in place.

1.1.6 Temporary Sedimentation Basins

Temporary sediment basins may be excavations or bermed stormwater detention structures (depending on grading) that will retain runoff for a sufficient period of time to allow suspended soil particles to settle out prior to discharge. These temporary basins will be located based on construction needs as determined by the contractor and outlet devices will be designed to control velocity and sediment. Points of discharge from sediment basins will be stabilized to minimize erosion. If the temporary basin is to be located within an area of future infiltration as part of the stormwater management system, the excavation for the temporary sedimentation basin shall be limited to one foot above final grade of the infiltration structure.

1.1.7 Stocking Additional Materials

A stock of additional erosion control materials shall be available on the site for emergency repairs and temporary measures. Stock shall be replenished when decreased to 50% of the numbers below. Stock shall include:

Straw Bales – 10 (kept dry) with 20 oak stakes

Or

Silt Fence – 30 Linear feet.

Or

Filter Sock – 4 – 8 foot sections (kept dry)

Washed Stone – One (1) cubic yard, ¾" to 2" diameter

1.1.8 Trench Protection

Open trenches shall be protected from accumulation of surface water or groundwater that could result in erosion of the trench and discharge of sediment. Where feasible, spoil shall be stockpiled on the up-slope side of the trench to prevent entrance of surface runoff. Backfill shall be crowned to allow for settlement and to avoid concentration of runoff on top of the trench.

1.1.9 Site Stabilization – Temporary

Where a portion of the site will not be subject to construction activity for over 14 days, measures shall be taken to provide temporary stabilization of that inactive portion of the site, within 14 days of the cessation of construction activity. Stabilization measures may include seeding for temporary cover, mulching, or other measures to protect exposed soil from erosion and prevent sediment movement.

1.1.10 Site Stabilization – Permanent

Within 14 days of completion of loaming and finish grading on any portion of the site, that area shall be seeded or planted for permanent cover (season permitting) in accordance with USDA NRCS guidelines or equivalent.

1.1.11 Roadway Sweeping

The entrance to the site and affected portions of the access drive or paved project areas shall be swept as needed to control sediment runoff into storm drains or waterways and to control blowing dust.

1.2 Short-Term Erosion Control Maintenance

The following provides short-term erosion control maintenance guidelines and requirements.

1. The contractor or subcontractor will be responsible for implementing each control shown on the sedimentation and erosion control plan.
2. All erosion and sediment control devices shall be properly maintained during all phases of construction until the completion of all construction activities and all disturbed areas have been stabilized. Additional control measures will be installed during construction in order to control erosion and/or off-site sedimentation if deemed necessary by on-site inspection.
3. Effective erosion control measures shall be initiated prior to the commencement of clearing, grading, excavation, or other operations that will disturb the natural protection.
4. All sediment and erosion control devices shall be inspected at least once every seven (7) calendar days and after any storm event greater than 0.5 inches of precipitation during any 24-hour period, and the inspection shall be documented in writing. Damaged or ineffective devices shall be repaired or replaced, as necessary.
5. The contractor shall take all reasonable precautions to avoid excess erosion of the site due to the construction of this project.
6. Silt shall be removed from behind barriers if greater than 6-inches deep or as needed. Sediment that is collected in structures shall be disposed of properly and covered if stored on-site
7. Damaged or deteriorated items will be repaired immediately after identification.
8. All ditches shall be stabilized as soon as is practicable to minimize erosion.
9. The contractor shall maintain all erosion control devices in a good, working state of repair. Upon complete stabilization of any tributary areas, the erosion control devices shall be removed and disposed of so as to cause no off-site siltation.
10. Inspect and maintain construction entrance stone such that sediment does not track onto the street. Any sediment tracked onto the street shall be swept daily.
11. After catch basins have been constructed, the contractor shall protect the inlets by constructing inlet protection as shown on the plans.
12. Once the site has been paved, all catch basin inlets shall receive a silt sack type protection.
13. Erosion control measures shall remain in place until all disturbed earth has been substantially stabilized. After removal of structures, disturbed areas shall be regraded and stabilized as necessary.

Appendix G: Long-Term Operation and Maintenance Plan

- Long-Term Operation & Maintenance Plan Narrative
- Barracuda Max Maintenance Guide
- StormTech Isolator Row Manual
- Isolator Row Sell Sheet
- StormTech SC-800 Sell Sheet
- O&M Checklist

Long-Term Operation & Maintenance Plan

Proposed Residential Subdivision

Project Location:

Old River Street, 27 Walnut Street & 17 High Street
Agawam, Massachusetts 01001
(Parcel IDs: J17-1-3, J17-1-1 & J17-1-5)

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I. Long-Term Stormwater Maintenance Program:

This Long-Term Operation and Maintenance Plan (O&M) identifies inspection and maintenance requirements for the proposed stormwater management system. The O&M references guidelines set forth by the Stormwater Management Handbook developed by the Massachusetts Department of Environmental Protection.

Owner/Responsible Party*:

Calabrese Construction, LLC
c/o Mr. Charles Calabrese
7 Brewster Road
West Springfield, Massachusetts 01089

_____
Signature of Authorized Representative

*The party listed shall be responsible for implementation and record keeping of the requirements listed in this operation and maintenance plan. Upon sale of property or any other transition of ownership, the responsible party shall be reinstated as the new owner or any other group created as determined by the owner.

2. Inspection and Maintenance Program:

Regular inspection and routine maintenance are necessary to ensure that the stormwater management system continues to control and treat runoff. The following lists the inspection schedule and maintenance procedures for the proposed stormwater Best Management Practices:

BMP	Inspection Schedule	Maintenance Schedule	Maintenance Procedures
Bituminous Concrete Pavement	Four times per year	Twice per year	• Roadway to be swept in March or April following snow melt and again in late November or early December to remove fallen leaves and debris.
Deep-Sump Catch Basins	Four times per year	Four times per year	• Remove sediment once deposits reach one half the depth from the bottom sump to the lowest invert.
Stormwater Piping	Once per year	Once per year	• Inspect pipe entrances in catch basins and manholes and remove any blockages.
Water Quality Unit*	As specified by the manufacturer	As specified by the manufacturer	• Clean the unit using the method specified by the manufacturer. Vactor trucks are typically used to clean these units.
Subsurface Detention Basin	Twice per year	Twice Per year	• Verify that the inlet structure has no accumulation of sediment.
Isolator Row(s)**	Every 6 months for the first year. Once per year thereafter	3 inches of accumulated sediment	• Measure accumulated sediment depth. Once sediment reaches 3 inches, maintenance cleaning should be performed.
Flared End Section	Four times per year	As Needed	• Remove any debris or vegetation around the flared end section such that flow out of the structure is not impeded.
Roof Leaders	Once per year	Once per year	• Inspect downspout connections at grade and remove any blockages. • Open and inspect cleanout locations and remove any blockages.
Level Spreader	Every six months during the first year. Annually thereafter.	As Needed	• Remove sediment from the toe of slope and/or riprap voids. • Repair gullies and reseed bare spots immediately.

*See attached Device Operation and Maintenance Guides

**See attached Maintenance Guide

See the attached Long-Term O&M Inspection Checklist for record keeping purposes.

3. Additional Long-Term Operation and Maintenance Items

The following is a list of additional operation and maintenance items to be implemented by the owner/governing group to maintain the features proposed in this project.

A. Proper storage, use, and disposal of hazardous chemicals, including automobile fluids, pesticides, paints, solvents, etc. shall be required. Information should be provided on chemicals of concern, proper use, and disposal options. Recycling programs for used motor oil, antifreeze, and other products should be developed.

B. Vehicle Washing. This management measure involves educating the owner on the water quality impacts of the outdoor washing of vehicles and how to avoid allowing polluted runoff to enter the storm drain system. Outdoor vehicle washing has the potential to result in high loads of nutrients, metals, and hydrocarbons which is conveyed by the detergent-rich water into storm drains.

C. Recycling, spill prevention and response plans, and proper material storage and disposal of potentially hazardous materials shall be implemented. It will be the responsibility of the owner to contain and legally remove any materials that are spilled onsite. The use of dry floor cleaners and absorbent materials and limiting the use of water to clean pavement is encouraged. Care should be taken to avoid accidental disposal of hazardous materials.

D. Provisions for storing trash and waste products shall be implemented. The waste materials shall be collected by the owner and all materials shall be properly disposed of.

E. Requirements for routine inspections and maintenance of stormwater best management practices. Routine inspections shall be performed to ensure the correct functioning of stormwater best management practices. See the specific maintenance criteria for detail regarding inspections and maintenance frequency.

F. Requirements for Storage and Use of Fertilizers, Herbicides, and Pesticides. Fertilizers, pesticides, herbicides, lawn care chemicals, or other leachable materials shall be used in accordance with the Lawn Care Regulations of the Massachusetts Pesticide Board, 33 CMR 10.03 (30,31), as amended, with manufacturer's label instructions and all other necessary precautions to minimize adverse impacts on surface and groundwater. The storage of any such materials shall be within structure designed to prevent the escape of contaminated runoff or leachate.

G. Provisions for prevention of illicit discharges to the stormwater management system shall be implemented. Any illicit discharges to the stormwater management system shall be prohibited. It will be the owner's responsibility to ensure compliance with the legal disposal of all materials and containment/cleanup of any illicit discharges.

H. Training for staff or personnel involved with implementation of the Long-Term Pollution Prevention Plan shall be required. The owner/governing group will be responsible for the implementation of the measures set forth in the Long-Term Pollution Prevention Plan. Documentation that personnel and owners involved with the implementation of the Long-Term Pollution Prevention Plan have been trained to conduct such tasks shall be documented.

4. Winter and Snow Conditions

The following is a list of additional operation and maintenance items to be implemented by the owner during winter and snow conditions.

A. Snowfall shall be stored on the grassed areas surrounding the pavement areas, excluding any areas utilized for stormwater management practices. As needed, any snow that cannot be stored on site shall be trucked off site and disposed of properly.

B. Winter road salt and/or sand use and storage restrictions shall be implemented based on any restrictions issued for the project. Sodium chloride for ice control shall be used at the minimum salt to sand ratio which is consistent with the Massachusetts Department of Environmental Protections guidelines. Sodium chloride, calcium chloride, chemically treated abrasives or other chemicals used for the removal of ice and snow on roads/drives shall not be stored on site.

5. Public Safety Features

The proposed site design utilizes the following features which have been incorporated to ensure the safety of the public:

A. Control and collection of stormwater runoff through positive drainage and curbing directing it towards the drainage inlets;

B. Heavy-duty stormwater drain manhole covers and catch basin grates have been designed to withstand H20 loading;

C. Reduction of peak discharge rates from the site in the post-development condition as compared to the pre-developed conditions;

D. Development and implementation of an Operations & Maintenance Plan to ensure the stormwater management system continues to function as designed.

6. Estimated Cost of Maintenance

The following budget was prepared as an estimate of inspection and maintenance costs for the stormwater management system. The budget is an estimate only as the costs may vary depending on the level of sediment accumulation and frequency of maintenance tasks required.

BMP Inspections	Number of Occurrences	Maintenance Cost	Number of Structures	Sum
Water Quality Unit	2/year	$200	1	$400
Catch Basin	4/year	$50	2	$400
Isolator Row	2/year	$100	1	$200
Subsurface Detention Basin	2/year	$100	1	$200
Level Spreader	2/year	$100	1	$200
Total Estimated Annual Cost of Inspections				$1,400

BMP Maintenance	Number of Occurrences	Maintenance Cost	Number of Structures	Sum
Water Quality Unit	2/year	$1,000	1	$2,000
Catch Basin	4/year	$100	2	$800
Isolator Row	2/year	$100	1	$200
Subsurface Detention Basin	2/year	$500	1	$1,000
Level Spreader	1/year	$1,000	1	$1,000
Total Estimated Annual Cost of Maintenance				$5,000

Barracuda® Max & Barracuda Maintenance Guide

One of Barracuda's advantages is the ease of maintenance. Like any system that collects pollutants, the Barracuda must be maintained for continued effectiveness. Maintenance is a simple procedure performed using a vacuum truck or similar equipment. The systems were designed to minimize the volume of water removed during routine maintenance, reducing disposal costs.

Contractors can access the pollutants stored in the manhole through the manhole cover. This allows them to gain vacuum hose access to the bottom of the manhole to remove sediment and trash. There is no confined space entry necessary for inspection or maintenance.

The entire maintenance procedure typically takes 2 to 4 hours, depending on the system's size, the captured material, and the vacuum truck's capacity.

Local regulations may apply to the maintenance procedure. Safe and legal disposal of pollutants is the responsibility of the maintenance contractor. Maintenance should be performed only by a qualified contractor.

Inspection and Cleaning Cycle

Periodic inspection is needed to determine the need for and frequency of maintenance. You should begin inspecting as soon as construction is complete and then on an annual basis. Typically, the system needs to be cleaned every 1-3 years.

Excessive oils, fuels or sediments may reduce the maintenance cycle. Periodic inspection is important.

Determining When to Clean

To determine the sediment depth, the maintenance contractor should lower a stadia rod into the manhole until it contacts the top of the captured sediment and mark that spot on the rod. Then push the probe through to the bottom of the sump and mark that spot to determine sediment depth.

Maintenance should occur when the sediment has reached the levels indicated in the Storage Capacity Chart.

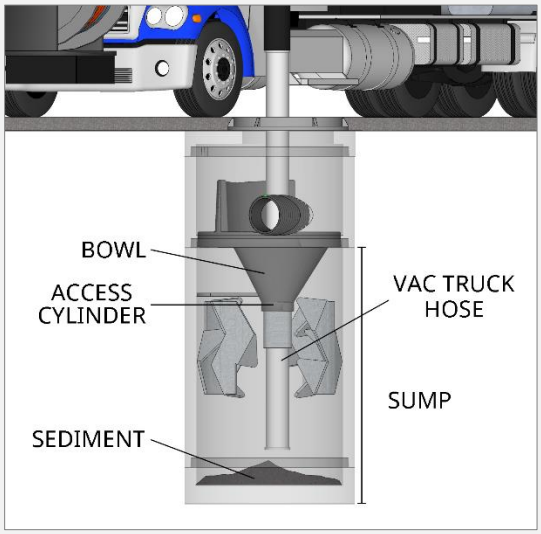
Barracuda Storage Capacities

Model	Manhole Diameter in. (mm)	Total System Volume Gallons (Liters)	Treatment Chamber Capacity Gallons (Liters)	Standard Sediment Capacity (20" depth) Yards^3 (meters^3)	NJDEP Sediment Capacity (50% of standard depth) Yards^3 (meters^3)
S3	36 (900)	264 (999)	212 (803)	0.44 (0.34)	0.22 (0.17)
S4	48 (1200)	665 (2517)	564 (2135)	0.78 (0.60)	0.39 (0.30)
S6	72 (1800)	1497 (5667)	1269 (4804)	1.75 (1.34)	0.88 (0.67)
S8	96 (2400)	4196 (15884)	3835 (14517)	3.10 (2.37)	1.55 (1.19)

Maintenance Instructions

1. Remove the manhole cover to provide access to the pollutant storage. Pollutants are stored in the sump, below the bowl assembly visible from the surface. Access this area through the 8" (200 mm), 10" (250 mm), 15" (375 mm) or 20" (500 mm) diameter access cylinder.
2. Use a vacuum truck or other similar equipment to remove all water, debris, oils and sediment. See figure 1.
3. Use a high pressure hose to clean the manhole of all the remaining sediment and debris. Then, use the vacuum truck to remove the water.
4. Fill the cleaned manhole with water until the level reaches the invert of the outlet pipe.
5. Replace the manhole cover.
6. Dispose of the polluted water, oils, sediment and trash at an approved facility.
    a. Local regulations prohibit the discharge of solid material into the sanitary system. Check with the local sewer authority for authority to discharge the liquid.
    b. Some localities treat the pollutants as leachate. Check with local regulators about disposal requirements.
    c. Additional local regulations may apply to the maintenance procedure.

Figure 1



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ADS® Barracuda® Concrete

Installation Guide

ADS Barracuda Max & Barracuda S4, S6, S8 Concrete Installation Guide

This installation guide is reference for installing the Barracuda Max S4, S6, S8 Water Quality Units into a precast concrete structure in the field.



(1) Deflector Plate



(1) Center Funnel Extender



(2) A/C Stainless Steel Tooth Set



(2) B/D Stainless Steel Tooth Set



(1) Barracuda Max Plastic Funnel

S4	 (4) Stainless Steel Funnel Mounting Flanges	 (1) Roll of Conseal®	 (16) Concrete Anchor ¼ x 2¼"
S6	 (4) Stainless Steel Funnel Mounting Flanges	 (3) Roll of Conseal®	 (16) Concrete Anchor ¼ x 2¼"
S8	 (8) Stainless Steel Funnel Mounting Flanges	 (4) Roll of Conseal®	 (22) Concrete Anchor ¼ x 2¼"

Please check that all components are on site. Below is a list of tools that may be required for installation.

- □ 1/4" Diameter Carbide Tipped Concrete Bit
- □ Standard Electrical or Battery Operated Drill
- □ Adjustable Wrench
- □ Marker for writing on the concrete wall
- □ Hammer Drill for Concrete (Fits the 1/4" Diameter Concrete Drill Bit)
- □ 7/16" Driver or deep socket for installation of provided ¼" Concrete Wedge Anchors
- □ Hammer
- □ Level
- □ Ladder that will extend to bottom of the structure
- □ Safety Glasses
- □ Hard Hat
- □ Protective Gloves
- □ Site Drawings
- □ ADS Design Layout

Installation Instructions (These directions assume the manhole base and riser have been assembled, but that the top slab/cone has not been set).

*Do not insert the inlet or outlet pipes until after the Barracuda Max internals have been installed. If pipes must be inserted in advance, the pipes should not protrude into the structure as they will interfere with installation of the bowl.

1. Install mounting flanges for the Barracuda Max plastic funnel. These flanges need to be installed at the same height, as indicated by model in Table 1. For example, the anchor holes for S4 flanges should be drilled 77" (1925 mm) from the sump floor. S4 and S6 models have four flanges and they need to be evenly spaced at 12, 3, 6, and 9 o'clock positions. S8 funnels require eight flanges that also need to be evenly spaced (i.e., forty-five degrees on a circle) around the inside of the manhole. This flange points are typically located in the third manhole section from the sump and also contain the pipe openings for the Barracuda Max unit. Use the same anchor procedure as you will when mounting the teeth (see step #4 below), using the ¼" (6.25 mm) concrete drill bit to drill 1¼" (31.25 mm) deep holes. Do not over drill the depth of the anchors. Lightly hammer the anchors in place and use locking nuts to firmly secure the flanges (Figure 1).
2. Next, mount the four sets of teeth vertically inside the manhole sump. Using the engineer's plans or the ADS layout, determine the correct orientation for the plastic funnel outlet hole in relation to the outlet pipe (Figures 2 and 5). The first set of teeth (marked as "A" on the teeth part) will be mounted under the center of the outlet hole from the Bowl. Mark that location with a plumb vertical line, this will serve as the "12 o' clock" landmark in the manhole (Figure 3). Repeat this process to mark lines at the 3, 6, and 9 o' clock positions for a total of four.
3. Each kit includes four sets of teeth. Two of these sets are stamped with the letters A and C. The other two sets are stamped B and D. The ADS shop drawing layout will label the teeth letters and all designs will be the A/B configuration (Figure 5). You will install each set of teeth in the correct location, with the indicated letter facing up (Figure 4). See Table 1 for the correct elevation for the top anchor location of each tooth set, measured from the sump floor for each Barracuda Max Unit. The teeth anchors are all at the same elevation. For example, for an S4 Barracuda the top anchor of an A or B indicated set of teeth will be 60" (1500 mm) off the sump floor. Mark the top anchor elevations on each of your four vertical lines (Figure 3), noting that A and B sets of teeth will be at the same height.



Figure 1



Figure 2



Figure 3

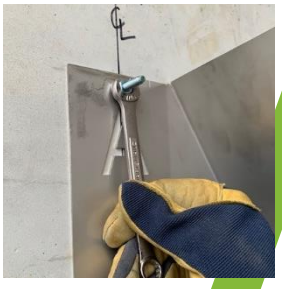
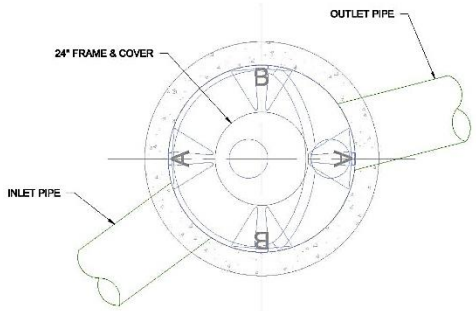


Figure 5

Figure 4



4. To fasten the sets of the teeth to the manhole, use the ¼" concrete drill bit and drill holes approximately 1¼" (31.25 mm) deep at your marked top anchor locations. Do not over drill into the concrete wall. Using a hammer, lightly tap the concrete anchors into the drilled holes (Figure 4). Hang the tooth set on the top anchor with the correct letter facing up and use a locking nut to loosely secure the tooth set to the wall (do not fully tighten the locking nut at this point). With the set of teeth hanging from the top anchor, line up and mark the bottom anchor location and drill the hole. Then hammer the bottom anchor in place and secure the teeth with a lock nut. Use an adjustable or socket wrench to tighten all the top and bottom locking nuts, except for the top nut on the outlet set of teeth (see step #5 below for the deflector plate installation, which will share the top anchor post), so that the teeth are firmly secured to the wall.
5. To attach the deflector plate to the concrete manhole you will use the exit tooth's top concrete anchor and share that linking point with the center tab of the deflector plate. Place the center tab of the deflector plate over the anchor bolt "post" on the outlet set of teeth and hand tighten the nut. Ideally, the plate will be held in place by this center point. Mark the location of the additional mounting tabs for the deflector plate while holding the plate relatively level. All deflector plate concrete anchors will be at the same elevation as the top tooth linking points and the anchors will be installed like the description in step #4. Once the two outer deflector plate linking points have been located, the installer can draw a vertical line and measure the exact location corresponding to the "high" teeth anchoring elevation. Once the deflector plate concrete anchors are installed tighten the nuts to complete the fastening of the deflector plate to the wall of the structure. See Figure 6 to show this more clearly.
6. Lower the plastic funnel into the structure (Figure 7), orienting the weir and outlet hole as depicted in the ADS layout (as identified in step 1). S6 and S8 units have eyebolts threaded holes on the top of the funnel to assist in lifting, and the eyebolts are provided in the equipment kit. If the eyebolts are misplaced, S6 units have ⅜" (9 mm) -16 threads and S8 units utilize ½" (12 mm) -13 threads. After the bowl is in place, install the center funnel extender through the hole and seat it until the tabs of the extender touch the bowl itself (Figure 8). This is a friction-based attachment and no fasteners are needed.
7. Next, you'll use Conseal to fill any gaps around the funnel. S6 and S8 units are provided with a metal funnel plug. This plug is placed in the funnel opening for worker safety and must be utilized ANYTIME SOMEONE ENTERS THE STRUCTURE. Unroll the Conseal and wedge it between the funnel and manhole to create a seal (Figure 9). Conseal should also be used to seal between the vertical edges of the weir wall and the manhole. The plastic funnel can expand with high temperature. Install the funnel during cooler parts of the day, or keep the funnel shaded until installation can mitigate fitment issues. Once the Conseal is installed, the internal component installation is complete. The funnel plug may be discarded (if applicable), and the top slab can be set. If the application calls for a grated inlet, orient the slab so the grate is above the inlet (large bowl) side of the plastic funnel.

For maintenance details, please refer to the Barracuda Max Maintenance Manual. If the application requires a trash rack or oil boom, reference the appropriate supplementary installation instructions.



Figure 6



Figure 7



Figure 8

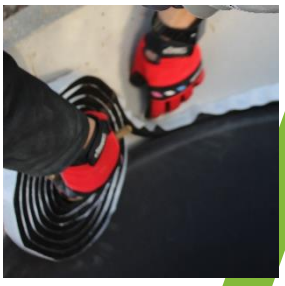


Figure 9

Table 1

	S4	S6	S8
Top Anchor Elevation from Sump Floor (A and B tooth indication)	60” (1270 mm)	68” (1475 mm)	90” (1880 mm)
Funnel Flange Anchor Elevation from Sump Floor	77” (1960 mm)	77” (1960 mm)	127” (3220 mm)

Note: Distances can be +/- 1-2 inches (25-50 mm) from these locations for the A, and B teeth, but flange elevations should be adhered to as much as possible and can only be lowered a maximum of 1 inch (25 mm) from these values listed above.
This guide is intended for field installations of Barracuda Max S4, S6, and S8 water quality units into precast manholes. For pre-casters installing internal components prior to job site delivery, contact ADS for possible modifications to component elevations.

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Isolator® Row Plus
O&M Manual



ADS StormTech™

The Isolator® Row Plus

Introduction

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row Plus is a technique to inexpensively enhance Total Suspended Solids (TSS), Total Phosphorus (TP), Total Petroluem Hydrocarbons (TPH) and Total Nitrogen (TN) removal with easy access for inspection and maintenance.

The Isolator Row Plus

The Isolator Row Plus is a row of StormTech chambers, either SC-160, SC-310, DC-780, SC-800, MC-3500, MC-4500 or MC-7200 models, are lined with filter fabric and connected to a closely located manhole for easy access. The fabric lined chambers provide for sediment settling and filtration as stormwater rises in the Isolator Row Plus and passes through the filter fabric. The open bottom chambers allow stormwater to flow vertically out of the chambers. Sediments are captured in the Isolator Row Plus protecting the adjacent stone and chambers storage areas from sediment accumulation.

ADS Isolator Row and Plus fabric are placed between the stone and the Isolator Row Plus chambers. The woven geotextile provides a media for stormwater filtration, a durable surface for maintenance, prevents scour of the underlying stone and remains intact during high pressure jetting.

The Isolator Row Plus is designed to capture the “first flush” runoff and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole provides access to the Isolator Row Plus and includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row Plus bypass through a manifold to the other chambers. This is achieved with an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row Plus row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row Plus. After Stormwater flows through the Isolator Row Plus and into the rest of the chamber system it is either exfiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

The Isolator Row Plus Flamp™ is a flared end ramp apparatus attached to the inlet pipe on the inside of the chamber end cap. The FLAMP provides a smooth transition from pipe invert to fabric bottom. It is configured to improve chamber function performance by enhancing outflow of solid debris that would otherwise collect at the chamber's end, or more difficult to remove and require confined space entry into the chamber area. It also serves to improve the fluid and solid flow into the access pipe during maintenance and cleaning and to guide cleaning and inspection equipment back into the inlet pipe when complete.

The Isolator Row Plus may be part of a treatment train system. The treatment train design and pretreatment device selection by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, StormTech recommend using the Isolator Row Plus to minimize maintenance requirements and maintenance costs.

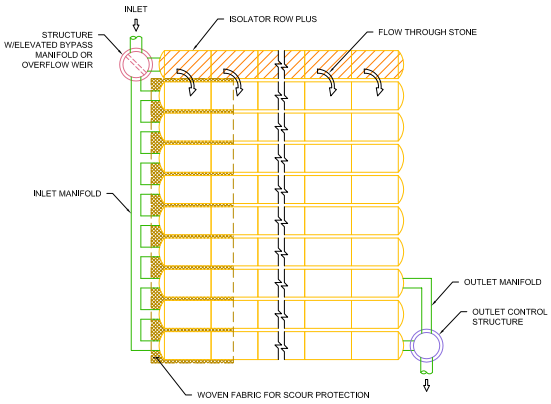
Note: *See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row Plus.*



Looking down the Isolator Row Plus from the manhole opening, ADS Plus Fabric is shown between the chamber and stone base.



StormTech Isolator Row Plus with Overflow Structure (not to scale)



Isolator Row Plus Inspection/Maintenance

Inspection

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row Plus should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

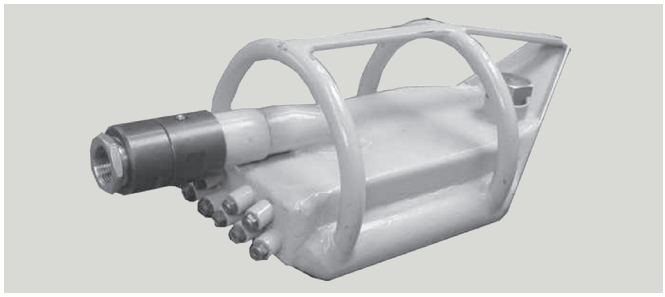
The Isolator Row Plus incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3" (75 mm) throughout the length of the Isolator Row Plus, clean-out should be performed.

Maintenance

The Isolator Row Plus was designed to reduce the cost of periodic maintenance. By “isolating” sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entry.

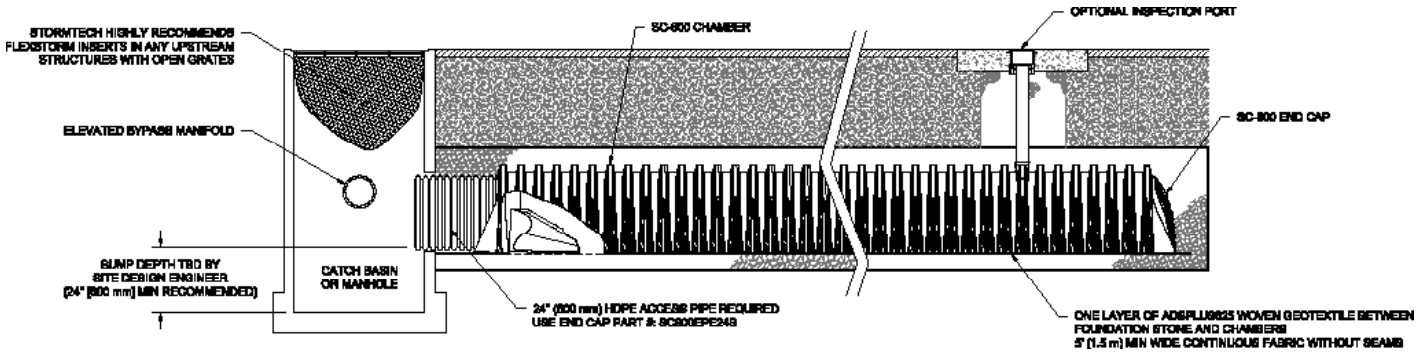
Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row Plus while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45” are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. JetVac reels can vary in length. For ease of maintenance, ADS recommends Isolator Row Plus lengths up to 200' (61 m). **The JetVac process shall only be performed on StormTech Isolator Row Plus that have ADS Plus Fabric (as specified by StormTech) over their angular base stone.**







StormTech Isolator Row Plus (*not to scale*)



Isolator Row Plus Step By Step Maintenance Procedures

Step 1

Inspect Isolator Row Plus for sediment.

A) Inspection ports (if present)
   i. Remove lid from floor box frame
   ii. Remove cap from inspection riser
   iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
   iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

B) All Isolator Row Plus
   i. Remove cover from manhole at upstream end of Isolator Row Plus
   ii. Using a flashlight, inspect down Isolator Row Plus through outlet pipe
      1. Mirrors on poles or cameras may be used to avoid a confined space entry
      2. Follow OSHA regulations for confined space entry if entering manhole
   iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2.
   If not, proceed to Step 3.

Step 2

Clean out Isolator Row Plus using the JetVac process.

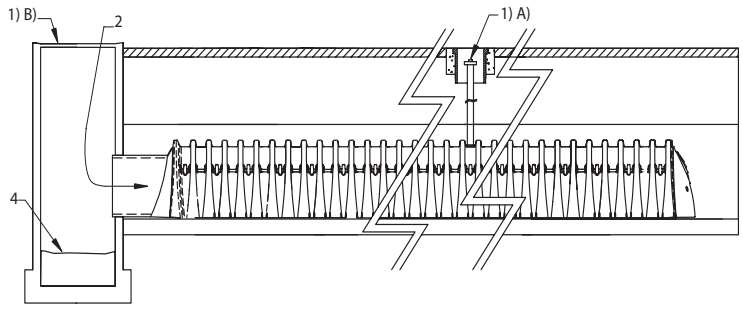
A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
B) Apply multiple passes of JetVac until backflush water is clean
C) Vacuum manhole sump as required

Step 3

Replace all caps, lids and covers, record observations and actions.

Step 4

Inspect & clean catch basins and manholes upstream of the StormTech system.



Sample Maintenance Log

Date	Stadia Rod Readings		Sedi-ment Depth (1)–(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row Plus, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

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adspipe.com
800-821-6710

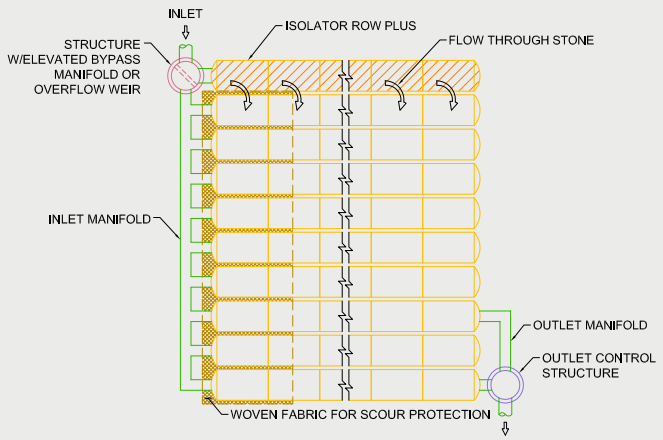
Isolator® Row Plus

The StormTech Isolator Row Plus is an enhancement to our proven water quality treatment system. This updated system is an NJCAT verified water quality treatment device that can be incorporated into any system layout.

Features

- Isolator Row Plus is now NJCAT verified. As a Manufactured Treatment Device it achieves over 80% TSS removal by filtration NJDEP Laboratory Protocol Assessment NJCAT Technology Verification.
- A patented Flamp™ (Flared End Ramp) provides a smooth transition from pipe invert to fabric bottom. The Flamp is attached to the inlet pipe inside the chamber end cap and improves chamber function over time by distributing sediment and debris that would otherwise collect at the inlet. It also serves to improve the fluid and solid flow back into the inlet pipe during maintenance and cleaning.
- Proprietary ADS Plus fabric maintains durability and sediment removal while allowing for higher water quality flow rates. A single layer of ADS Plus fabric is placed between the angular base stone and the Isolator Row Plus chambers.

Schematic of the StormTech Isolator Row Plus System



Technology Descriptions

The Isolator Row Plus is designed to capture the “first flush” runoff and offers the versatility to be sized on a volume or a flow basis. An upstream manhole not only provides access to the Isolator Row Plus but includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row Plus bypass through a manifold to the other chambers. This is achieved with either an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row Plus row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row Plus. After Stormwater flows through the Isolator Row Plus and into the rest of the StormTech chamber system it is either infiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

Summary of Verified Claims[1]

Treatment Rate (gpm/ft²)	4.1
Underlying Geotextile Layers	1
NJDEP Test Sediment	D50=75um
Mean Particle Concentration (mg/L)	200
TSS Removal Efficiency	>80%

[1] Verification testing of the StormTech SC-740 Isolator Row PLUS in accordance with NJDEP Laboratory protocol to access total suspended solids removal by filtration manufactured treatment device, 2013



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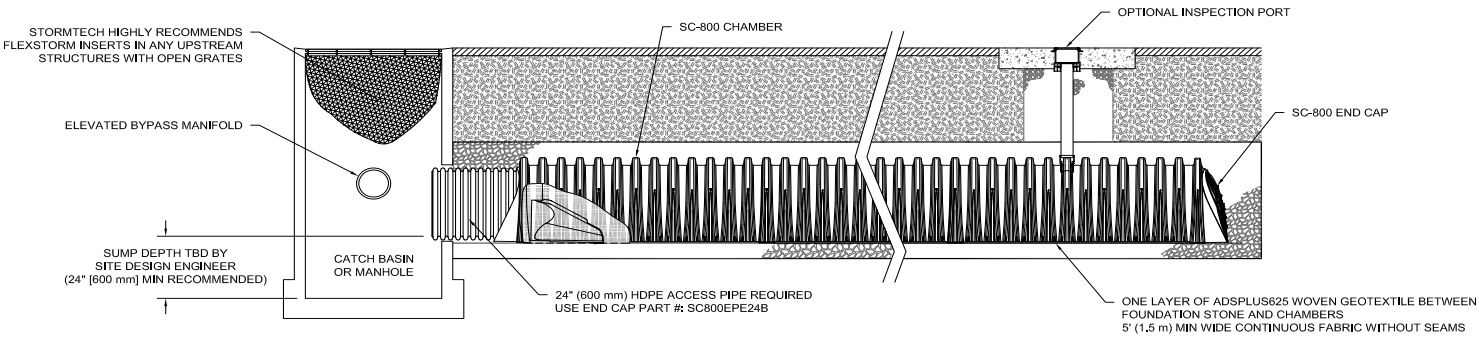
StormTech Isolator Row Plus (not to scale)



Maintenance

The Isolator Row Plus was designed to reduce the cost of periodic maintenance. By "isolating" sediment to just one row of the StormTech system, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout.

Maintenance is accomplished with the JetVac® process. The JetVac process utilizes a high-pressure water nozzle to propel itself down the Isolator Row Plus while scouring and suspending sediment. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency.

StormTech Isolator Row Plus

Chamber Model	Chamber Storage	Chamber Footprint	Treatment Rate
SC-160LP	15.0 cf (0.42 m^3)	11.45 sf (1.06 m^2)	0.11 cfs (3.11 L/s)
SC-310	31.0 cf (0.88 m^3)	17.7 sf (1.64 m^2)	0.16 cfs (4.53 L/s)
DC-780	78.4 cf (2.22 m^3)	27.8 sf (2.58 m^2)	0.26 cfs (7.36 L/s)
SC-800	81.0 cf (2.29 m^3)	27.3 sf (2.54 m^2)	0.25 cfs (7.1 L/s)
MC-3500	175.0 cf (4.96 m^3)	42.9 sf (3.99 m^2)	0.40 cfs (11.32 L/s)
MC-4500	162.6 cf (4.60 m^3)	30.1 sf (2.80 m^2)	0.28 cfs (7.93 L/s)
MC-7200	267.3 cf (7.57 m^3)	50.0 sf (4.65 m^2)	0.45 cfs (12.74 L/s)

Installation

Installation of the stormwater treatment unit(s) shall be preformed per manufacture's installation instructions. Such instructions can be obtained by calling Advanced Drainage Systems Inc. at (800) 821-6710 or by logging on to adspipe.com.

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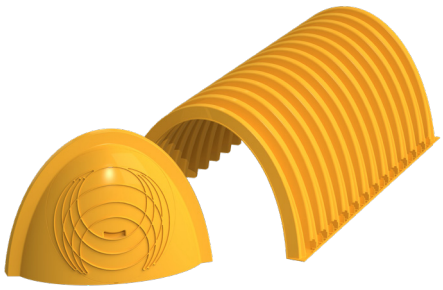
StormTech® SC-800 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



Nominal Chamber Specifications
(not to scale)

Size (L x W x H)
85.4” x 51” x 33”
2169 mm x 1295 mm x 838 mm

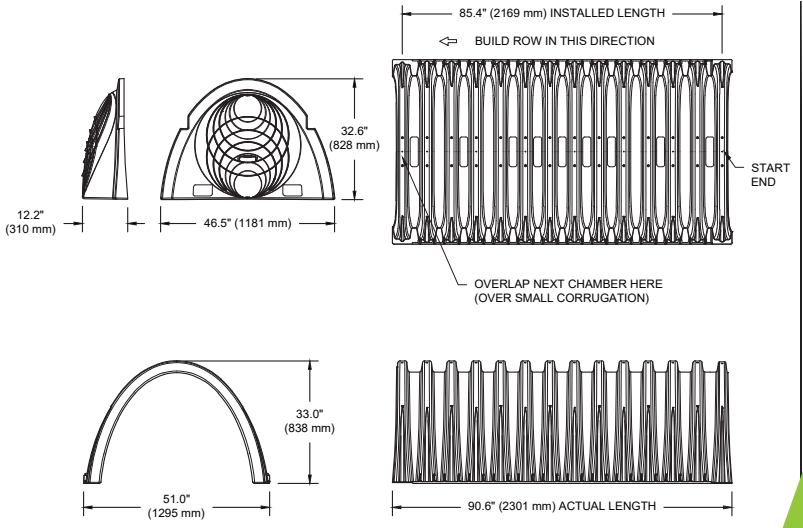
Chamber Storage
50.6 ft³ (1.43 m³)

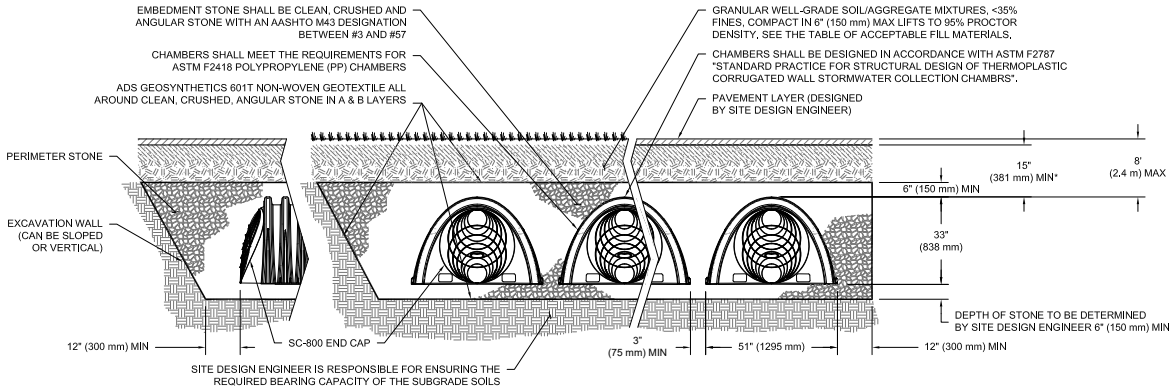
Min. Installed Storage*
78.4 ft³ (2.22 m³)

Weight
81.8 lbs (37.1 kg)

Shipping
30 chambers/pallet
60 end caps/pallet
12 pallets/truck

*Assumes 6” (150 mm) stone above and below chambers, 3” (75 mm) stone between chambers, and 40% stone porosity.





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 21" (533 mm).

ADS StormTech™

StormTech SC-800 Specifications

Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 6” (150 mm) Stone Base Under Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
45 (1143)	50.62 (1.433)	78.41 (2.22)
44 (1118)	50.62 (1.433)	77.34 (2.19)
43 (1092)	50.62 (1.433)	76.28 (2.16)
42 (1067)	50.62 (1.433)	75.21 (2.13)
41 (1041)	50.62 (1.433)	74.14 (2.10)
40 (1016)	50.62 (1.433)	73.07 (2.07)
39 (991)	50.62 (1.433)	72.01 (2.04)
38 (965)	50.55 (1.431)	70.89 (2.01)
37 (940)	50.35 (1.426)	69.71 (1.97)
36 (914)	50.07 (1.418)	68.47 (1.94)
35 (889)	49.56 (1.403)	67.10 (1.90)
34 (864)	48.82 (1.382)	65.59 (1.86)
33 (838)	47.93 (1.357)	63.98 (1.81)
32 (813)	46.91 (1.328)	62.31 (1.76)
31 (787)	45.79 (1.297)	60.57 (1.72)
30 (762)	44.58 (1.262)	58.77 (1.66)
29 (737)	43.28 (1.226)	56.93 (1.61)
28 (711)	41.91 (1.187)	55.04 (1.56)
27 (686)	40.47 (1.146)	53.10 (1.50)
26 (660)	38.96 (1.103)	51.13 (1.45)
25 (635)	37.40 (1.059)	49.13 (1.39)
24 (610)	35.78 (1.013)	47.09 (1.33)
23 (584)	34.10 (0.966)	45.02 (1.27)
22 (559)	32.38 (0.917)	42.91 (1.22)
21 (533)	30.61 (0.867)	40.79 (1.15)
20 (508)	28.80 (0.816)	38.63 (1.09)
19 (483)	26.95 (0.763)	36.45 (1.03)
18 (457)	25.06 (0.710)	34.25 (0.97)
17 (432)	23.13 (0.655)	32.02 (0.91)
16 (406)	21.17 (0.599)	29.78 (0.84)
15 (381)	19.17 (0.543)	27.51 (0.78)
14 (356)	17.14 (0.485)	25.23 (0.71)
13 (330)	15.09 (0.427)	22.93 (0.65)
12 (305)	13.00 (0.368)	20.61 (0.58)
11 (279)	10.89 (0.308)	18.28 (0.52)
10 (254)	8.76 (0.248)	15.93 (0.45)
9 (229)	6.60 (0.187)	13.57 (0.38)
8 (203)	4.42 (0.125)	11.19 (0.32)
7 (178)	2.22 (0.063)	8.81 (0.25)
6 (152)	0 (0)	6.41 (0.18)
5 (127)	0 (0)	5.34 (0.15)
4 (102)	0 (0)	4.27 (0.12)
3 (76)	0 (0)	3.20 (0.09)
2 (51)	0 (0)	2.14 (0.06)
1 (25)	0 (0)	1.07 (0.03)

Stone Cover

Stone Foundation

Note: Add 1.07 ft³ (0.03 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber ft³ (m³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
SC-800 Chamber	50.6 (1.43)	78.4 (2.22)	84.8 (2.4)	91.2 (2.58)

Note: Assumes 6” (150 mm) stone above chambers, 3” (75 mm) row spacing and 40% stone porosity.

Amount of Stone Per Chamber

English Tons (yds³)	Stone Foundation Depth		
	6”	12”	18”
SC-800	3.6 (2.6)	4.4 (3.2)	5.3 (3.8)
Metric Kilograms (m³)	**150 mm**	**300 mm**	**450 mm**
SC-800	3270 (2.0)	3990 (2.4)	4810 (2.9)

Note: Assumes 6” (150 mm) of stone above chambers and 3” (75 mm) stone between chambers.

Volume Excavation Per Chamber yd³ (m³)

	Stone Foundation Depth		
	6” (150 mm)	12” (300 mm)	18” (450 mm)
SC-800	5.3 (4.1)	5.9 (4.5)	6.5 (5.0)

Note: Assumes 3” (75 mm) of row separation and 15” (375 mm) of cover. The volume of excavation will vary as depth of cover increases.

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Project: _____ Responsible Party: _____

Address: _____ Date: _____

BPM Name: _____ Page: 1 of 1

Operation & Maintenance Inspection Checklist

BMP Element:	Potential Problem:	Resolution:	Pass	Fail	Recommended Remediation
Deep-Sump Catch Basins	Sediment has accumulated to a depth greater than the original design depth for sediment storage, approximately 2-feet of sediment.	Remove the sediment and dispose of in accordance with local and state regulations.			
Stormwater Piping	Blockage of inlet/outlet pipes due to debris or sediment accumulation.	Remove any debris and sediment via proper means. Dispose of debris/sediment in accordance with local & state regulations			
Roof Leaders	Downspout connections have been damaged or disconnected.	Repair and reconnect downspout connections.			
	Roof leaders are surcharging at the downspout connections	Open and insepct at cleanout locations and remove any blockages.			
Proprietary Treatment Device	Sediment has accumulated to a depth greater that the original design depth for sediment storage.	Remove sediment and disposed of in accordance with local and state regulations.			
Subsurface Detention Basin	Accumulation of sediment at the inlet structure above maintenance level.	Remove the sediment and conduct proper maintenance to the up-gradient pretreatment devices.			
Isolator Row	Accumulation of sediment over 3-inches within the isolator row.	Remove the sediment and conduct the proper maintenance per the Isolator Row Operation and Maitenance Manual.			
Flared End Sections	Vegetation has started to grow within the riprap area.	Remove vegetation immediately.			
	Accumulation of sediment/debris at the culvert inlet.	Remove sediment or debris such that the culvert has free flow.			
	Erosion is occuring where riprap has been dislodged.	Remedy scoured area and replace riprap immediately.			
Level Spreader	Sediment has accumulated in riprap channel void space.	Remove the sediment and dispose of in accordance with local and state regulations and replace riprap.			
	Down-gradient gullies have formed due to sheet flow concentration.	Fill gullies with native backfill, No. 6 pea-stone, topsoil and errosion control blanket. Sod or re-seed with stabalized errosion control grass mix.			

_____ _____

Inspector's Signature Date

Appendix H: Illicit Discharge Compliance Statement

Illicit Discharge Compliance Statement

The owners of the land/responsible party will be responsible for prohibiting illicit discharges to the stormwater management system during construction and during its life of operation. The stormwater management system is comprised of the components for conveying, treating, and infiltrating stormwater runoff on-site, including stormwater best management practices and any pipes intended to transport stormwater to the groundwater, a surface water, or municipal separate storm sewer system. An illicit discharge shall constitute any connection or discharge to the stormwater management system including, but not limited to, wastewater discharges, discharge of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease.

Responsible Party*:

Calabrese Construction, LLC
c/o Mr. Charles Calabrese
7 Brewster Road
West Springfield, Massachusetts 01089

*The party listed shall be responsible for implementation and record keeping of the requirements listed in this operation and maintenance plan. Upon sale of property or any other transition of ownership, the responsible party shall be reinstated as the new owner or any other group created as determined by the owner.

_____ _____

Signature of Responsible Party Representative Date

_____ _____

Signature of Responsible Party Representative** Date

**Required upon transfer of ownership

Appendix I: Low Impact Development Considerations

Low Impact Development Considerations

Proposed Residential Subdivision

Project Location:

Old River Street, 27 Walnut Street & 17 High Street
Agawam, Massachusetts 01001
(Parcel IDs: J17-1-3, J17-1-1 & J17-1-5)

Submitted To:

Town of Agawam Planning Board
1000 Suffield Street
Agawam, Massachusetts 01001

Applicant & Property Owner:

Calabrese Construction, LLC
c/o Mr. Charles Calabrese
7 Brewster Road
West Springfield, Massachusetts 01089

RLA Project File: 220627

January 30, 2026

R LEVESQUE ASSOCIATES, INC
A LAND PLANNING SERVICES COMPANY
40 School Street · Westfield, MA 01085
p 413.568.0985 · f 413.568.0986 · www.rlaland.com

Introduction

Per the Massachusetts Stormwater Handbook, project proponents must consider environmentally sensitive site design and low impact development techniques to effectively manage stormwater. As a part of the proposed project, the proponent has considered a number of environmentally sensitive, low impact development techniques to prevent the generation of stormwater and non-point source pollution.

The following is a detailed description of the considerations for each low impact development measure. For ease of review, RLA has provided the consideration of each measure as detailed in the Massachusetts Stormwater Report Checklist.

Low Impact Development (Lid) Measures

1. Environmentally Sensitive Project Approach

   The proposed project has been designed to create three new building lots and the construction of three new multi-family homes on the northerly end of High Street and the paper street called Old River Street in Agawam, Massachusetts. The site is bordered to the north by the Westfield River and associated riverfront area. The proposed site improvements have been designed specifically to avoid jurisdictional area and therefor provide an environmentally sensitive approach to the site development.

2. No disturbance to any Wetland Resource Areas

   The project was designed in the least intrusive manner possible and almost entirely within previously developed areas. Riverfront area associated with the Westfield River is located on the property to the northeast. There is no work proposed within any wetland resource areas or, in this case, the respective 200-foot riverfront area.

3. Site Design Practices (e.g. clustered development, reduced frontage setbacks)

   The project will entail the creation of a three lot subdivision and will involve the reconstruction of a portion of High Street, a cul-de-sac, utility connections, and stormwater management system. The subdivision lots have been laid out in the most efficient manner possible, effectively utilizing the upland areas within the property and minimizing disturbance within the riverfront area. All proposed work is located outside of the 200-foot riverfront area.

4. Reduced Impervious Area (Redevelopment Only)

   The proposed project is not part of a redevelopment project.

5. Minimizing disturbance to existing trees and shrubs

   The goal of the project proponent is to maintain as much of the existing vegetative cover on-site as possible. The majority of the area being developed as part of the subdivision has been historically disturbed and lacks mature vegetation. Special care has been taken to avoid disturbance within the 200-foot riverfront area.

6. LID Site Design Credit Requested

No LID Site Design Credit is requested for the proposed project.

7. Use of "country drainage" versus curb and gutter conveyance and pipe

Country drainage systems are often times much less costly than closed drainage systems such as gutter conveyance and pipe. Alternatives to the proposed curb and gutter, catch basin, and underground infrastructure were considered. It was discovered that due to the site layout, the project proponent was unable to take advantage of country drainage systems. It was not feasible to convey the water to a pre-treatment and detention area that meets the DEP standards by country drainage methods.

8. Bioretention Cells (includes Rain Gardens)

Due to the site layout along with the proposed curb and gutter stormwater management system, a viable location to include a bioretention cell was not feasible.

9. Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

There are no wetland impacts proposed, therefore, a constructed wetland is not logical and would create additional regulated area.

10. Treebox Filter

Treebox filters were considered for the project, however, due to the nature of the project being a residential subdivision and the site layout, the extensive costs associated with such a method and the climatic conditions of the area, it is believed that such methods would be detrimental to the proposed project and would only provide a maintenance problem and a potential hazard for the owner.

11. Water Quality Swale

Due to the layout of the site, a water quality swale has not been included as part of the treatment train process for the stormwater management system.

12. Grass Channel

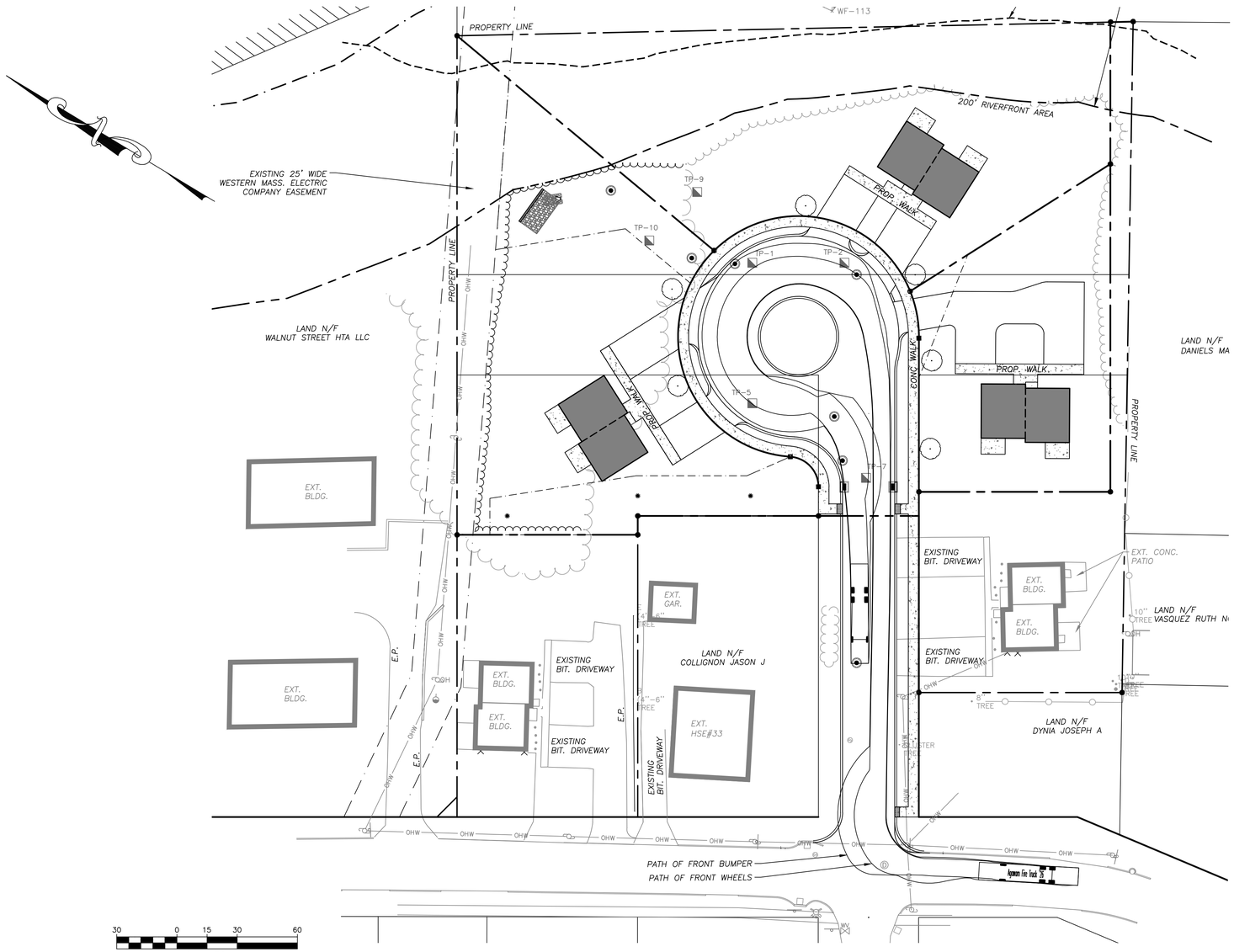
Due to the layout of the site, a grassed channel has not been included as part of the treatment train process for the stormwater management system.

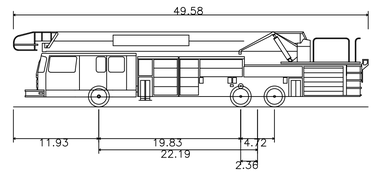
13. Green Roof

Green roofs are not suitable or marketable for the proposed project.

14. Other

Please see the Stormwater Report for more information.





Agawam Fire Truck '26	
Overall Length	49.580ft
Overall Width	8.700ft
Overall Body Height	10.482ft
Min Body Ground Clearance	0.913ft
Track Width	8.290ft
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	37.220ft

PERMITTING

SWEPT PATH ANALYSIS

0 Old River Street
Agawam, Massachusetts
Map J17 Parcel I-3

R LEVESQUE ASSOCIATES INC
Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants
ph: 413.568.0985 fax: 413.568.0986
40 School Street
Westfield, MA 01085
rlaland.com

PREPARED FOR:

Chuck Calabrese
Calabrese Construction, LLC

7 Brewster Road
West Springfield, MA.

ISSUANCE DATE: March 5, 2026

REVISIONS:	DATE:

DRAFTED BY: T.A. & F.C.

UNAUTHORIZED ALTERATION OF
THIS DOCUMENT IS A VIOLATION
OF MASSACHUSETTS STATE LAW

SCALE: As Noted

RLA PROJ. NUMBER: 220627

DRAWING#	REV.
VEH-1	-

S:\Projects\2022\220627 - Calabrese - 0 Old River St, Agawam, MA\05 Civil 3D\220627 - Defin.dwg

Definitive Subdivision Application

Under the Town of Agawam Subdivision of Land Section 159-7 Definitive plan

Proposed Residential Subdivision

Project Location:

Old River Street, 27 Walnut Street & 17 High Street
Agawam, Massachusetts 01001
(Parcel IDs: J17-1-3, J17-1-1 & J17-1-5)

Submitted To:

Town of Agawam Planning Board
1000 Suffield Street
Agawam, Massachusetts 01001

Applicant & Property Owner:

Calabrese Construction, LLC
c/o Mr. Charles Calabrese
7 Brewster Road
West Springfield, Massachusetts 01089

RLA Project File No. 220627

January 30, 2026

R LEVESQUE ASSOCIATES, INC.

A LAND PLANNING SERVICES COMPANY

40 School Street, Westfield, MA 01085

p 413.568.0985 · f 413.568.0986 · www.rlaland.com

TABLE OF CONTENTS

SECTIONS

1. COVER LETTER
2. ADMINISTRATIVE DOCUMENTS
   - 2.1 NOTICE TO THE TOWN CLERK
   - 2.2 FORM C – APPLICATION FOR APPROVAL OF DEFINITIVE PLAN
   - 2.3 WAIVER REQUEST LETTER
   - 2.4 STATEMENT OF INTEREST
3. REQUIRED STUDIES
4. FIGURES
   - 4.1 LOCATION MAP
   - 4.2 USGS TOPOGRAPHIC MAP
   - 4.3 FEMA FLOODPLAIN MAP
   - 4.4 NRCS SOIL MAP
   - 4.5 NHESP PRIORITY HABITAT OF RARE SPECIES
5. DEED REFERENCES

LIST OF APPENDICES

APPENDICES

APPENDIX A: SITE PLAN SET

APPENDIX B: STORMWATER DRAINAGE REPORT

I. COVER LETTER

R LEVESQUE ASSOCIATES, INC.
40 School Street, P.O. BOX 640, Westfield, MA 01085
p 413.568.0985 · f 413.568.0986 · www.rlaland.com

January 30, 2026

Violet Baldwin, Chairperson
Town of Agawam Planning Board
1000 Suffield Street
Agawam, Massachusetts 01001

RE: Definitive Subdivision Application
Old River Street, 27 Walnut Street & 17 High Street
Agawam, Massachusetts 01001
(Parcel IDs: J17-1-3, J17-1-1 & J17-1-5)
RLA Project File No. 220627

Dear Chairperson Baldwin and Board Members:

On behalf of the applicant and property owner, Calabrese Construction, LLC c/o Mr. Charles Calabrese, please find the requisite number of copies of a Definitive Subdivision application and supporting documentation. The applicant proposes the construction of a residential subdivision to be located at the above-referenced properties.

Included within this submission package is the requisite filing fee. As required, a copy of this application submission has been transmitted electronically via email to the Town of Agawam Planning Department.

We are requesting to be placed on the Planning Board's next available agenda. Should you have any questions or comments regarding this submission, please do not hesitate to contact our office at your earliest convenience.

Sincerely,
R LEVESQUE ASSOCIATES, INC.

Nina Fazio

Nina Fazio
Permitting Coordinator

2. ADMINISTRATIVE DOCUMENTS

2.1 NOTICE TO THE TOWN CLERK

2.2 FORM C – APPLICATION FOR APPROVAL OF DEFINITIVE PLAN

2.3 WAIVER REQUEST LETTER

2.4 STATEMENT OF INTEREST

R LEVESQUE ASSOCIATES, INC.
40 School Street, P.O. BOX 640, Westfield, MA 01085
p 413.568.0985 · f 413.568.0986 · www.rlaland.com

January 30, 2026

Town of Agawam Town Clerk
36 Main Street
Agawam, Massachusetts 01001

RE: Notice to Town Clerk
Old River Street, 27 Walnut Street & 17 High Street
Agawam, Massachusetts 01001
(Parcel IDs: J17-1-3, J17-1-1 & J17-1-5)
RLA Project File No. 220627

To Whom It May Concern:

I hereby provide notice that a copy of the above-referenced Definitive Subdivision Application and supporting documentation has been filed with the Town Clerk, via hand delivery by R Levesque Associates, Inc. This notice is pursuant to Section 159-7 – Definitive Plan Submission under the Rules & Regulations for the Subdivision of Land for the Town of Agawam, Massachusetts

Should you have any questions or comments regarding this notification, please do not hesitate to contact our office at your earliest convenience.

Sincerely,
R LEVESQUE ASSOCIATES, INC.

Nina Fazio

Nina Fazio
Permitting Coordinator

TOWN OF AGAWAM

36 Main Street Agawam, Massachusetts
Tel. 413-786-0400

FORM C
APPLICATION FOR APPROVAL OF DEFINITIVE PLAN

File one completed form with the Planning Board and a copy with the Town Clerk in accordance with the requirements of Section III-B.

Agawam January 29 2026

To the Planning Board:

The undersigned herewith submits the accompanying Definitive Plan of property located in the Town of Agawam for approval as a subdivision under the requirements of the Subdivision Control Law and the Rules and Regulations Governing the Subdivision of Land of the Planning Board in the Town of Agawam.

1. Name of Applicant: Calabrese Construction, LLC c/o Charles Calabrese
   Address: 7 Brewster Road, West Springfield, MA 01089

2. Name of Engineer or Surveyor: R Levesque Associates, Inc.
   Address: 40 School Street, Westfield, MA 01085

3. Deed of property recorded in Hampden County Registry
   Book 22388 / 22935 Page 46 / 347

4. Location and Description of Property: Please see Environmental Study

5. A list of the documents included in this application shall accompany notice to the Town Clerk.

   a. Notarized Statement of Interest in the land;
   b. Environmental Study;
   c. Plans and specifications;
   d. Statement of time-development;
   e. Plan of sequence of development;
   f. Town-development relationship study;
   g. Reports of test borings, etc.; and
   h. Certified copy of Deed.

Your attention is directed to Section III, B. 8 of the Subdivision Rules and Regulations requiring the posting of a bond or recording of a covenant BEFORE approval can be given.

Signature of Owner _____
Address: 7 Brewster Road, West Springfield, MA 01089

Agawam Planning Board

STATEMENT OF INTEREST

Date 01/29/2026

The petitioner hereby certifies that he is the owner of all lands contained within the description of the subject petition. Agawam Planning Board Case No._____.

Charles Calabrese
(Name)

7 Brewster Road, West Springfield, MA 01089
(Address)

(Signature)

COMMONWEALTH OF MASSACHUSETTS

HAMPDEN ss Date 1-22-2026

There personally appeared before me, on the above date, Charles Calabrese to me known to be the person described in and who executed the foregoing document.

Feb 1, 2030
My commission expires

Notary Public

Guilherme Costa
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
February 1, 2030

4-59-8/74-150

R LEVESQUE ASSOCIATES, INC.
40 School Street, P.O. BOX 640, Westfield, MA 01085
p 413.568.0985 · f 413.568.0986 · www.rlaland.com

January 30, 2026

Violet Baldwin, Chairperson
Town of Agawam Planning Board
1000 Suffield Street
Agawam, Massachusetts 01001

RE: Waiver Request Letter
Old River Street, 27 Walnut Street & 17 High Street
Agawam, Massachusetts 01001
(Parcel IDs: J17-1-3, J17-1-1 & J17-1-5)
RLA Project File No. 220627

Dear Chairperson Baldwin and Board Members:

On behalf of the applicant, Calabrese Construction, LLC c/o Mr. Charles Calabrese, R Levesque Associates, Inc. is submitting this waiver request letter. The following text is taken directly from the Town of Agawam Bylaws Chapter 159 Subdivision of Land and is presented below in *italic text*, followed by a waiver request presented below in **boldface text**.

1. *Section 159-23(A) Sidewalks, tree belts and pedestrian and bicycle paths – There shall be cement concrete sidewalks constructed on both sides of each street in the subdivision. The width of the sidewalks shall be as specified under the Design Standards for the various classes of streets. The construction must conform to the Town of Agawam Department of Public Works Specifications for Construction of Cement Concrete Sidewalks, April 1989. All materials and construction methods shall be as specified in the Department of Public Works Specifications.*

   Waiver Request: The applicant respectfully requests a waiver from the requirement to provide sidewalks on both sides of the roadway. Sidewalks are proposed along one side of the roadway and partially within the cul-de-sac; however, sidewalks are not proposed along the northern side of High Street abutting land of Mr. Collignon. This area is currently utilized by the owner for access to their property, and the installation of sidewalks would disrupt this access and would place sidewalk infrastructure immediately adjacent to property not owned by the applicant. Given the limited length of roadway involved and the proposed sidewalk coverage elsewhere, the applicant believes this waiver is considered reasonable and appropriate.

2. *Section 159-8(D) Intersections - The intersection of places and lanes with other streets shall have a property line radius of 15 feet and a curbline radius of 25 feet. The intersections of all other*

R LEVESQUE ASSOCIATES, INC.
40 School Street, P.O. BOX 640, Westfield, MA 01085
p 413.568.0985 · f 413.568.0986 · www.rlaland.com

streets shall have a property line radius of 25 feet and a curb radius of 35 feet. The Planning Board reserves the right to increase these radii wherever it may deem necessary for public safety. Maximum grade allowed within 100 feet of an intersection, measured from the outer gutter line, is 2.5%.

Waiver Request: The applicant respectfully requests a waiver from the requirement to provide a curbline radius of 25'. The proposed curbline radius is 15' due to the location of an existing utility pole.

3. *Section 159-20(A) Sanitary Sewers - Sanitary sewer mains and laterals shall be polyvinyl chloride pipe conforming to ASTM D 3034-SDR 35. The minimum size for sewer mains shall be eight inches while the minimum size of sewer laterals shall be four inches.*

   Waiver Request: The applicant respectfully requests a waiver from the requirement to provide an 8" sanitary sewer main. The existing main is 6", therefore the proposed sewer main is 6".

4. *Section 159-21(A). Drainage - Storm drains shall be reinforced concrete pipe conforming to ASTM C-76, Class 3 minimum, polyvinyl chloride pipe conforming to ASTM D3034, SDR35 or polyvinyl chloride ASTM F-794. Bedding for various types of storm drains shall be as approved by the Engineer.*

   Waiver Request: The applicant respectfully requests a waiver from the requirement to provide concrete pipe. The applicant proposes HDPE, which is industry standard.

Should you have any questions or comments regarding this information, please do not hesitate to contact our office at your earliest convenience.

Sincerely,
R LEVESQUE ASSOCIATES, INC.

Nina Fazio

Nina Fazio
Permitting Coordinator

3. REQUIRED STUDIES

REQUIRED STUDIES

For

DEFINITIVE SUBDIVISION APPLICATION
OLD RIVER ROAD, 27 WALTNUT STREET & 17 HIGH STREET
AGAWAM, MASSACHUSETTS 01001
(PARCEL IDS: J17-1-3, J17-1-1 & J17-1-5)

INTRODUCTION

On behalf of the applicant and property owner, Calabrese Construction, LLC c/o Mr. Charles Calabrese, R Levesque Associates, Inc. is providing these studies as required for the submission of a definitive subdivision application. The applicant proposes the construction of residential subdivision to be located at the above-referenced properties. The applicant received Preliminary Subdivision Approval on November 6, 2025.

PROPERTY DESCRIPTION

The subject properties are located east of Walnut Street and consist of approximately 1.9 ± acres as shown on the associated site plan prepared by R Levesque Associates, Inc. Said properties are owned by Calabrese Construction, LLC and are recorded in the Hampden County Registry of Deeds in Book 22388, Page 42 (27 Walnut Street & 0 River Road) and Book 22935, Page 347 (17 High Street).

EXISTING CONDITIONS & SURROUNDING LAND USES

The subject properties consist of cleared and forested land, with residential structures located at 27 Walnut Street and 17 High Street. In general, the topography of the subject properties vary, generally sloping from the west along Walnut Street to the east towards the Westfield River. Please refer to the USGS Topographic Map included within this application packet under Section 4.

The subject properties were rezoned to the Residence B (RB) zoning district by the Town of Agawam City Council in 2025. The surrounding land uses consist primarily of residential uses.

STATEMENT OF TIME-DEVELOPMENT

The following statement of time and development is based on anticipated start of Spring 2026 and is contingent upon the timeline of local approvals, labor, and construction costs (subject to change).

1. **Endorsement and Mobilization (Spring 2026)**

- Planning Board endorses definitive plan
- Applicant records plan and secure performance guarantee or covenant
- Pre-construction meeting
- Contractor bidding and utility coordination.

2. **Site Preparation and Erosion Control (Spring 2026 - Summer 2026)**

- Clearing and grubbing
- Install erosion and sediment controls
- Establish construction access
- Perform rough earthwork and initial roadway cut/fill.

3. **Drainage Installation and Rough Grading (Spring 2026 - Fall 2026)**

- Install catch basins and subsurface storm piping
- Construct stormwater management features
- Complete rough roadway grading.

4. **Utility Trenching and Installation (Fall 2026)**

- Install water, sewer, gas, electric, and communications utilities
- Coordinate with utility companies for service laterals and perform required testing.

5. **Temporary Roadway Base and Winter Preparations (Fall 2026 – Winter 2026)**

- Fine grade roadway base
- Install temporary binder course if weather allows
- Stabilize site for winter with erosion controls and stockpile protection.

6. **Administrative Activities During Winter Slowdown (Winter 2026)**

- Submit building permit applications for released lots

7. Roadway Completion and Lot Service Tie-ins (Spring 2027 – Summer 2027)

- Complete roadway base or binder course
- Connect utility service laterals
- Construct driveways and foundations for homes.

8. Curbing, Sidewalks, Lighting, and Landscaping (Spring 2027 – Fall 2027)

- Install curbs, sidewalks, and street lighting
- Complete right-of-way landscaping
- Install final stormwater elements.

9. Infrastructure Close-out and Punch List Work (Fall 2027 – Winter 2027)

- Address punch list items from inspections
- Install monuments and street signs

10. Final Paving and As-Built Preparation (Spring 2028 – Summer 2028)

- Apply final roadway wearing course
- Complete any remaining utility tie-ins
- Prepare and submit as-built drawings.

11. Final Inspections and Acceptance Package (Spring 2028 - Summer 2028)

- Conduct final subdivision inspection and address remaining punch list items
- Assemble acceptance package with as-builts and maintenance bond.

12. Petition for Street Acceptance and Town Approval (Spring 2028 - Summer 2028)

- Submit petition and documentation for street acceptance
- Request bond release

13. Recordation, Final Bond Release, and Project Closeout (Summer 2028)

- Record street acceptance documents at Registry of Deeds

- Release remaining performance bond and close out permits.

ENVIRONMENTAL STUDY

Examination of GIS information from the Massachusetts Natural Heritage Atlas revealed that the subject properties are not located within Natural Heritage and Endangered Species Program jurisdiction.

According to the Web Soil Survey Map, the soil types mapped on the subject properties consist of Merrimac fine sandy loam, 3 to 8 percent slopes (254B). Please refer to the attached NRCS Soil Map included within this application packet under Section 4.

- The Merrimac series consists of very deep, somewhat excessively drained soils formed in outwash. They are nearly level through very steep soils on outwash terraces and plains and other glaciofluvial landforms. Slope ranges from 0 through 35 percent.

Please refer to the Figures within Section 5 of this application packet for greater detail regarding the environmental considerations.

WETLAND RESOURCE AREAS

The wetland resource areas were flagged in the field by R Levesque Associates, Inc. in July 2025. A Positive 2A Determination of Applicability was issued by the Town of Agawam Conservation Commission in August 2025.

The definition of each applicable resource area is presented below in italic text, followed by a description of the resource area presented below in boldface text.

Isolated Vegetated Wetlands (IVW)

Isolated vegetated wetlands are not subject to jurisdiction under the Massachusetts Wetlands Protection Act 310 CMR 10.00. Additionally, the Town of Agawam does not have a local wetlands bylaw that provides independent regulatory authority over isolated wetlands; therefore, these areas are not regulated at the local level either.

Two (2) Isolated Vegetated Wetlands (IVW) are located off-site to the east of Old River Road. The boundary of the IVWs have been flagged in the field with sequentially numbered pink flagging and are shown on the accompanying filing plan labeled "WF-100" through "WF-119" and "B-100" through "B-103".

Bank

In 310 CMR 10.54(2) it states, "*A Bank is the portion of the land surface which normally abuts and confines a water body. It occurs between a water body and a vegetated bordering wetland and adjacent flood plain, or, in the absence of these, it occurs between a water body and an upland.*"

The western upper limit of bank of the Westfield River has been marked in the field with sequentially numbered blue flagging labeled "MAHW-100" through "MAHW-119".

Riverfront Area

Riverfront Area (RFA) as defined in 310 CMR 10.58(3) "*…is the area of land between a river's mean annual high-water line measured horizontally outward from the river and a parallel line located 200 feet away. The riverfront area may include or overlap other resource areas or their buffer zone. The riverfront area does not have a buffer zone.*"

Riverfront Area is associated with the Westfield River and has been shown to extend 200' from the delineated MAHW. The 100' Inner Riparian has been shown as well. The total Riverfront Area on site is 2,085 ± SF.

Land Under Water Bodies and Waterways (LUWW)

As defined in 310 CMR 10.56(2) "Land Under Water Bodies and Waterways is the land beneath any creek, river, stream, pond or lake. Said land may be composed of organic muck or peat, fine sediments, rocks or bedrock."

LUWW is associated with the Westfield River, a perennial stream located off-site. The mean annual low flow, or bottom of bank, has not been delineated therefore LUWW is not shown or defined.

Bordering Land Subject to Flooding (BLSF)

As stated in 310 CMR 10.57(2)(a), *"Bordering Land Subject to Flooding is an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds, or lakes. It extends from the banks of these waterways and water bodies; where a bordering vegetated wetland occurs, it extends from said wetland."* .

An eastern portion of the subject property is located within the 100-year flood zone according to Flood Insurance Rate Map Number 25013C0382E effective date July 16, 2013. The 100-year flood zone elevation is shown at 65 feet (NAVD '88) according to said mapping.

PROPOSED DEVELOPMENT IMPACTS

The proposed project represents a relatively minor development in comparison to the surrounding neighborhood and is not expected to negatively impact pedestrian or vehicular traffic in the surrounding area, nor will it adversely affect solid waste management or air and water quality. The lots will be connected to public utilities where feasible, with all services coordinated in accordance with the requirements of the appropriate utility providers. Construction activities are not anticipated to disturb any historic, architectural, or archaeological resources on the site.

The project will not affect outdoor recreational opportunities, as the land in question is currently privately owned and will remain so following division of the land. Furthermore, the proposed development aligns with the Town of Agawam's Zoning Bylaw and Community Development Plan by contributing to the local housing stock within an area that is predominantly zoned and used for residential purposes.

TOWN-DEVELOPMENT RELATIONSHIP STUDY

(a) The impact on utilities and services which will be required to service the development.

The proposed subdivision will create a de minimis increase in demand on municipal utilities and public services. Each lot will be served by extensions of existing water, sewer, and utility infrastructure located along the frontage roadway, designed to meet municipal standards and verified through engineering review. The additional service connections represent a minimal incremental load well within the capacity of the existing systems, with no anticipated adverse impact on pressure, flow, or treatment capacity. Solid waste collection, snow removal, and emergency services can be readily accommodated within the town's existing operations, as the project's small scale will not materially affect municipal budgets or staffing levels.

(b) The tentative sale price of houses, type of housing and square footage of finished living space per unit.

The tentative sale price of the proposed dwelling units will be established at market rates at the time of sale. The housing type will be consistent with residential uses permitted within the underlying zoning district. Final floor plans and square footage of finished living space will be determined during the building design phase and submitted to the Building Department as part of the building permit process. Copies of these materials can be provided to the Planning Board for review as they become available.

[END OF REQUIRED STUDIES]

4. FIGURES

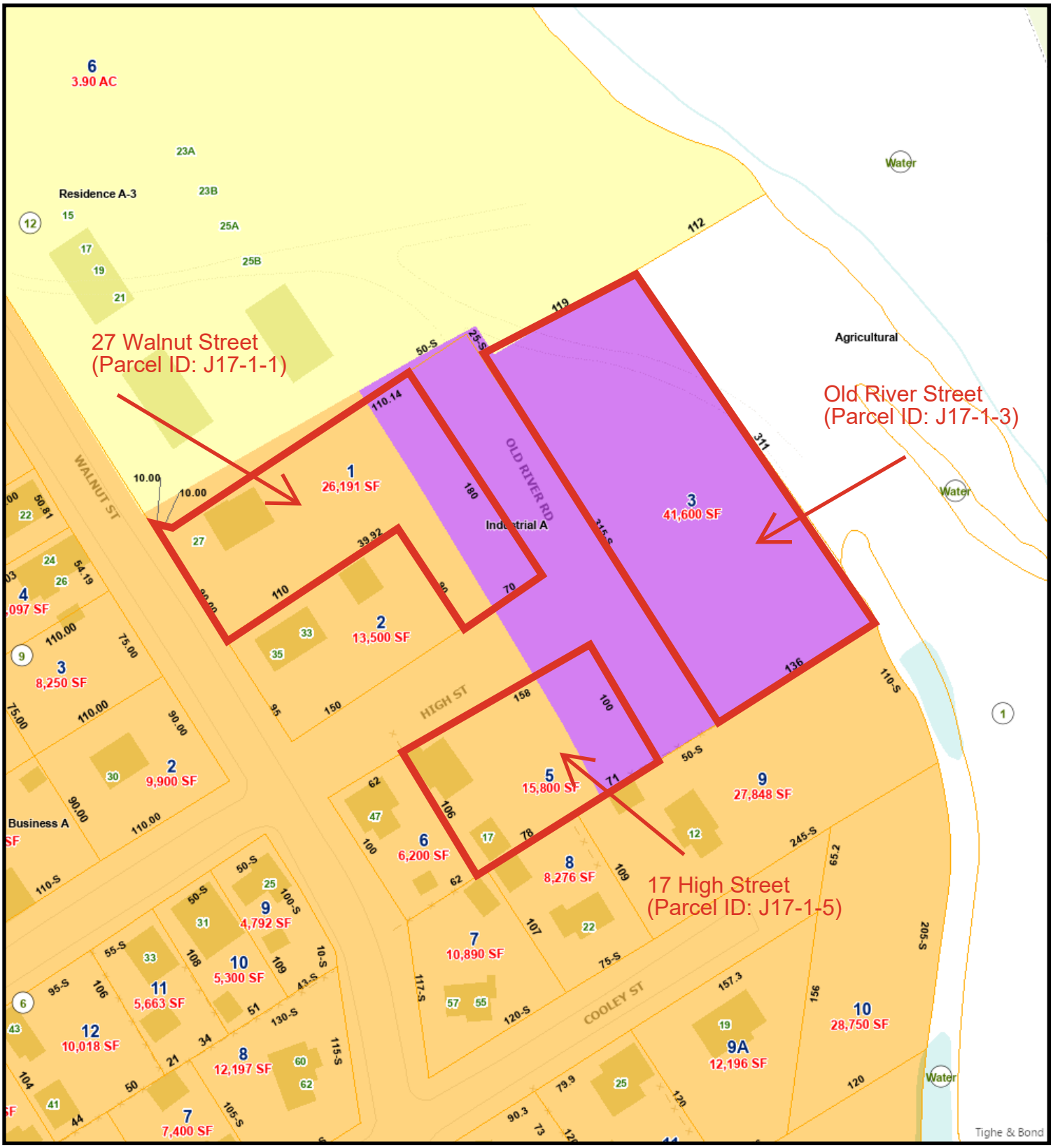
4.1 LOCATION MAP

4.2 USGS TOPOGRAPHIC MAP

4.3 FEMA FLOODPLAIN MAP

4.4 NRCS SOIL MAP

4.5 NHESP PRIORITY HABITAT OF RARE SPECIES



Locus Map (Current Zoning)

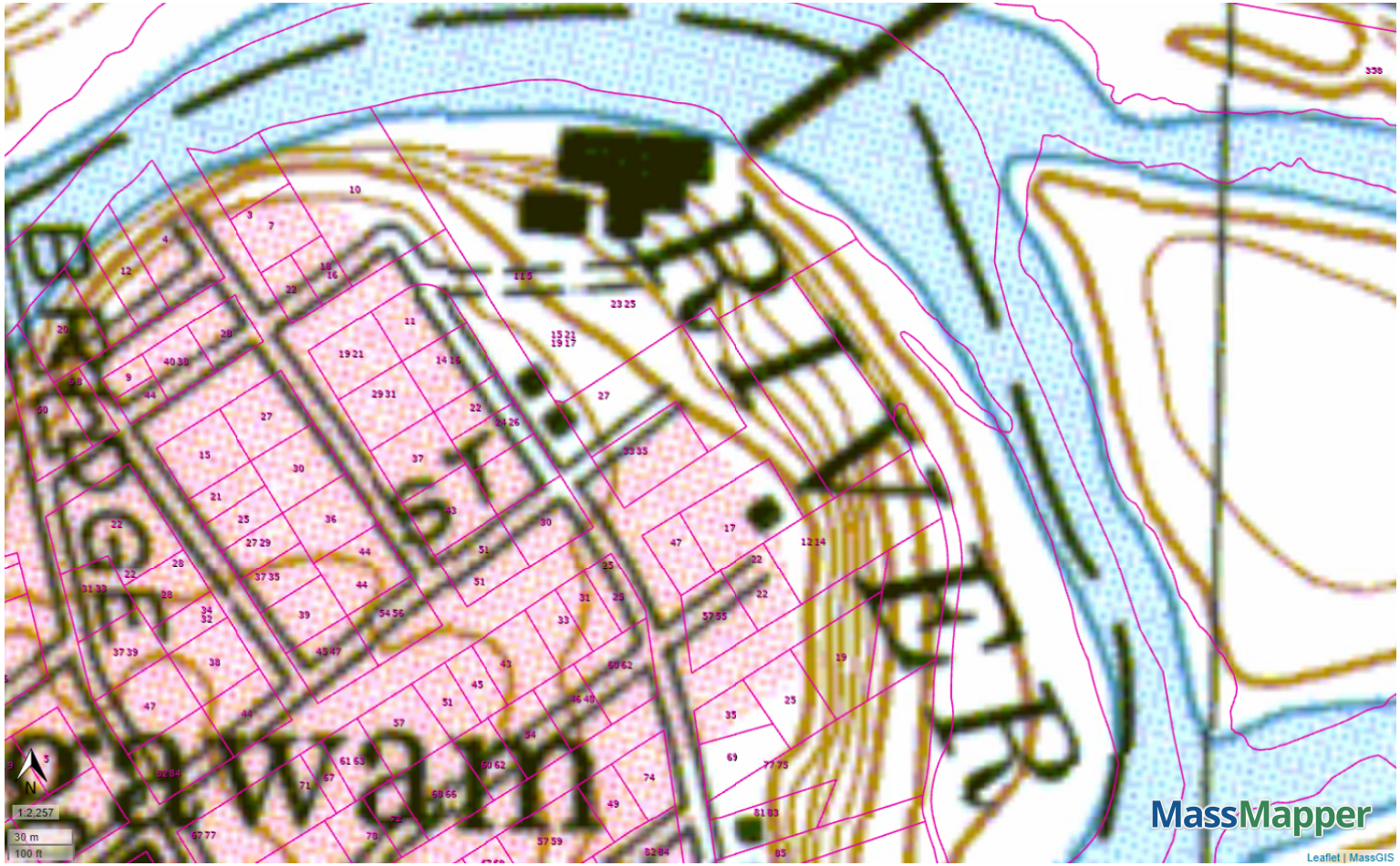
1/8/2025 4:32:43 PM

Scale: 1"=100'

Scale is approximate

The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analyses.

USGS Topographic Map



Property Tax Parcels
USGS Topographic Maps

National Flood Hazard Layer FIRMette

72°38'17"W 42°6'9"N



72°37'39"W 42°5'43"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/21/2025 at 8:47 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Soil Map—Hampden County, Massachusetts, Central Part
(GISDATA_L3_TAXPAR_POLY_ASSESSPolygon)



Map Scale: 1:1,140 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hampden County, Massachusetts, Central Part
Survey Area Data: Version 18, Aug 27, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

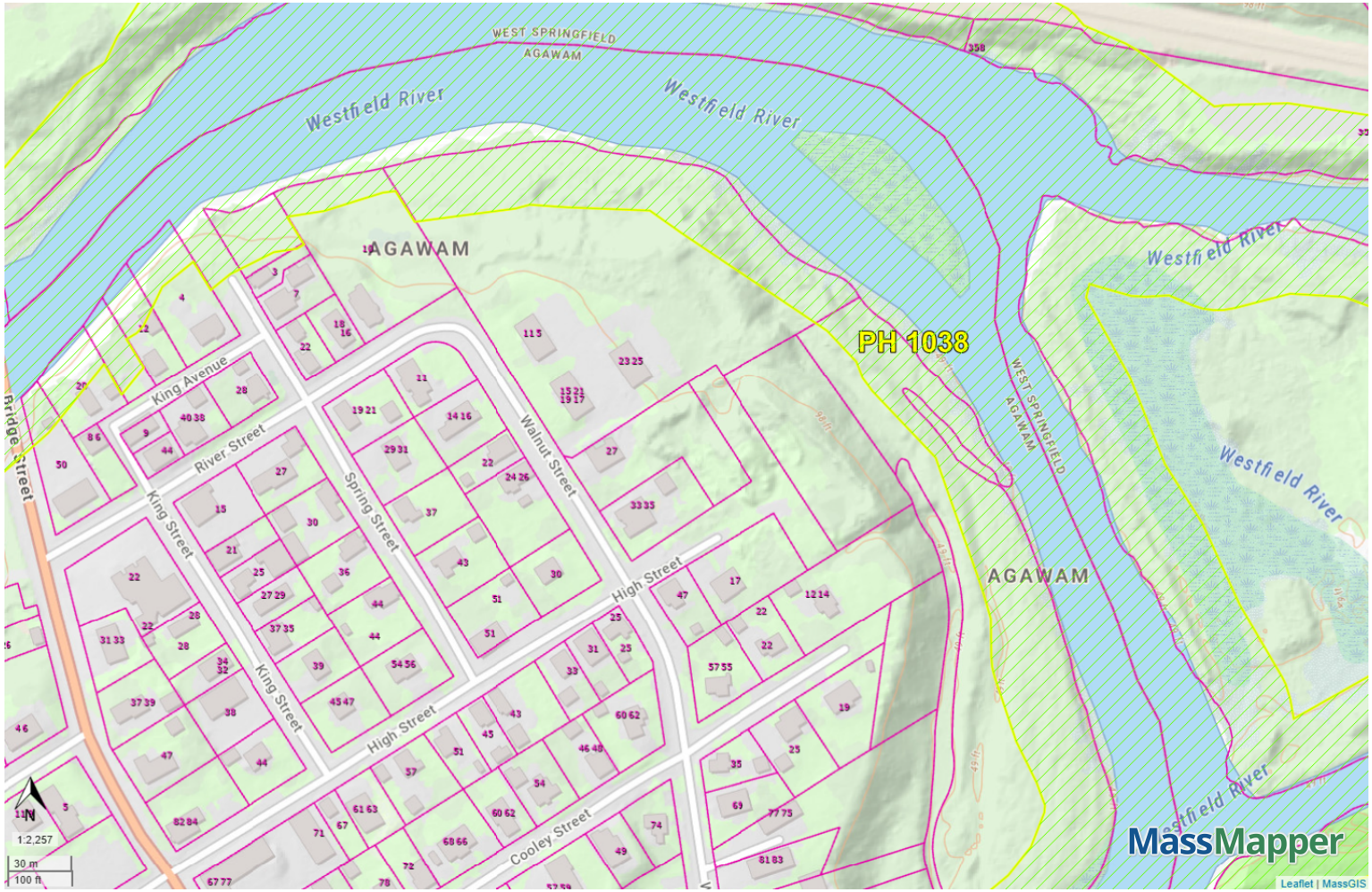
Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	1.9	100.0%
Totals for Area of Interest		**1.9**	**100.0%**

NHESP



NHESP Estimated Habitats of Rare Wildlife

NHESP Priority Habitats of Rare Species

Property Tax Parcels

5. DEED REFERENCES

(SOURCE: HAMPDEN COUNTY REGISTRY OF DEEDS)

Bk 22388 Pg46 #59514
10-03-2018 @ 01:56p

MASSACHUSETTS STATE EXCISE TAX
HAMPDEN COUNTY REGISTRY OF DEEDS
Date: 10-03-2018 @ 01:56pm
Ctl#: 208 Doc#: 59514
Fee: $456.00 Cons: $100,000.00

QUITCLAIM DEED

KNOW ALL PERSONS BY THESE PRESENTS, that, 27 GROUP, LLC, a Massachusetts Limited Liability Company with an address of 167 Coyote Circle, Feeding Hills, Hampden County, Massachusetts

for consideration paid and in full consideration of ONE HUNDRED THOUSAND AND 00/100 DOLLARS ($100,000.00);

grants to **CALABRESE CONSTRUCTION, LLC,** a Massachusetts Limited Liability Company with an address of 7 Brewster Road, West Springfield, Massachusetts

with **QUITCLAIM COVENANTS**

Certain real estate situated in Agawam, being more particularly bounded and described as follows:

Beginning at a point on the easterly side of Walnut Street, about ninety (90) feet northerly from High Street, and running thence

EASTERLY	about one hundred (100) feet; thence
NORTHERLY	about ninety (90) feet; thence
WESTERLY	about one hundred (100) feet to said Walnut Street, and thence
SOUTHERLY	on said Walnut Street, about ninety (90) feet to the point of the beginning.

Being Lot #3 (three) on a plan of lots of the Agawam Canal Company, recorded in Hampden County Registry of Deeds in Book 365, Page (H). Subject to all restrictions, liens and encumbrances of record, if any are in force and applicable.

The sale is in the ordinary course of business of 27 GROUP, LLC.

BEING the same premises conveyed to the grantor herein by deed of Edward J. Mutti dated September 14, 2012, and recorded in the Hampden County Registry of Deeds in Book 19486, Page 591. See also Book 19486, Page 589 and Book 16786, Page 4.

Property Address: 27 Walnut Street, Agawam, MA 01001

WITNESS my hand and seal this 6th day of September, 2018.

27 GROUP, LLC

Edward J. Mutti, manager

COMMONWEALTH OF MASSACHUSETTS

HAMPDEN, ss.

On this 6th day of September, 2018, before me, the undersigned notary public, personally appeared Edward J. Mutti as manager of 27 GROUP, LLC, proved to me through satisfactory evidence of identification, which was ☐ photographic identification with signature issued by a federal or state governmental agency, ☒ personal knowledge of the undersigned, ☐ oath or affirmation of a credible witness, to be the person whose name is signed on the preceding or attached document, and who swore, subscribed and affirmed to me that the contents of the document are truthful and accurate to the best of his knowledge and belief and that he signed the document voluntarily for its stated purpose on behalf of 27 GROUP, LLC, and affirmed to me that the contents of the document are truthful and accurate to the best of his knowledge and belief.

Gina M. Barry, Notary Public

GINA M. BARRY
NOTARY PUBLIC
Commonwealth of Massachusetts
My Commission Expires
September 17, 2021

My Commission Expires: 9/17/2021

KELLY CAVANAUGH-KELLY
HAMPDEN COUNTY REGISTRY OF DEEDS

Bk 22388 Pg42 #59513
10-03-2018 @ 01:56p

MASSACHUSETTS STATE EXCISE TAX
HAMPDEN COUNTY REGISTRY OF DEEDS
Date: 10-03-2018 @ 01:56pm
Ctl#: 207 Doc#: 59513
Fee: $177.84 Cons: $39,000.00

WARRANTY DEED

KNOW ALL PERSONS BY THESE PRESENTS, that 17 GROUP, LLC, a Massachusetts Limited Liability Company with an address of 167 Coyote Circle, Feeding Hills, Hampden County, Massachusetts and Edward H. Mutti, of Agawam, Hampden County, Massachusetts

for consideration paid and in full consideration of THIRTY-NINE THOUSAND AND 00/100 DOLLARS ($39,000.00);

grants to **CALABRESE CONSTRUCTION, LLC,** a Massachusetts Limited Liability Company with an address of 7 Brewster Road, West Springfield, Massachusetts

with **QUITCLAIM COVENANTS**

Locus: 0 High Street and 0 Old River, Agawam MA

Parcel 1: 0 High Street
Certain real estate situated in Agawam, being known and designated as "Parcel B" as shown on a plan entitled "Property Plan for Helen E. Geoffrion Agawam, Massachusetts" dated April 1985 and recorded in Hampden County Registry of Deeds in Book of Plans 224, Page 18, said lot being more particularly bounded and described as follows:

SOUTHERLY	by High Street, seventy (70) feet;
EASTERLY	by River Street, one hundred eighty (180.00) feet;
NORTHERLY	by land now or formerly of Worthy Paper Company, one hundred ten and 14/100 (110.14) feet;
WESTERLY	by land now or formerly of one Jacobsen, ninety and 01/100 (90.01) feet;
NORTHERLY	by land now or formerly of Helen E. Geoffrion, thirty-nine and 92/100 (39.92) feet; and

WESTERLY by land now or formerly of Helen E. Geoffrion, ninety (90) feet to the point of beginning.

BEING the same premises conveyed to 17 Group LLC by deed of Edward J. Mutti dated September 14, 2012, and recorded in the Hampden County Registry of Deeds in Book 19486, Page 596. See also Book 16786, Page 9.

Parcel 2: 0 Old River:
A certain parcel of land situated in Agawam in said County of Hampden, bounded and described as follows:

Bounded Northerly by land now or formerly of Worthy Paper Company and the Westfield River; Easterly by said River; Southerly by land now or formerly of Justus R. Cooley; and Westerly by River Street; containing approximately one and 88/100 (1.88) acres.

The sale is in the ordinary course of business of 17 GROUP, LLC.

The grantors herein release all rights of homestead in the conveyed premises and certify that no one else has acquired such rights.

BEING Parcel 2 as conveyed to 17 Group LLC by deed of Edward J. Mutti dated September 14, 2012, and recorded in the Hampden County Registry of Deeds in Book 19486, Page 598. See also 16786, Page 2.

Edward H. Mutti joins in signing this deed to release his life estate interest on both properties.

-Signature page(s) to follow-

WITNESS my hand and seal this 6th day of September, 2018.

17 GROUP, LLC

Edward J. Mutti, manager

COMMONWEALTH OF MASSACHUSETTS

HAMPDEN, ss.

On this 6th day of September, 2018, before me, the undersigned notary public, personally appeared Edward J. Mutti as manager of 17 GROUP, LLC, proved to me through satisfactory evidence of identification, which was ☐ photographic identification with signature issued by a federal or state governmental agency, ☒ personal knowledge of the undersigned, ☐ oath or affirmation of a credible witness, to be the person whose name is signed on the preceding or attached document, and who swore, subscribed and affirmed to me that the contents of the document are truthful and accurate to the best of his knowledge and belief and that he signed the document voluntarily for its stated purpose on behalf of 17 GROUP, LLC, and affirmed to me that the contents of the document are truthful and accurate to the best of his knowledge and belief.

Gina M. Barry, Notary Public

GINA M. BARRY
NOTARY PUBLIC
Commonwealth of Massachusetts
My Commission Expires
September 17, 2021

My Commission Expires: 9/17/2021

WITNESS my hand and seal this 6th day of September, 2018.

Edward H. Mutti, by Edward J. Mutti,
his attorney in fact

COMMONWEALTH OF MASSACHUSETTS

HAMPDEN, ss.

On this 6th day of September, 2018, before me, the undersigned notary public, personally appeared Edward J. Mutti, who proved to me through satisfactory evidence of identification, being personal knowledge, to be the person who executed the foregoing instrument on behalf of Edward H. Mutti and acknowledged to me that he signed it voluntarily and as the free act and deed of Edward H. Mutti, his principal as his free act and deed

Gina M. Barry, Notary Public

My Commission Expires: 9/17/2021

GINA M. BARRY
NOTARY PUBLIC
Commonwealth of Massachusetts
My Commission Expires
September 17, 2021

KELLY CAVANAUGH-KELLY
HAMPDEN COUNTY REGISTRY OF DEEDS

Bk 22935 Pg347 #64532
11-01-2019 @ 03:38p

MASSACHUSETTS STATE EXCISE TAX
HAMPDEN COUNTY REGISTRY OF DEEDS
Date: 11-01-2019 @ 03:38pm
Ctl#: 515 Doc#: 64532
Fee: $478.80 Cons: $105,000.00

WARRANTY DEED

KNOW ALL PERSONS BY THESE PRESENTS, that 17 GROUP, LLC, a Massachusetts Limited Liability Company with an address of 167 Coyote Circle, Feeding Hills, Hampden County, Massachusetts

for consideration paid and in full consideration of ONE HUNDRED FIVE THOUSAND AND 00/100 DOLLARS ($105,000.00);

grants to **CALABRESE CONSTRUCTION, LLC,** a Massachusetts Limited Liability Company with an address of 7 Brewster Road, West Springfield, Massachusetts

with **QUITCLAIM COVENANTS**

Certain real estate situated in Agawam, being more particularly bounded and described as follows:

A certain lot of land with the buildings thereon lying on the Southerly side of High Street in said Agawam being part of Lot Number Nine (9) and all of lot Number Ten (10) on a Plan of the Agawam Canal Company, recorded in the Registry of Deeds for Hampden County in Book 365 in the fore part of said Book before the paging and marked "I", said lot being described more fully as follows, to wit:

Beginning at an iron pin on the Southerly side of High Street sixty-two (62) feet Easterly of the Southeasterly corner of Walnut Street and High Street and running thence Easterly by High Street one hundred fifty-eight (158) feet to an iron pin on the Westerly side of River Street; thence running by River Street in a Southerly direction one hundred (100) feet to an iron pin; thence running Westerly and parallel with the Southerly line of High Street one hundred fifty-eight (158) feet to an iron pin; thence running Northerly and parallel with the Westerly line of River Street one hundred (100) feet to the place of beginning.

BEING a portion of the premises conveyed to 17 Group LLC by deed of Edward J. Mutti dated September 14, 2012, and recorded in the Hampden County Registry of Deeds in Book 19486, Page 598. See also Book 16786, Page 2. Edward H. Mutti, having reserved a life estate, died on September 14, 2019.

The sale is in the ordinary course of business of 17 GROUP, LLC.

Locus: 17 High Street, Agawam MA

WITNESS my hand and seal this 31st day of October, 2019.

17 GROUP, LLC

Edward J. Mutti, manager

COMMONWEALTH OF MASSACHUSETTS

HAMPDEN, ss.

On this 31st day of October, 2019, before me, the undersigned notary public, personally appeared Edward J. Mutti as manager of 17 GROUP, LLC, proved to me through satisfactory evidence of identification, which was ☒ photographic identification with signature issued by a federal or state governmental agency, ☐ personal knowledge of the undersigned, ☐ oath or affirmation of a credible witness, to be the person whose name is signed on the preceding or attached document, and who swore, subscribed and affirmed to me that the contents of the document are truthful and accurate to the best of his knowledge and belief and that he signed the document voluntarily for its stated purpose on behalf of 17 GROUP, LLC, and affirmed to me that the contents of the document are truthful and accurate to the best of his knowledge and belief.

Gina M. Barry, Notary Public

GINA M. BARRY
NOTARY PUBLIC
Commonwealth of Massachusetts
My Commission Expires
September 17, 2021

My Commission Expires: 9/17/2021

CHERYL A. COAKLEY-RIVERA, ESQ.
HAMPDEN COUNTY REGISTRY OF DEEDS

APPENDIX A: SITE PLAN SET

SITE PLAN SET ENTITLED “PROPOSED RESIDENTIAL SUBDIVISION”

PREPARED FOR CALABRESE CONSTRUCTION, LLC

PREPARED BY R LEVESQUE ASSOCIATES, INC.

DATED JANUARY 30, 2026

APPENDIX B: STORMWATER REPORT

STORMWATER DRAINAGE REPORT

PREPARED FOR CALABRESE CONSTRUCTION, LLC

PREPARED BY R LEVESQUE ASSOCIATES, INC.

DATED JANUARY 30, 2026

TOWN OF AGAWAM
PLANNING BOARD
APPROVAL UNDER THE SUBDIVISION
CONTROL LAW IS REQUIRED

_____ _____
DATE

I, _____, CLERK OF THE TOWN OF AGAWAM HEREBY CERTIFY THAT NOTICE OF APPROVAL OF THIS PLAN BY THE AGAWAM PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING TWENTY DAYS AFTER SUCH RECEIPT AND RECORDED OF SAID NOTICE.

I CERTIFY THAT THIS PLAN WAS BEEN PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS.

_____
PROFESSIONAL LAND SURVEYOR

COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

Definitive Subdivision Plans

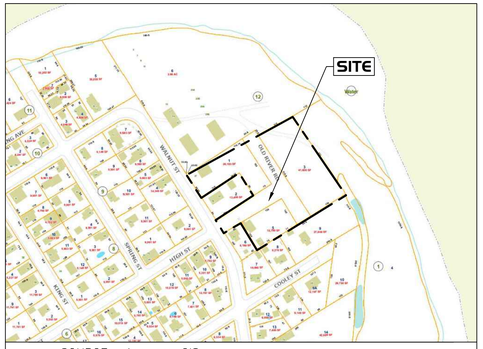
High Street

Old River Street, 27 Walnut Street & 17 High Street
Parcel IDs: J17-1-3, J17-1-1 & J17-1-5
Agawam, Masschusetts 01001

AS PREPARED FOR

Calabrese Construction, LLC
c/o Mr. Charles Calabrese

7 Brewster Road
West Springfield, Massachusetts



SOURCE: Agawam GIS

NORTH

January 30, 2026

DRAWING INDEX

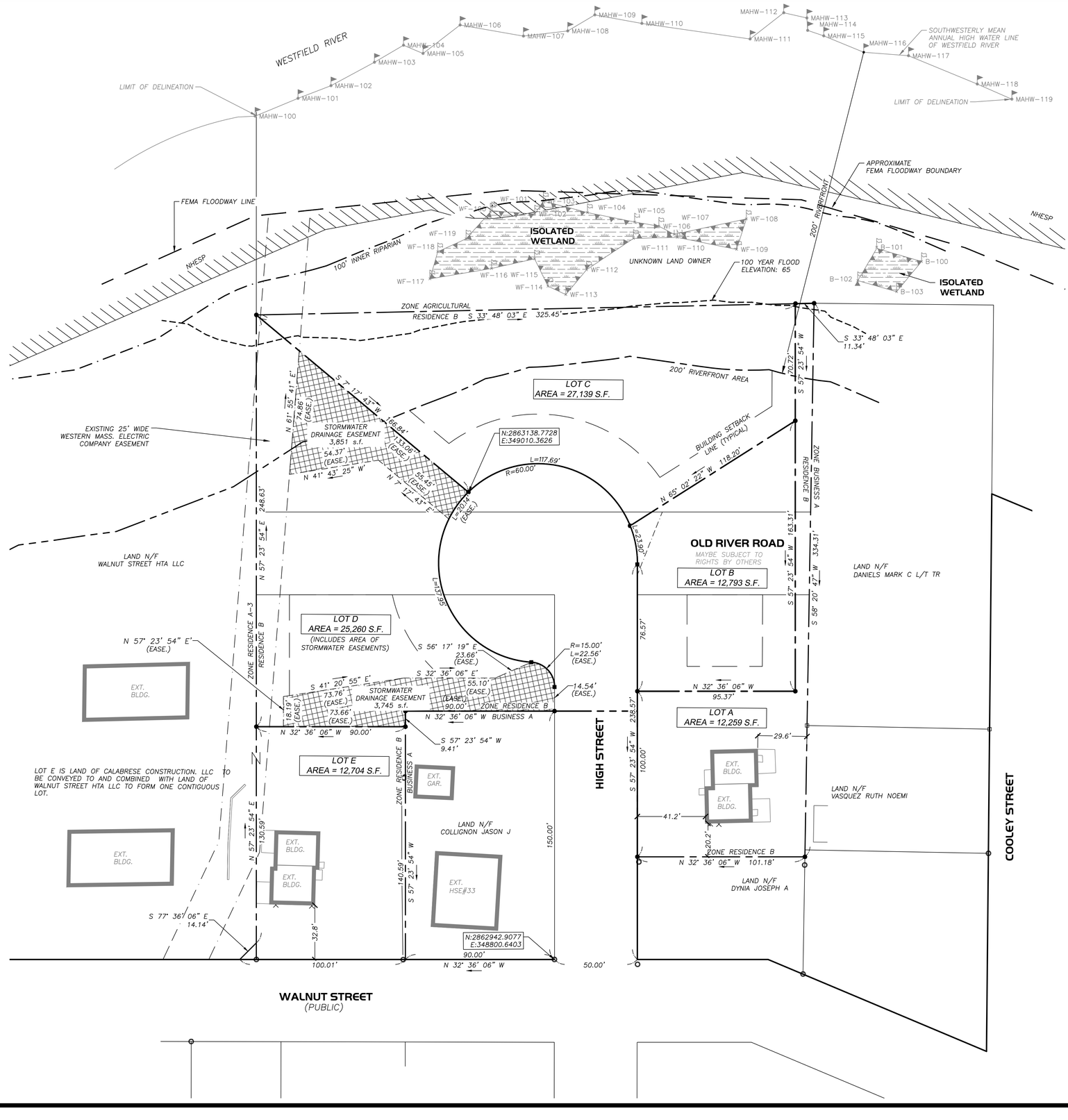
SHEET NO.	SHEET NAME	ISSUE DATE	REVISION DATE
T-1	TITLE SHEET	1/30/26	
P-1	DEFINITIVE SUBDIVISION PLAN	1/30/26	
EX-1	EXISTING CONDITIONS PLAN	1/30/26	
C-1	NOTES, SYMBOL & LINE LEGEND, AND ABBREVIATIONS	1/30/26	
C-2	CONSTRUCTION NOTES	1/30/26	
C-3	GRADING, EROSION & SEDIMENTATION CONTROL PLAN	1/30/26	
C-4	PLAN & PROFILE - HIGH STREET - STA -0+50 to STA 3+50	1/30/26	
C-5	SUBSURFACE INFILTRATION BASIN	1/30/26	
D-1	DETAILS	1/30/26	
D-2	DETAILS	1/30/26	
D-3	DETAILS	1/30/26	
D-4	DETAILS	1/30/26	
D-5	DETAILS	1/30/26	

BY

R LEVESQUE ASSOCIATES INC
A LAND PLANNING SERVICES COMPANY
40 School Street · Westfield, MA · 01085
ph 413.568.0985 · fax 413.568.0986
www.rlaland.com

RLA Project Number: 220627

PERMITTING



NOTES

1. THE RECORD OWNER OF THE SUBJECT PARCEL CALABRESE CONSTRUCTION, LLC. SEE HAMPDEN COUNTY REGISTRY OF DEEDS BOOK DEED BOOK 22388 PAGE 42 – 47, BOOK 22935 PAGE 347.
2. THE PROPERTY LINES SHOWN HEREON ARE BASED UPON ON A GROUND SURVEY PERFORMED BY R.LEVESQUE ASSOCIATES INC.
3. THIS PLAN HAS BEEN PREPARED FOR DEFINITIVE SUBDIVISION AND SHALL BE USED FOR THE CONVEYANCE OF LAND.
4. THE SUBJECT PROPERTIES SHOWN HEREON MAY BE SUBJECT TO RIGHTS AND EASEMENTS AS CONTAINED IN THE VARIOUS DEEDS OF RECORD DESCRIBING SAID PROPERTIES. THE LOCATION AND EXTENT OF ANY SUCH RIGHTS AND EASEMENTS IS NOT THE SUBJECT OF THIS PLAN.
5. WETLANDS AND M.A.H.W. DELINEATED BY R.LEVESQUE ASSOCIATES INC JULY 17, 2025.
6. THE EXISTING TOPOGRAPHIC INFORMATION SHOWN IS BASED UPON NOAA LIDAR TOPOGRAPHIC DIGITAL AND R. LEVESQUE ASSOCIATES FIELD SURVEY ON MARCH 2025
7. ADJACENT PROPERTY LINES AND ABUTTERS SHOWN HEREON ARE REFERENCED FROM THE TOWN OF WEST SPRINGFIELD GIS MAPPING.
8. SUBJECT PARCELS ARE ZONED RESIDENCE B ACCORDING TO ZONING MAP AMENDMENT.
9. A PORTION OF SUBJECT PARCEL IS LOCATED WITHIN A SPECIAL FLOOD ZONE AREA ACCORDING TO FLOOD INSURANCE RATE MAP NUMBER 25013C0382E – EFFECTIVE DATE: 7/16/2013. ELEV: 65.0
10. THE SUBJECT PROPERTY IS NOT LOCATED WITHIN NATURAL HERITAGE & ENDANGERED SPECIES PROGRAM (NHESP) JURISDICTION.
11. OFFSITE WETLAND RESOURCE HAVE BEEN SHOWN TO ACCURATELY DEPICT BUFFER ZONE AND RIVERFRONT AREA ON THE SUBJECT PROPERTIES. THE DETERMINATION OF OFFSITE RESOURCE AREAS ARE NOT THE SUBJECT OF THIS FILING.
12. LOTS TO BE SERVICED BY PUBLIC WATER AND PUBLIC SEWER

TOWN OF AGAWAM PLANNING BOARD

APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS REQUIRED

_____ DATE

I HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE TOWN OF AGAWAM PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDINGS OF SAID NOTICE.

_____ DATE
CITY CLERK

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS.

PROFESSIONAL LAND SURVEYOR

COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

SYMBOL & LINE LEGEND

- IRON PIPE FOUND
- CONCRETE BOUND FOUND
- IRON PIPE TO BE SET
- CONCRETE BOUND TO BE SET
- BUILDING SETBACK LINE
- EDGE OF WETLAND

Owner
Calabrese Construction, LLC

Definitive Subdivision Plan
HIGH STREET EXTENSION
Agawam, MA

Surveyed and Mapped for
Calabrese Construction, LLC
7 Brewster Road
West Springfield, Massachusetts

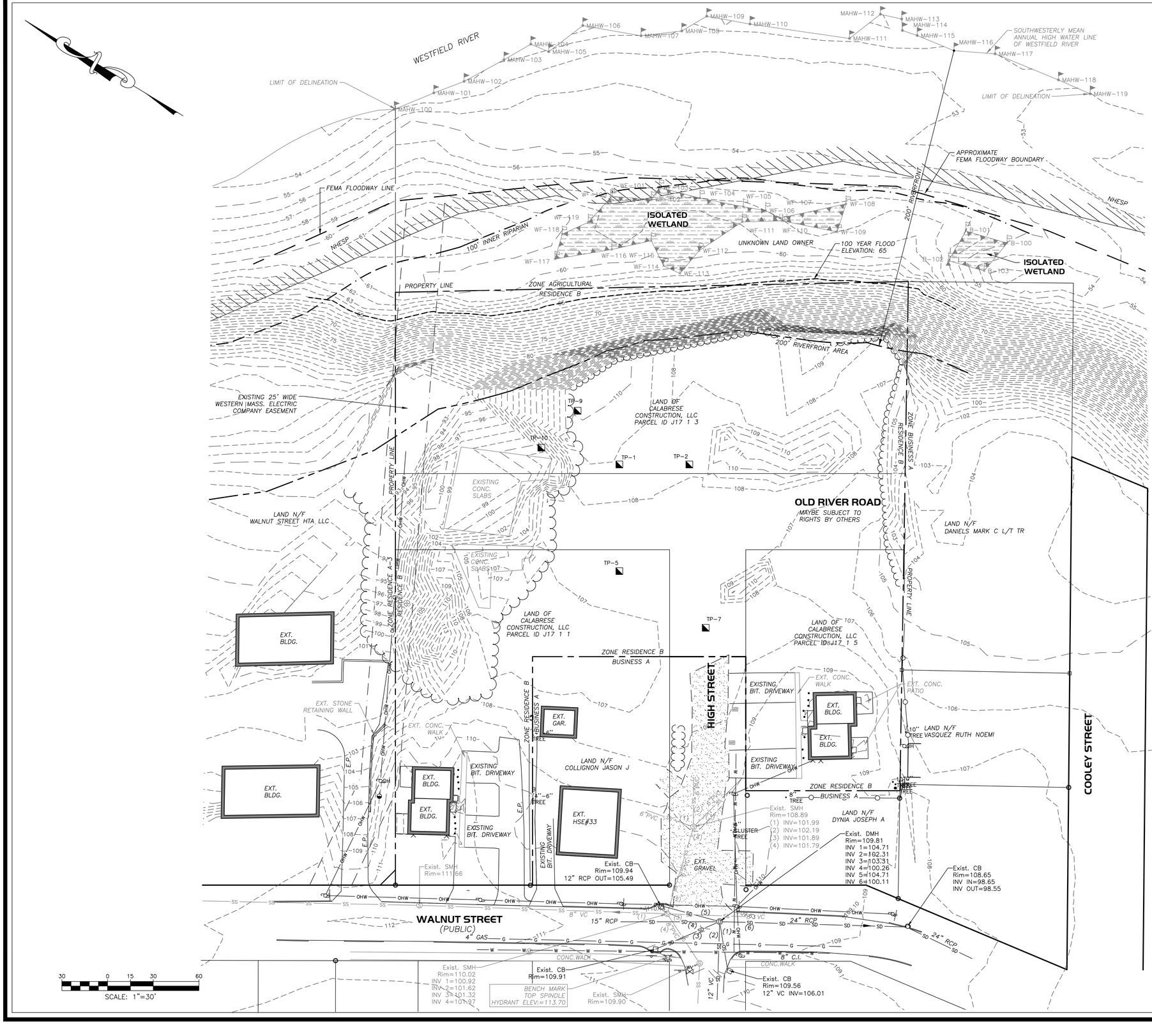
January 30, 2026 Scale: 1"=30'

Prepared by
R LEVESQUE ASSOCIATES INC
ph: 413.568.0985 fax: 413.568.0986
40 School Street · P.O. Box 640
Westfield, MA 01086
rlaland.com

30 0 15 30 60
SCALE: 1"=30'

RLA Project Number: 220627

P-1



TOWN OF AGAWAM
PLANNING BOARD

APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS REQUIRED

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_____
PROFESSIONAL LAND SURVEYOR

EXISTING SITE CONDITIONS

0 Old River Street
Agawam, Massachusetts
Map J17 Parcel I-3

RLA
R LEVESQUE ASSOCIATES INC
Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants
ph: 413.568.0985 fax: 413.568.0986
40 School Street
Westfield, MA 01085
rlaland.com

COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

PREPARED FOR:

Chuck Calabrese
Calabrese Construction, LLC

7 Brewster Road
West Springfield, MA.

ISSUANCE DATE: January 30, 2026

REVISIONS:	DATE:

DRAFTED BY: T.A. & F.C.

UNAUTHORIZED ALTERATION OF THIS DOCUMENT IS A VIOLATION OF MASSACHUSETTS STATE LAW

SCALE: As Noted

RLA PROJ. NUMBER: 220627

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PERMITTING

S:\Projects\2022\220627 - Calabrese - 0 Old River St, Agawam, MA\05 Civil 3D\220627 - Defin.dwg

SYMBOL & LINE LEGEND

- IRON PIPE FOUND
- IRON PIPE TO BE SET
- CONCRETE BOUND FOUND
- CONCRETE BOUND TO BE SET
- COMPUTED POINT
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING MONITORING WELL
- EXISTING LIGHT POLE
- UTILITY POLE
- GUY ANCHOR
- EXISTING ELECTRIC MANHOLE
- EXISTING TELEPHONE MANHOLE
- EXISTING CABLE TV BOX
- EXISTING WELL LOCATION
- EXISTING WATER VALVE
- EXISTING WATER SHUT-OFF
- EXISTING HYDRANT
- PROPOSED WATER VALVE
- PROPOSED HYDRANT
- EXISTING GAS VALVE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING CATCH BASIN
- EXISTING DRAIN MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED MANHOLE
- SOIL BORING LOCATION
- TEST PIT LOCATION
- PERC TEST LOCATION
- WETLAND FLAG LOCATION
- M.A.H.W. FLAG LOCATION
- EXISTING STONE WALL
- TREE LINE
- × 102.4 EXISTING SPOT GRADE
- 219 EXISTING CONTOUR
- × 94.7 PROPOSED SPOT GRADE
- 214 PROPOSED CONTOUR
- EDGE OF WETLAND
- FENCE LINE
- GUARDRAIL
- OHW OHW EXISTING OVERHEAD WIRES
- UEL UEL EXISTING UNDERGROUND ELECTRIC
- TEL TEL EXISTING TELEPHONE LINE
- G G EXISTING GAS LINE
- W W EXISTING WATER LINE
- SD SD EXISTING STORM DRAIN
- SS SS EXISTING SANITARY SEWER
- LOW LOW LIMIT OF WORK LINE
- SF SF SF SILT FENCE LINE

ABBREVIATIONS

A.F.F.	–	ABOVE FINISHED FLOOR
A.F.S.	–	ABOVE FINISHED SLAB
APPROX.	–	APPROXIMATE
A.T.F.	–	ABOVE TOP OF FOUNDATION
BLDG.	–	BUILDING
BLK.	–	BLOCK
BOT.	–	BOTTOM
B.O.W.	–	BOTTOM OF WALL
BRG.	–	BEARING
CB.	–	CATCH BASIN
CL	–	CENTERLINE
C.I.	–	CAST IRON
CLR.	–	CLEAR
CONC.	–	CONCRETE
CONT.	–	CONTINUOUS
CONTR.	–	CONTRACTOR
DBL.	–	DOUBLE
DET.	–	DETAIL
D.I.	–	DUCTILE IRON
DIA.	–	DIAMETER
DIM.	–	DIMENSION
DT'L.	–	DETAIL
DWG.	–	DRAWING
EA.	–	EACH
ELEC.	–	ELECTRIC
ELEV.	–	ELEVATION
EXIST.	–	EXISTING
EXT.	–	EXTERIOR
FFE	–	FINISH FLOOR ELEVATION
FIN.	–	FINISH
FLR.	–	FLOOR
FOUND.	–	FOUNDATION
FT.	–	FOOT OR FEET
INSTL.	–	INSTALLED
LT.	–	LIGHT
MAX.	–	MAXIMUM
M.A.H.W.	–	MEAN ANNUAL HIGH WATER
MH.	–	MANHOLE
MIN.	–	MINIMUM
MISC.	–	MISCELLANEOUS
N.T.S.	–	NOT TO SCALE
O.A.	–	OVERALL
O.C.	–	ON CENTER
PCB	–	PROPOSED CATCH BASIN
PDMH	–	PROPOSED DRAIN MANHOLE
PFES	–	PROP. FLARED END SECTION
POCS	–	PROP. OUTLET CONTROL STRUCT.
PROP.	–	PROPOSED
PSMH	–	PROP. SANITARY SEWER MANHOLE
PWQU	–	PROP. WATER QUALITY UNIT
P.S.I.	–	POUNDS PER SQUARE INCH
REINF.	–	REINFORCING
R.H.	–	RIGHT HAND
SHT.	–	SHEET
SPEC.	–	SPECIAL OR SPECIFICATIONS
SQ.	–	SQUARE
ST.	–	STEEL
STA.	–	STATION
T.O.F.	–	TOP OF FOUNDATION
T.O.W.	–	TOP OF WALL
T.S.	–	TOP OF STEEL
TYP.	–	TYPICAL
W/	–	WITH
WTR.	–	WATER
W.W.M.	–	WELDED WIRE MESH

TOWN OF AGAWAM
PLANNING BOARD

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PROFESSIONAL LAND SURVEYOR

COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

EROSION & SEDIMENT CONTROL NOTES

MANAGEMENT STRATEGIES

1. CONSTRUCTION TRAFFIC SHALL BE LIMITED TO THE CONSTRUCTION ENTRANCE.
2. CONSTRUCTION SEQUENCE SHALL BE PHASED TO AVOID LEAVING LARGE AREAS EXPOSED FOR LONG PERIODS OF TIME.
3. TEMPORARY SEED AND MULCH SHALL BE APPLIED IMMEDIATELY FOLLOWING ROUGH GRADING.
4. SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED CONTINUOUSLY, ESPECIALLY FOLLOWING STORM EVENTS TO LOCATE FAILING CONTROL MEASURES AND CONDUCT ROUTINE MAINTENANCE OPERATIONS.
5. THE CONSTRUCTION SUPERINTENDENT SHALL INFORM ALL ON-SITE WORKERS OF THE SEDIMENTATION CONTROL PROGRAM.

VEGETATIVE CONTROL PRACTICES

1. TOPSOIL STOCKPILING: TOPSOIL SHALL BE STRIPPED FROM AREAS TO BE DISTURBED AND STOCKPILED FOR LATER USE. STOCKPILE LOCATION SHALL BE APPROVED BY THE OWNER AND ENGINEER AND BE WITHIN LIMIT OF WORK.
2. TEMPORARY SEEDING: THE TEMPORARY SEDIMENT BASIN, TOPSOIL STOCKPILE AND ROUGH GRADED AREAS SHALL BE SEEDED WITH WINTER RYE AT A RATE OF 30 LBS. PER ACRE ANY SOILS THAT ARE LEFT EXPOSED AND UNDISTURBED FOR MORE THAN 30 DAYS SHALL BE TEMPORARILY SEEDED.

A. SITE PREPARATION
- COMPLETE ALL ROUGH GRADING ACTIVITIES
- REMOVE ALL ROCKS AND DEBRIS LARGER THAN 3" IN DIAMETER FROM AREAS TO BE TEMPORARILY SEEDED. -EVENLY APPLY LIME TO ACHIEVE A PH VALUE OF 6.0.
- EVENLY APPLY 14 LBS. OF 5-10-10 ANALYSIS FERTILIZER TO A DEPTH OF 4" USING SUITABLE EQUIPMENT.
- SEEDBED IS TO BE LEFT IN FIRM AND SMOOTH CONDITION.
- THE LAST TILLAGE OPERATION SHALL BE PERFORMED ACROSS THE SLOPE.

B. ESTABLISHMENT
- EVENLY APPLY SEED IN ACCORDANCE WITH THE SPECIES AND RATE INDICATED ABOVE BY MEANS OF BROADCASTING OR HYDROSEEDING.
- UNLESS HYDROSEEDED, COVER SEED WITH 1/4" TO 1/2" OF TOPSOIL
- APPLY MULCH OR EROSION CONTROL BLANKET IMMEDIATELY FOLLOWING SEEDING.
- VERIFY SEEDING DATES WITH ENGINEER/LANDSCAPE ARCHITECT. IF ENGINEER/LANDSCAPE ARCHITECT DETERMINES THAT SEED CANNOT BE APPLIED DUE TO CLIMATE, TOPSOIL SHALL NOT BE SPREAD AND MULCHING SHALL BE APPLIED TO THE EXPOSED SURFACE TO STABILIZE SOILS UNTIL THE NEXT RECOMMENDED SEEDING PERIOD.
- PERMANENT SEEDING SHALL BE APPLIED BETWEEN APRIL 15 AND SEPTEMBER 30. TEMPORARY SEEDING SHALL BE APPLIED TO ALL DISTURBED AREAS OUTSIDE THIS TIME FRAME, UPON APPROVAL BY THE ENGINEER/LANDSCAPE ARCHITECT.

C. MAINTENANCE
- ALL SEEDED/MULCHED AREAS SHALL BE INSPECTED REGULARLY TO SEE THAT A GOOD STAND IS MAINTAINED. AREAS SHALL BE REPAIRED AS NECESSARY.

NONSTRUCTURAL CONTROL PRACTICES

1. SCARIFICATION: EXPOSED SLOPES EXCEEDING 4:1 SHALL BE SCARIFIED AT RIGHT ANGLES TO THE SLOPE. PROVIDE PERIODIC UPGRADING OF SERRATIONS DURING EXPOSED PERIOD UNTIL VEGETATION IS ESTABLISHED. PROVIDE VEGETATIVE COVER AS SOON AS POSSIBLE.
2. STRAW MULCH: STRAW MULCH SHALL BE APPLIED IN CONJUNCTION WITH TEMPORARY/PERMANENT SEEDING AND TO GRADED AREAS WHICH REMAIN EXPOSED OUTSIDE OF RECOMMENDED SEEDING DATES. MULCH SHALL BE APPLIED AT 90 LBS. PER 1000 S.F. CONTRACTOR SHALL PERIODICALLY INSPECT AND REAPPLY AS NECESSARY, PARTICULARLY FOLLOWING SIGNIFICANT STORM EVENTS.
3. TOPSOIL: DISTURBED AREAS SHALL BE TOPSOILED PRIOR TO SEED APPLICATION. APPLICATION STANDARDS:
- REMOVE ALL ROCKS AND DEBRIS OVER 1"-1 1/2" IN DIAMETER.
- SCARIFY SURFACE PRIOR TO SEED APPLICATION.
- APPLY 6" DEPTH OF TOPSOIL.
4. SILT FENCE: SILT FENCE SHALL BE INSTALLED AROUND THE PERIMETER OF THE SITE, AT CULVERT OUTLET LOCATIONS, OR AS INDICATED ON THE DRAWINGS. SILT FENCE SHALL BE INSPECTED AND REPAIRED ROUTINELY, ESPECIALLY FOLLOWING STORM EVENTS UNTIL THE SITE HAS BEEN STABILIZED (COVER > 70%) BY VEGETATION.

STRUCTURAL CONTROL PRACTICES

1. RIP-RAP OUTLET PROTECTION: RIP-RAP SHALL BE PROVIDED AT ALL PIPE OUTLETS. MATERIAL SHALL BE HARD, DURABLE FIELD OR QUARRY STONE WHICH IS ANGULAR AND RESISTS BREAKING DOWN WHEN EXPOSED TO WATER OR WEATHERING.
2. CONSTRUCTION ENTRANCE: CONSTRUCTION ENTRANCE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE DRAWINGS.
3. DUST CONTROL: A WATER TRUCK SHOULD BE LOCATED ON-SITE FOR DUST CONTROL WHILE WORK IS PROCEEDING. MAINTENANCE SEDIMENTATION CONTROL MEASURES SHALL BE CHECKED WEEKLY AND AFTER EACH SIGNIFICANT RAINFALL EVENT. THE FOLLOWING ITEMS SHALL BE CHECKED IN PARTICULAR:
   A. RIP-RAP OUTLET PROTECTION SHALL BE CHECKED REGULARLY FOR SEDIMENT ACCUMULATION. IF SIGNIFICANT AMOUNTS OF SEDIMENT ACCUMULATE, RIP-RAP SHALL BE REMOVED AND REPLACED.
   B. SILT FENCING SHALL BE INSPECTED REGULARLY FOR UNDERMINING AND DETERIORATION. REMOVE SEDIMENT FROM BEHIND FENCE WHEN IT BECOMES 6 INCHES DEEP.
   C. SEEDED/MULCHED AREAS SHALL BE INSPECTED REGULARLY TO SEE THAT A GOOD STAND IS MAINTAINED. AREAS SHALL BE REPAIRED AS NECESSARY.

SILT FENCE INSTALLATION NOTES

1. THIS SEDIMENT BARRIER UTILIZES MIRAFI ENVIROFENCE (100X) OR EQUAL. IT IS DESIGNED FOR SITUATIONS IN WHICH ONLY SHEET OR OVERLAND FLOWS ARE EXPECTED.
2. THE HEIGHT OF THE BARRIER SHALL NOT EXCEED 36 INCHES (HIGHER BARRIERS MAY IMPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE). IDEALLY THE FILTER FENCE SHALL BE PLACED 10 FEET AWAY FROM THE TOE OF SLOPE.
3. WHEN JOINTS ARE NECESSARY, FILTER FABRICS SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT STAKES WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY SEALED. SEE MANUFACTURER'S RECOMMENDATION.
4. STAKES SHALL BE SPACED A MAXIMUM OF 10 FEET APART AT THE BARRIER LOCATION AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 12 INCHES). IN APPLICATIONS WHERE HEAVY FLOWS ARE EXPECTED SUCH AS IN-STREAM INSTALLATIONS STAKE SPACING SHALL BE PER MANUFACTURER'S RECOMMENDATIONS AND/OR THE ENGINEERS RECOMMENDATIONS.
5. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 6 INCHES WIDE AND 6 INCHES DEEP ALONG THE LINE OF STAKES AND UPSLOPE FROM THE BARRIER IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
6. THE PRE ASSEMBLED SILT FENCE SYSTEM SHALL BE UNROLLED, POSITION THE STAKES ON THE DOWNHILL SIDE OF THE TRENCH AND HAMMER THE STAKES AT LEAST 12 INCHES INTO THE GROUND.
7. THE BOTTOM SIX (6) INCHES OF THE FABRIC SHALL BE LAID INTO THE TRENCH TO PREVENT UNDERMINING BY STORM WATER RUNOFF.
8. BACKFILL THE TRENCH OVER THE FILTER FABRIC AND COMPACT SUFFICIENTLY TO PREVENT THE RUNOFF FROM ERODING THE BACKFILL.
9. THE FABRIC SHALL NOT EXTEND MORE THAT 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES OR SUPPORTS OTHER THAN THE STANDARD STAKES.
10. INSTALLED SILT FENCE BARRIERS SHALL BE MAINTAINED ON A REGULAR SCHEDULE WHICH MAY BE PRESCRIBED BY THE LOCAL, STATE OF FEDERAL REGULATORY AUTHORITY; BUT, AT MINIMUM SHALL BE CHECKED WEEKLY AS WELL AS AFTER EACH STORM EVENT. MAINTENANCE SHALL CONSIST OF AN INSPECTION OF THE ENTIRE LENGTH OF THE BARRIER TO DETERMINE IF IT IS FUNCTIONING AS INTENDED. ALL BREAKS, DETACHED FABRIC, SLUMPED FABRIC, CLOGGED FABRIC, AND UNDERMINED AREAS SHALL BE FIXED THE DAY THAT THEY ARE DISCOVERED.
11. WHEN A MAXIMUM OF SIX (6) INCHES OF SEDIMENT HAS ACCUMULATED BEHIND THE SILT FENCE THIS SEDIMENT SHALL BE REMOVED AND THE FENCE SHALL BE INSPECTED FOR TEARS, CLOGGING OF BREAKS. ALL DEFICIENCIES SHALL BE CORRECTED IMMEDIATELY EITHER BY REPAIR OF REPLACEMENT OF THE SILT FENCE BARRIER AND/OR STAKES AS NEEDED.
12. SILT FENCE BARRIERS SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN CLEANED OF SILT AND PERMANENTLY STABILIZED.

HAY BALE INSTALLATION & MAINTENANCE (AS REQ'D)

1. HAY BALES SHALL BE PLACED IN A SINGLE ROW, LENGTHWISE ON THE CONTOUR, WITH ENDS OF ADJACENT BALES TIGHTLY ABUTTING ONE ANOTHER.
2. ALL BALES SHALL BE EITHER WIRE BOUND OR STRING TIES. BALES SHALL BE INSTALLED SO THAT BINDINGS ARE ORIENTED AROUND THE SIDES RATHER THAN ALONG THE TOPS AND BOTTOMS OF THE BALES TO PREVENT DETERIORATION OF THE BINDINGS.
3. THE BARRIER SHALL BE ENTRENCHED AND BACKFILLED. A TRENCH SHALL BE EXCAVATED THE WIDTH OF A BALE AND THE LENGTH OF THE PROPOSED BARRIER TO A MINIMUM DEPTH OF FOUR (4) INCHES AND A MAXIMUM DEPTH OF SIX (6) INCHES. AFTER THE BALES ARE STAKED AND CHINKED, THE EXCAVATED SOIL SHALL BE BACKFILLED AGAINST THE BARRIER. BACKFILL SOIL SHALL CONFORM TO THE GROUND LEVEL ON THE DOWNHILL SIDE AND SHALL BE BUILT UP TO FOUR (4) INCHES AGAINST THE UPHILL SIDE OF THE BARRIER.
4. EACH BALE SHALL BE SECURELY ANCHORED BY AT LEAST TWO (2) STAKES OR REBARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER. STAKES OR REBARS SHALL BE DRIVEN DEEP ENOUGH INTO THE GROUND TO SECURELY ANCHOR THE BALES.
5. THE GAPS BETWEEN BALES SHALL BE CHINKED (FILLED BY WEDGING) WITH STRAW TO PREVENT WATER FROM ESCAPING BETWEEN THE BALES. (LOOSE STRAW SCATTERED OVER THE AREA IMMEDIATELY UPHILL FROM A STRAW BALE BARRIER TENDS TO INCREASE BARRIER EFFICIENCY.)
6. HAY BALES GENERALLY DETERIORATE IN 2-6 MONTHS AND THUS NEED REPLACEMENT.
7. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
8. BALE BARRIERS SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS, BUT NOT BEFORE THE UPSLOPE AREAS HAVE BEEN PERMANENTLY STABILIZED.

SITE PREP

1. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL RELOCATION, INCLUDING BUT NOT LIMITED TO, ALL UTILITIES, STORM DRAINAGE, SIGNS, TRAFFIC SIGNALS & POLES, ETC. AS REQUIRED. ALL WORK SHALL BE IN ACCORDANCE WITH GOVERNING AUTHORITIES SPECIFICATIONS AND SHALL BE APPROVED BY SUCH.
2. CONTRACTOR SHALL ERECT AND MAINTAIN SAFETY BARRICADES AND POST PROPER NOTICES PRIOR TO THE COMMENCEMENT OF WORK.
3. CONTRACTOR SHALL PROTECT EXISTING SITE IMPROVEMENTS, APPURTENANCES, AND LANDSCAPING TO REMAIN.
4. CONTRACTOR SHALL MAINTAIN EXISTING UTILITIES TO REMAIN IN SERVICE AND PROTECT THEM FROM DAMAGE DURING DEMOLITION OPERATIONS.
5. DO NOT DAMAGE EXISTING UTILITIES TO REMAIN WITHIN PROJECT AREA. ALL DAMAGE TO EXISTING UTILITIES TO REMAIN SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE UTILITY OWNER.
6. THERE SHALL BE NO BURNING OF DEMOLISHED MATERIAL ALLOWED ON SITE.
7. CONTRACTOR SHALL COORDINATE WITH OWNER FOR ANY ITEMS TO BE TURNED OVER TO OWNER.
8. DEMOLISH AND REMOVE ALL PAVEMENT, SLABS, FOOTINGS, SUBSURFACE ELEMENTS, MISCELLANEOUS DEBRIS, ETC. WITHIN PROPERTY LINES UNLESS NOTED OTHERWISE.
9. CONTRACTOR IS RESPONSIBLE FOR CONTROLLING DUST SO THAT DUST DOES NOT CREATE A NUISANCE ON ADJACENT ROADS OR PROPERTIES. SITE CONTRACTOR SHALL BE RESPONSIBLE FOR STREET SWEEPING AND CATCH BASIN CLEANING AFTER EACH PHASE OF CONSTRUCTION AND AS NEED IS DETERMINED BY THE ENGINEER.
10. CONTRACTOR SHALL REMOVE AND DISPOSE OF ANY ABANDONED SUBSURFACE SOIL ABSORPTION SYSTEM (SAS) AND MISCELLANEOUS DEBRIS.
11. NO ACTIVITY OTHER THAN NORMAL MAINTENANCE SHALL OCCUR OUTSIDE OF LIMIT OF WORK LINES AS SHOWN ON PLAN WITHOUT THE APPROVAL OF THE ENGINEER.
12. THE CONTRACTOR SHALL NOTIFY DIG SAFE @ 1-888-344-7233 PRIOR TO COMMENCEMENT OF ANY DEMOLITION/CONSTRUCTION ACTIVITY.

LANDSCAPE NOTES

1. THE CONTRACTOR SHALL VERIFY FINAL SELECTION OF PLANT MATERIALS WITH THE LANDSCAPE ARCHITECT AND OWNER PRIOR TO INSTALLATION.
2. NO PLANT MATERIAL WILL BE ACCEPTED WHICH DISPLAYS MAJOR IRREGULARITIES OR DAMAGE. THE OWNER/LANDSCAPE ARCHITECT RETAINS THE RIGHT TO REJECT ANY PLANT MATERIAL DEEMED UNFIT.
3. WARRANTEE: FOR A PERIOD OF TWO GROWING SEASONS FROM THE DATE THAT THE WORK UNDER THIS CONTRACT IS CERTIFIED AS SUBSTANTIALLY COMPLETE, THE CONTRACTOR SHALL: 1) WARRANTEE ALL PLANTS AND SEEDED AREAS UNDER THIS CONTRACT; 2)REMOVE AND REPLACE DURING THIS GUARANTEE PERIOD PLANTS WHICH DIE OR ARE IN POOR CONDITION AS DETERMINED BY THE OWNER; 3) REPLANT WITH STOCK OF SAME SIZE AND QUALITY AS ORIGINALLY SPECIFIED; 4) GUY AND MAINTAIN AS SPECIFIED HEREIN AT NO ADDITIONAL COST TO THE OWNER.
4. ALL NEW LAWN AREAS SHALL RECEIVE A MINIMUM OF 4 INCHES TOPSOIL OF THE PROPER pH AND ORGANIC CONTENT SUITABLE FOR THE HEALTHY GROWTH OF LAWNS. THESE AREAS SHALL BE SEEDED WITH A FINE BLADE LAWN GRASS SEED OR SODDED. ADDITIONAL OFF-SITE TOPSOIL MAY BE REQUIRED.
5. ALL AREAS TO BE MULCHED SHALL RECEIVE 4 INCHES MINIMUM 100% SHREDDED BARK MULCH WITHIN 48 HOURS OF PLANTING UNLESS OTHERWISE NOTED IN PLANTING DETAILS.
6. ALL TREE AND SHRUB PITS SHALL BE AT LEAST 2 FEET WIDER AND 1 FOOT DEEPER THAN THE TREE OR SHRUB ROOT BALL TO BE PLANTED IN IT. BACKFILL SHALL BE HIGH QUALITY LOAM OF THE PROPER pH AND ORGANIC CONTENT SUITABLE FOR THE HEALTHY GROWTH OF PLANT MATERIALS.
7. ALL PLANTS SHALL BE NURSERY GROWN AND CONFORM TO THE LATEST EDITION OF "ANSI Z60.1, AMERICAN STANDARD FOR NURSERY STOCK".
8. EACH PLANT TO BE FREE FROM DISEASE, INSECT INFESTATION, MECHANICAL INJURIES, AND IN ALL RESPECTS BE SUITABLE FOR FIELD PLANTING.
9. EACH PLANT TO BE IN THE TOP OF ITS SIZE CLASS AFTER SHEARING AND PRUNING.
10. ADJACENT TO THE TOP OF ANY WALLS OVER 36" A FENCE OR WALL SHALL BE CONSTRUCTED PER PLAN THAT MEETS LOCAL BUILDING CODE AND ALL OTHER APPLICABLE STATE AND FEDERAL LAWS.
11. SEE DETAIL SHEETS FOR ADDITIONAL DETAILS & SPECIFICATIONS.
12. SHOULD GC OR ANY SUBCONTRACTOR ENCOUNTER A DISCREPANCE/CONFLICT IN THE PLAN AN THE ACTUAL LOCATION OF A SITE FEATURE, THE CONTRACTOR SHALL CONTACT THE LANDSCAPE ARCHITECT/ENGINEER AND OWNER IMMEDIATELY.
13. ALL AREAS DISTURBED DURING CONSTRUCTION NOT DESIGNATED TO RECEIVE OTHER TREATMENT SHALL BE LOAMED TO A MINIMUM DEPTH OF 4" AND SEEDED IN ACCORDANCE WITH THE FOLLOWING:
   A. INCORPORATE GROUND LIMESTONE INTO ALL AREAS TO BE SEEDED AT A RATE OF 50 LBS/1,000 S.F.
   B. APPLY 10-6-4 FERTILIZER TO ALL AREAS TO BE SEEDED AT A RATE OF 2 LBS/1,000 S.F.
   C. THOROUGHLY INCORPORATE LIME AND FERTILIZER INTO SEED BED TO DEPTH OF 3" BY DISCING OR OTHER APPROVED METHOD.
   D. SEED WITH THE FOLLOWING MIXTURE, APPLIED AT A RATE OF 10 LBS/1,000 S.F.

SEED MIX:

NAME OF SEED	% BY WEIGHT IN MIXTURE	MIN. % PURITY	MIN. GERMINATION
POS PRETENSES "BARON" BARON BLUEGRASS	50	90	75
FESTUCA RUBRA "PENNLAWN" PENNLAWN FESCUE	25	95	85
LOLIUM PERENNE "PENNFINE" PENNFINE	25	98	95

   E. MULCH ALL SEEDED AREAS WITH STRAW AT A RATE OF 5 LBS/1,000 S.F.UNLESS HYDROSEEDING WAS USED.
   F. ALL SLOPES OF 3:1 OR GREATER AFTER BEING LOAMED, SEEDED AND MULCHED IN ACCORDANCE WITH THE ABOVE SHALL SECURED WITH EROSION CONTROL BLANKETS (NO. AMERICAN GREEN S150 OR EQUAL). OVERLAP ALL NETTING JOINTS A MINIMUM OF 6" AND SECURE WITH DOUBLE ROW OF STAPLES.

PERMITTING

RLA
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Landscape Architects
Civil Engineers · Land Surveyors
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NOTES, SYMBOL & LINE LEGEND AND ABBREVIATIONS

0 Old River Street
Agawam, Massachusetts
Map J17 Parcel I-3

COMMONWEALTH OF MASSACHUSETTS
FILIPE J. CRAVO
CIVIL
No. 49576
REGISTERED PROFESSIONAL ENGINEER
1/30/26

PREPARED FOR:
Chuck Calabrese
Calabrese Construction, LLC
7 Brewster Road
West Springfield, MA.

ISSUANCE DATE: January 30, 2026

REVISIONS:	DATE:

DRAFTED BY: T.A. & F.C.

UNAUTHORIZED ALTERATION OF THIS DOCUMENT IS A VIOLATION OF MASSACHUSETTS STATE LAW

SCALE: As Noted

RLA PROJ. NUMBER: 220627

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GENERAL CONSTRUCTION NOTES

1. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE SHALL CONVENE A PRE-CONSTRUCTION CONFERENCE BETWEEN THE CITY/TOWN REPRESENTATIVES, CONSULTING ENGINEER/LANDSCAPE ARCHITECT, UTILITY COMPANY REPRESENTATIVES, AND ANY OTHER AFFECTED PARTIES.
2. THE OWNER, R LEVESQUE ASSOCIATES, INC., AND/OR THEIR REPRESENTATIVES, IN PREPARING THESE PLANS HAVE ATTEMPTED TO LOCATE ALL EXISTING UTILITIES IN THE PROJECT AREA. HOWEVER, THERE MAY BE UTILITIES THAT WERE NOT OR COULD NOT BE LOCATED. UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL CALL ALL APPROPRIATE UTILITY COMPANIES FOR LOCATIONS OF THEIR UTILITIES AT LEAST 48 HOURS BEFORE COMMENCING EXCAVATION. IN THE EVENT THAT A UTILITY IS SITUATED SUCH THAT CONSTRUCTION CANNOT PROCEED AS SHOWN ON THE PLANS, THE PROJECT ENGINEER/LANDSCAPE ARCHITECT AND OWNER SHALL BE NOTIFIED IMMEDIATELY.
3. THE SITE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH OCCUR DUE TO HIS FAILURE TO LOCATE AND PRESERVE ANY AND ALL UTILITIES.
4. ALL FILL WORK REQUIRED TO BRING THE PROPOSED ROADWAY UP TO SUB-GRADE LEVEL SHALL CONFORM TO MHD SPECIFICATIONS SECTION 150.
5. CONSTRUCTION SHALL COMPLY WITH ALL APPLICABLE GOVERNING CODES AND BE CONSTRUCTED TO SAME.
6. ALL WORK IN THE CITY/TOWN RIGHT-OF-WAY AND EASEMENTS SHALL BE IN ACCORDANCE WITH THE CITY/TOWN SPECIFICATIONS AND MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION.
7. THE CONTRACTOR SHALL GIVE THE CITY/TOWN A MINIMUM OF 48 HOURS NOTICE BEFORE BEGINNING EACH PHASE OF CONSTRUCTION.
8. CONTRACTOR IS RESPONSIBLE FOR REPAIRS OF DAMAGE TO ANY EXISTING IMPROVEMENTS DURING CONSTRUCTION, SUCH AS, BUT NOT LIMITED TO, DRAINAGE, UTILITIES, PAVEMENT, STRIPING, CURB, ETC. REPAIRS SHALL BE EQUAL TO OR BETTER THAN EXISTING CONDITIONS.
9. ALL WORK SHALL BE PERFORMED IN CONFORMANCE WITH THE CONDITIONS OF APPROVAL OUTLINED IN ALL STATE AND LOCAL PERMITS. COPIES OF THE CONDITIONS ARE INCLUDED WITHIN THE PROJECTS TECHNICAL SPECIFICATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING THIS INFORMATION PRIOR TO CONSTRUCTION AND CONFORMING TO THE CONDITIONS AS REQUIRED DURING CONSTRUCTION.
10. THE CONTRACTOR SHALL MAINTAIN THE JOB CLEAR OF TRASH AND DEBRIS. THE WORK AREAS ARE TO BE PICKED UP AT THE END OF EACH WORK DAY.
11. ANY TEMPORARY FACILITIES FOR THE STORAGE OR PROTECTION OF TOOLS, EQUIPMENT OR MATERIALS SHALL CONFORM TO LOCAL REGULATIONS AND SHALL BE THE GENERAL CONTRACTORS RESPONSIBILITY. THESE DOCUMENTS DO NOT INCLUDE THE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. SAFETY, CARE OF ADJACENT PROPERTIES DURING CONSTRUCTION, AND COMPLIANCE WITH STATE AND FEDERAL REGULATIONS REGARDING SAFETY SHALL BE THE GENERAL CONTRACTORS RESPONSIBILITY.
12. THE GENERAL CONTRACTOR AND HIS SUBCONTRACTORS SHALL VISIT THE SITE AND BECOME FAMILIAR WITH ALL CONDITIONS PRIOR TO SUBMITTING HIS PROPOSAL. NO EXTRAS DUE TO UNFAMILIARITY WITH THE EXISTING SITE OR WORKING CONDITIONS WILL BE ALLOWED.
13. CONTRACTOR SHALL BE REQUIRED TO PERFORM FINAL CLEANUP CONSISTING OF CLEANING THE PROPOSED DRAINAGE AND SEWER SYSTEMS OF ALL DEBRIS PRIOR TO THE ACCEPTANCE BY THE OWNER. ADDITIONALLY, THE PROPOSED ROADWAY SHALL BE CLEANED AND SWEPT BY THE CONTRACTOR PRIOR TO ACCEPTANCE.
14. ALL EXCAVATION SHALL COMPLY WITH OSHA'S LATEST STANDARDS. ALL REQUIREMENTS OF OSHA'S EXCAVATION STANDARDS SHALL BE PROVIDED BY THE CONTRACTOR INCLUDING, BUT NOT LIMITED TO, THE PROVISION FOR A COMPETENT PERSON ON SITE MANAGER AND ANY REQUIRED DOCUMENTATION THAT MAY REQUIRE CERTIFICATION BY A PROFESSIONAL ENGINEER. THE OWNER, THROUGH ITS ENGINEER, SHALL EXPRESSLY NOT PROVIDE ANY OF THE ABOVE REQUIREMENTS DESIGNATED BY OSHA'S EXCAVATION STANDARD.
15. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE COST OF LAYING OUT ALL ITEMS OF THE WORK BASED ON CERTAIN HORIZONTAL CONTROL AND BENCHMARK SUPPLIED BY THE SURVEYOR OF RECORD. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER.
16. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, EQUIPMENT, PERMITS AND APPURTENANCES NECESSARY TO PROVIDE A COMPLETE PROJECT AS INDICATED ON THE PLANS AND IN THESE SPECIFICATIONS.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR A THOROUGH SITE EXAMINATION IN ORDER TO PREPARE SITE FOR CONSTRUCTION.
18. ANY AND ALL DEMOLISHED TREES, STRUCTURES AND OTHER RUBBLE MATERIAL PERTAINING TO THIS PROJECT SHALL BE DISPOSED OF BY THE CONTRACTOR OFF-SITE AT HIS EXPENSE IN ACCORDANCE WITH ALL OF THE CITY/TOWN ORDINANCES AND ALL APPLICABLE STATE AND FEDERAL ENVIRONMENTAL REGULATIONS.
19. ALL PAVEMENT DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED IN ACCORDANCE WITH THE SPECIFICATIONS AND AS SHOWN ON THE DRAWINGS.
20. ALL STREET EXCAVATIONS SHALL BE COMPLETELY CLOSED AT THE END OF EACH WORKING DAY BY BACKFILLING OR COVERING WITH STEEL PLATES.
21. ALL MATERIALS AND METHODS ARE TO COMPLY WITH THE CITY/TOWN DPW STANDARDS OR MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (MASSDOT) (WHERE APPLICABLE), UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
22. PERMITS WILL BE REQUIRED BY CONTRACTOR WHEN WORKING WITHIN OR OCCUPYING PUBLIC WAY. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED WORK PERMITS AND MAINTAINING A COPY OF ALL PERMITS IN A THREE RING BINDER OR PROJECT BOOK AND ON-SITE AT ALL TIMES.
23. BACKFILL WILL BE PLACED IN SUCCESSIVE LAYERS NOT MORE THAN TWELVE INCHES IN THICKNESS AND SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY DETERMINED BY STANDARD PROCTOR TEST (ASTM 698) FOR ALL APPLICABLE TYPES OF BACKFILL MATERIAL. NO FROZEN MATERIAL SHALL BE USED AS BACKFILL. IF, IN THE OPINION OF THE ENGINEER OR THE DPW, THE EXCAVATED MATERIAL IS UNSUITABLE, THE ENTIRE MATERIAL FOR BACKFILLING SHALL CONSIST OF APPROVED GRAVEL OR APPROVED BORROW, AS DIRECTED. AFTER THOROUGH TAMPING AROUND AND BENEATH THE UTILITY, A SIX-INCH LAYER OF BACKFILL WILL BE THOROUGHLY COMPACTED AS FOLLOWS: IF DRY, SHALL BE MOISTENED AND THEN COMPACTED WITH MECHANICAL TAMPERS OR BY HAND TAMPERS HAVING A TAMPING FACE NOT EXCEEDING 25 SQUARE INCHES IN AREA. THE FINAL TWELVE INCHES OF FILLING WILL, IN ALL CASES, CONSIST OF APPROVED GRAVEL THOROUGHLY TAMPED.
24. CONTRACTOR SHALL PROVIDE FIELD COMPACTION VERIFICATION UTILIZING ASTM D5195-02, STANDARD TEST METHOD FOR DENSITY OF SOIL & ROCK IN-PLACE AT DEPTHS BELOW THE SURFACE BY NUCLEAR METHODS.
25. CONTRACTOR SHALL PROVIDE FIELD COMPACTION RESULTS TO ENGINEER WITHIN 24-HOURS PRIOR TO PLACEMENT OF INFRASTRUCTURE OR BITUMINOUS BINDER.
26. ALL FILL TO BRING PROPOSED ROADWAY UP TO THE SUB-GRADE LEVEL SHALL EXTEND PAST THE EDGE OF THE RIGHT-OF-WAY AT A 2:1 SLOPE. THIS IS TO PROVIDE ADEQUATE SUPPORT FOR THE RIGHT-OF-WAY.

LAYOUT NOTES

1. ALL CONSTRUCTION IN CITY/TOWN RIGHT-OF-WAYS AND/OR EASEMENTS SHALL BE IN ACCORDANCE WITH THE CITY/TOWN STANDARD SPECIFICATIONS.
2. IN THE EVENT OF DISCREPANCIES BETWEEN LOCAL SPECIFICATIONS AND SITE SPECIFICATIONS, THE MORE STRINGENT REQUIREMENT SHALL GOVERN.
3. SITE CONTRACTOR SHALL PROTECT ALL BENCHMARKS AND PROPERTY MONUMENTATION AND SHALL REPLACE OR REPAIR, AT HIS OWN EXPENSE, BENCHMARKS AND MONUMENTATION DISTURBED DURING CONSTRUCTION.
4. ALL STRIPING, PAVEMENT MARKINGS, AND TRAFFIC SIGNAGE SHALL BE IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION, UNLESS OTHERWISE NOTED ON THE PLANS.
5. ALL WORK SHALL COMPLY WITH FEDERAL, STATE AND LOCAL CODES AND ORDINANCES INCLUDING BUT NOT LIMITED TO: AASHTO, OSHA, EPA, DEP, MASSDOT , ETC. THE GENERAL CONTRACTOR SHALL APPLY FOR ALL PERMITS AND SHALL PAY ALL PERMIT RELATED FEES. ALL NECESSARY PERMITS SHALL BE OBTAINED PRIOR TO THE START OF WORK.
6. ALL DIMENSIONS AND CONDITIONS SHOWN ON THE DRAWINGS ARE TO BE VERIFIED BY THE CONTRACTOR. IF FIELD CONDITIONS VARY SIGNIFICANTLY ENOUGH TO REQUIRE A CHANGE TO THE CONTRACT DOCUMENTS, THE PROJECT PROPONENT AND ENGINEER SHALL BE NOTIFIED IMMEDIATELY.
7. THE SITE/GENERAL CONTRACTOR AND SUBCONTRACTORS SHALL CONTACT THE OWNER AND ENGINEER SHOULD HE FIND ANY CONFLICT OR INCONSISTENCY BETWEEN THE WORK SHOWN ON THE DRAWINGS AND NORMAL ACCEPTED CONSTRUCTION PRACTICES, OR HE SHALL ASSUME RESPONSIBILITY FOR ALL CORRECTIONS.
8. ANY CORRECTIONS REQUIRED FOR REVISIONS TO THE CONTRACT DRAWINGS INITIATED BY THE GENERAL CONTRACTOR OR SUBCONTRACTORS WITHOUT PRIOR APPROVAL OF THE OWNER AND OR THE ENGINEER SHALL BE ACCOMPLISHED AT THE CONTRACTORS RISK.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL & LEGAL DISPOSAL OF ALL MATERIAL NECESSARY TO PREPARE THE SITE FOR THE NEW CONSTRUCTION AS SHOWN ON THE SITE DRAWINGS.
10. REPAIR DAMAGED CITY/TOWN ROADS AND CURBS IN ACCORDANCE WITH MASSDOT AND/OR THE CITY/TOWN REGULATIONS.
11. CONTRACTOR SHALL SAWCUT PAVEMENT EDGE WHERE PAVEMENT TO REMAIN IS ADJACENT TO PAVEMENT TO BE REMOVED.
12. CONTRACTOR SHALL PREPARE SITE AS NECESSARY FOR CONSTRUCTION SHOWN ON THE PLANS.

EARTHWORK NOTES

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
2. ALL CUT OR FILL SLOPES SHALL BE 3:1 OR FLATTER UNLESS OTHERWISE NOTED.
3. STORM PIPE SHALL BE AS NOTED ON PLANS.
4. EXISTING DRAINAGE STRUCTURES TO BE INSPECTED AND REPAIRED AS NEEDED, AND EXISTING PIPES TO BE CLEANED OUT TO REMOVE ALL SILT AND DEBRIS.
5. EXISTING GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT INTERVALS.
6. PROPOSED GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT INTERVALS.
7. IF ANY EXISTING STRUCTURES TO REMAIN ARE DAMAGED DURING CONSTRUCTION IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO REPAIR AND/OR REPLACE THE EXISTING STRUCTURE AS NECESSARY TO RETURN IT TO EXISTING CONDITIONS OR BETTER.
8. ALL STORM PIPE ENTERING STRUCTURES SHALL BE SEALED TO ASSURE CONNECTION AT STRUCTURE IS WATERTIGHT.
9. ALL STORM SEWER MANHOLES FRAMES AND GRATES ARE TO BE SET EQUAL TO FINISH GRADES, AND SHALL HAVE TRAFFIC BEARING RING & COVERS (H20).
10. CONTRACTOR SHALL ADJUST AND/OR CUT EXISTING PAVEMENT AS NECESSARY TO ASSURE A SMOOTH FIT AND CONTINUOUS GRADE.
11. CONTRACTOR SHALL ASSURE POSITIVE DRAINAGE AWAY FROM BUILDINGS FOR ALL NATURAL AND PAVED AREAS.
12. ALL UNSURFACED AREAS DISTURBED BY GRADING OPERATION SHALL RECEIVE 4 INCHES OF TOPSOIL. CONTRACTOR SHALL APPLY STABILIZATION FABRIC TO ALL SLOPES 3H:1V OR STEEPER. CONTRACTOR SHALL GRASS DISTURBED AREAS IN ACCORDANCE WITH THE SPECIFICATIONS UNTIL A HEALTHY STAND OF GRASS IS OBTAINED.
13. CONSTRUCTION SHALL COMPLY WITH ALL APPLICABLE GOVERNING CODES AND BE CONSTRUCTED TO SAME.
14. IF CONTRACTOR RELOCATES OR SETS NEW BENCHMARKS, THE VERTICAL ELEVATIONS OF THE BENCHMARKS SHALL BE SET WITHIN A TOLERANCE OF 0.010 FT.
15. CONTRACTOR SHALL LEAVE GRADE BEHIND CURB IN ALL PLANTER AREAS A MINIMUM OF 4" LOW FOR THE PLACEMENT OF SUITABLE TOPSOIL OR PLANTING MIX.

SITE UTILITY NOTES

GENERAL:

1. ALL FILL MATERIAL IS TO BE IN PLACE, AND COMPACTED BEFORE INSTALLATION OF PROPOSED UTILITIES.
2. TOPS OF EXISTING MANHOLES SHALL BE SET EQUAL TO FINISH GRADE. IN GRASSED LANDSCAPED AREAS WITH WATER TIGHT LIDS.
3. ALL CONCRETE FOR ENCASEMENTS SHALL HAVE A MINIMUM 28 DAY COMPRESSION STRENGTH AT 3000 P.S.I.
4. DRAWINGS DO NOT PURPORT TO SHOW ALL EXISTING UTILITIES.
5. EXISTING UTILITIES SHALL BE VERIFIED IN FIELD PRIOR TO INSTALLATION OF ANY NEW LINES.
6. SITE/GENERAL CONTRACTOR IS RESPONSIBLE FOR COMPLYING TO THE SPECIFICATIONS OF THE LOCAL AUTHORITIES AT THE CITY WITH REGARD TO MATERIALS AND INSTALLATION OF THE WATER AND SEWER LINES.
7. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
8. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES FOR INSTALLATION REQUIREMENTS AND SPECIFICATIONS.
9. CONTRACTOR SHALL COORDINATE INSPECTION OF UTILITY LINES WITH APPROPRIATE AUTHORITIES PRIOR TO BACKFILLING TRENCHES.
10. CONTRACTOR SHALL COMPLY WITH THE LATEST OSHA STANDARDS OR DIRECTIVES OR ANY OTHER AGENCY HAVING JURISDICTION FOR EXCAVATION AND TRENCHING PROCEDURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND MAINTENANCE OF ALL SUPPORT SYSTEMS, SLOPING, BENCHING, AND OTHER MEANS OF PROTECTION.
11. CONTRACTOR SHALL COORDINATE INSTALLATION OF UTILITIES WITH LOCAL COMPANIES TO AVOID CONFLICTS AND TO ASSURE THAT PROPER DEPTHS ARE ACHIEVED. CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITY COMPANIES FOR EXACT LOCATION AND SCHEDULING OF CONNECTIONS TO THEIR FACILITIES.
12. THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. DUE TO THE LACK OF AVAILABLE DOCUMENTATION. ALL UTILITIES, INCLUDING CURB BOXES, MAY NOT BE SHOWN ON THESE DRAWINGS. THE CONTRACTOR SHALL CALL THE "DIG SAFE CENTER" TO HAVE ALL UTILITIES MARKED ON THE GROUND PRIOR TO THE START OF CONSTRUCTION
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH OCCUR DUE TO HIS FAILURE TO LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
14. DO NOT INTERRUPT EXISTING UTILITIES WITHOUT AUTHORIZATION FROM THE OWNER, OWNERS OF ADJACENT PROPERTIES, AND THE CORRESPONDING UTILITY OWNER. CONTRACTOR SHALL ARRANGE TO SHUT OFF UTILITIES, AS REQUIRED, WITH THE UTILITY OWNERS.
15. COORDINATE UTILITY TERMINATION WITH UTILITY OWNERS.

SEWER:

1. SANITARY SEWER MAINS AND LATERALS SHALL BE PVC PIPE CONFORMING TO ASTM D 3034-SDR35. THE MINIMUM SIZE FOR SEWER MAINS SHAL BE 8"; SEWER LATERALS SHALL BE 4" MIN.
2. ALL SANITARY SEWERS, SEWER FORCE MAINS, AND SEWER LATERALS SHALL BE INSTALLED IN FIRST-CLASS BEDDING AND IN ACCORDANCE WITH THE DEPARTMENT OF PUBLIC WORKS SPECIFICATIONS. SEWERS SHALL BE INSTALLED TO THE LINE AND GRADE INDICATED ON THE PLANS.
3. ONLY PRECAST CONCRETE MANHOLES OF A DESIGN APPROVED BY THE TOWN ENGINEER SHALL BE INSTALLED ON A SANITARY SEWER MAIN.
4. NO GROUNDWATER OR SURFACE WATER SHALL BE DISCHARGED INTO THE SANITARY SEWER.
5. WHERE ROCK IS ENCOUNTERED, IT SHALL BE REMOVED TO A DEPTH OF ONE FOOT BELOW THE FLOWLINE OF THE SEWER AND THE PIPE LAID IN A PROPERLY COMPACTED GRANULAR MATERIAL APPROVED BY THE TOWN ENGINEER.
6. ONLY GRANULAR MATERIAL APPROVED BY THE TOWN ENGINEER SHALL BE USED AS BACKFILL IN ANY TRENCH EXCAVATION.

WATER:

1. CONTRACTOR SHALL CONTACT THE CITY/TOWN WATER DEPARTMENT FOR SPECIFICATIONS AND MAKE OF VALVES, VALVE BOXES, FIRE HYDRANTS AND ALL OTHER WATER LINE APPURTENANCES.
2. WATER LINE TESTING AND STERILIZATION SHALL BE PERFORMED IN ACCORDANCE WITH LOCAL DPW SPECIFICATIONS AND WATER DISTRIBUTION SYSTEM. CONTRACTOR SHALL COORDINATE TESTING WITH THE CITY WATER DEPARTMENT.
3. ALL WATER MAIN SHALL BE DUCTILE IRON (D.I.), CLASS 52, AWWA C-151 (ANSI A21.40). D.I. PIPE SHALL BE DOUBLE CEMENT LINED WITH A SEAL COAT CONFORMING TO AWWA C-104 (ANSI A-21.4).
4. JOINTS FOR D.I. PIPE SHALL BE PUSH-ON OR OTHERWISE APPROVED, AWWA C151(ANSI A-21.51) WITH GASKETS CONFORMING TO AWWA C-111 (ANSI A-21.11) MAXIMUM LENGTH OF PIPE TO BE 20 L.F.
5. ALL FITTINGS SHALL BE DUCTILE IRON CLASS 53 WITH PRESSURE RATING OF 350 PSI AND MECHANICAL JOINTS CONFORMING TO AWWA C-151 (ANSI A21.51).
6. RETAINER GLANDS: RETAINER GLANDS SHALL BE DESIGNED TO IMPART MULTIPLE WEDGING ACTION AGAINST THE PIPE, INCREASE ITS RESISTANCE AS THE PRESSURE INCREASES. GLANDS SHALL BE MANUFACTURED OF DUCTILE IRON CONFORMING TO ASTM A536-80. RESTRAINING DEVICES SHALL BE DUCTILE IRON HEAT-TREATED TO A MINIMUM HARNESS OF 370 BHN. TWIST-OFF NUTS SHALL BE USED TO INSURE PROPER ACTUATING OF THE RETAINER GLAND. DIMENSIONS OF THE GLAND SHALL BE SUCH THAT IT CAN BE USED WITH THE STANDARD MECHANICAL JOINT BELL AND TEE-HEADED BOLTS CONFORMING TO ANSI/AWWA A21.1 AND ANSI/WWA 153/A21.5. THE RETAINER GLAND SHALL HAVE A WORKING PRESSURE OF 250 PSI WITH A MINIMUM SAFETY FACTOR OF 2:1 AND SHALL BE CERTIFIED BY THE MANUFACTURER TO BE COMPATIBLE WITH THE PIPE CLASS AND PIPE MANUFACTURER FOR ALL SIZES PROVIDED ON THE JOB. THE RETAINER GLAND SHALL BE MEGA-LUG AS MANUFACTURED EBAA IRON, INC., OR APPROVED EQUAL.
7. ALL WATER MAINS, UNLESS OTHERWISE NOTED, SHALL BE INSTALLED WITH A MINIMUM FIVE FEET OF COVER. WHEN CROSSING ABOVE OR BELOW WATER PIPELINES, A MINIMUM VERTICAL SEPARATION OF SIX INCHES SHALL BE PROVIDED. WHEN CROSSING SANITARY SEWERS, A MINIMUM OF 18" SHALL BE PROVIDED.

TOWN OF AGAWAM PLANNING BOARD

APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS REQUIRED

_____ DATE

_____

_____

_____

_____

_____

I HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE TOWN OF AGAWAM PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDINGS OF SAID NOTICE.

_____ _____
CITY CLERK DATE

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS.

_____
PROFESSIONAL LAND SURVEYOR

COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

SITE UTILITY NOTES (CONTINUED)

8. THE INSTALLED WATER MAIN SHALL BE PRESSURE TESTED, FLUSHED AND DISINFECTED BY CONTRACTOR IN ACCORDANCE WITH AWWA C-600 AND AWWA C-651 OR PER CITY/TOWN WATER DEPARTMENT STANDARDS.
9. DUCTILE IRON PIPES SHALL BE INSTALLED IN ACCORDANCE WITH AWWA C-600.
10. ALL MECHANICAL JOINTS ARE TO BE RESTRAINED. FITTINGS SHALL BE RESTRAINED BY MECHANICAL JOINT RESTRAINTS. THE PIPE CONNECTED TO THE FITTING SHALL BE RESTRAINED PER THE MANUFACTURER'S SCHEDULE.
11. THE CONTRACTOR SHALL MARK THE LOCATION OF THE PROPOSED WATER MAIN AT LEAST 48 HOURS PRIOR TO EXCAVATING. EXCAVATION SHALL NOT PROCEED WITHOUT AUTHORIZATION BY THE ENGINEER.
12. ALL WATER MAINS, HYDRANT BRANCHES, AND SERVICES SHALL HAVE UTILITY WARNING TAPE. THE TAPE SHALL BE BURIED APPROXIMATELY 2 FEET BELOW FINISHED GRADE.
13. BACKFILL SHALL BE COMPACTED TO 95 PERCENT OF THE STANDARD PROCTOR DENSITY AS DETERMINED BY ASTM D698. COMPACTION EQUIPMENT USED MUST BE SPECIFICALLY DESIGNED FOR COMPACTION. TAMPING WITH THE BACK OF THE BACK HOE BUCKET IS UNACCEPTABLE COMPACTION.
14. ALL WATER SERVICES SHALL BE 1" DIA. COPPER TUBING TYPE K, SOFT TEMPER CONFORMING TO ASTM B88 UNLESS OTHERWISE NOTED.
15. DEPRESS WATER MAIN UNDER EXISTING SERVICES AND HYDRANT BRANCHES TO MAINTAIN 5'-0" OF COVER.
16. ALL WATER MAINS SHALL BE LAID PER THE PLANS TO MAINTAIN THE MAXIMUM SEPARATION FROM EXISTING OR PROPOSED SANITARY SEWER. DISTANCE SHALL BE MEASURED EDGE TO EDGE.
17. IDENTIFY EACH PIPE LENGTH & FITTING CLEARLY WITH MANUFACTURE'S NAME & TRADEMARK. NOMINAL PIPE SIZE & MATERIAL DESIGNATION.
18. ALL WATER MAINS & SERVICE PIPES SHALL BE LAID IN A TRENCH SEPARATE FROM ANY OTHER UTILITY (GAS, ELECTRIC, TELEPHONE, ETC.) SHALL BE A MINIMUM NO LESS THAN FIVE (5) FEET FROM ANOTHER UTILITY.
19. ALL MATERIAL SHALL BE IN ACCORDANCE WITH CITY/TOWN WATER DEPARTMENT "RULES & REGULATIONS". ALL WORK TO BE PERFORMED IN ACCORDANCE WITH CITY/TOWN WATER DEPARTMENT "SPECIFICATIONS". CITY/TOWN WATER DEPARTMENT STANDARDS SHALL TAKE PRECEDENCE OVER ANY REQUIREMENTS LISTED ABOVE.

PERMITTING

RLA

R LEVESQUE ASSOCIATES INC

Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants

ph: 413.568.0985 fax: 413.568.0986

40 School Street
Westfield, MA 01085

rlaland.com

CONSTRUCTION NOTES

0 Old River Street
Agawam, Massachusetts
Map J17 Parcel I-3

FILIPE J. CRAVO
CIVIL
COMMONWEALTH OF MASSACHUSETTS
1/30/26

PREPARED FOR:

Chuck Calabrese
Calabrese Construction, LLC

7 Brewster Road
West Springfield, MA.

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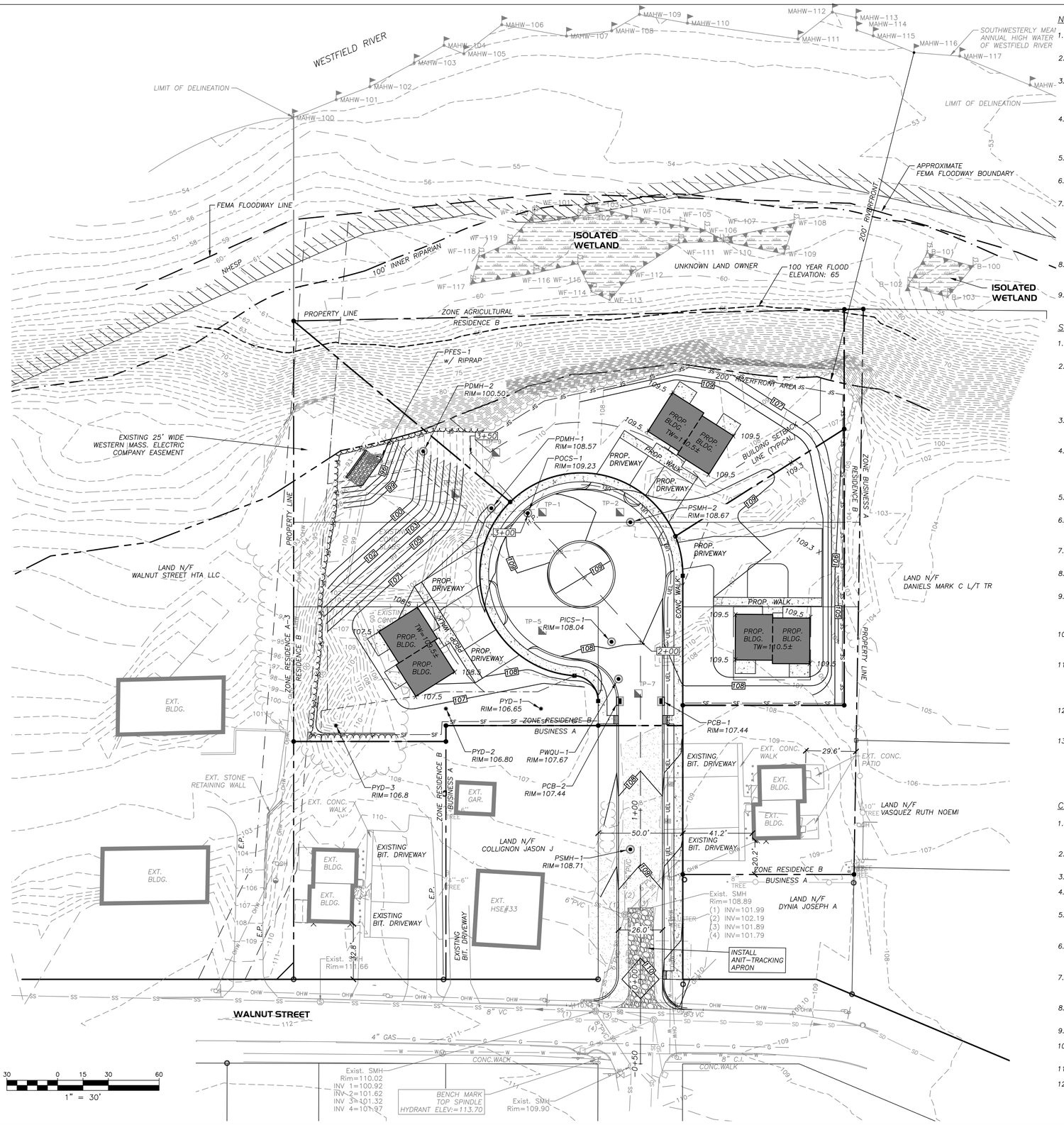

BENCHMARK

TOP OF HYDRANT SPINDLE (SEE BELOW)

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS.

PROFESSIONAL LAND SURVEYOR

I, _____, CLERK OF THE TOWN OF AGAWAM HEREBY CERTIFY THAT NOTICE OF APPROVAL OF THIS PLAN BY THE AGAWAM PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING TWENTY DAYS AFTER SUCH RECEIPT AND RECORDED OF SAID NOTICE.

COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

TOWN OF AGAWAM
PLANNING BOARD
APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS REQUIRED

_____ DATE

NOTES

1. THE RECORD OWNER OF THE SUBJECT PARCELS ARE CHARLES R. CALABRESE SEE HAMPDEN COUNTY REGISTRY OF DEEDS BOOK 2727 PAGE 258.
2. PROPERTY LINES SHOWN HEREON WERE DERIVED FROM PLAN BOOK 231 PAGE 47, PLAN BOOK 334 PAGE 8 AND PLAN BOOK 30 PAGE 4.
3. THE SUBJECT PROPERTIES SHOWN HEREON MAY BE SUBJECT TO RIGHTS AND EASEMENTS AS CONTAINED IN THE VARIOUS DEEDS OF RECORD DESCRIBING SAID PROPERTIES. THE LOCATION AND EXTENT OF ANY SUCH RIGHTS AND EASEMENTS IS NOT THE SUBJECT OF THIS PLAN.
4. PARTIAL WETLAND AND M.A.H.W. BOUNDARIES DELINEATED BY R. LEVESQUE ASSOCIATES, INC. (KATE BEDNAZ PWS# 1906) IN SEPTEMBER 2014. OFFSITE WETLANDS ARE NOT THE SUBJECT OF THIS FILING AND HAVE BEEN SHOWN TO DEPICT THE LIMITS OF BUFFER ZONE.
5. ADJACENT PROPERTY LINES AND ABUTTERS SHOWN HEREON ARE REFERENCED FROM THE ASSESSOR DATA.
6. SUBJECT PARCELS ARE ZONED AGRICULTURAL ACCORDING TO THE AGAWAM GIS ZONING MAP.
7. THE UNDERGROUND UTILITIES SHOWN HEREON HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND AVAILABLE RECORD DATA. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN HEREON COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN HERE ARE IN THE EXACT LOCATION INDICATED. ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM AVAILABLE INFORMATION.
8. THE SUBJECT PARCELS DO NOT CONTAIN BORDERING LAND SUBJECT TO FLOODING ACCORDING TO FLOOD INSURANCE RATE MAP NUMBER 25013C0384E EFFECTIVE DATE: JULY 16, 2013.
9. THE SUBJECT PROPERTY IS NOT LOCATED WITHIN NATURAL HERITAGE & ENDANGERED SPECIES PROGRAM (NHESP) JURISDICTION (2008 NHESP ATLAS).

SHORT-TERM EROSION CONTROL MAINTENANCE

1. THE CONTRACTOR OR SUBCONTRACTOR WILL BE RESPONSIBLE FOR IMPLEMENTING EACH CONTROL SHOWN ON THE SEDIMENTATION AND EROSION CONTROL PLAN.
2. ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL MEASURES WILL BE INSTALLED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFF-SITE SEDIMENTATION IF DEEMED NECESSARY BY ON-SITE INSPECTION.
3. EFFECTIVE EROSION CONTROL MEASURES SHALL BE INITIATED PRIOR TO THE COMMENCEMENT OF CLEARING, GRADING, EXCAVATION, OR OTHER OPERATIONS THAT WILL DISTURB THE NATURAL PROTECTION.
4. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED AT LEAST ONCE EVERY SEVEN (7) CALENDAR DAYS AND AFTER ANY STORM EVENT GREATER THAN 0.5 INCHES OF PRECIPITATION DURING ANY 24-HOUR PERIOD, AND THE INSPECTION SHALL BE DOCUMENTED IN WRITING. DAMAGED OR INEFFECTIVE DEVICES SHALL BE REPAIRED OR REPLACED, AS NECESSARY.
5. THE CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO AVOID EXCESS EROSION OF THE SITE DUE TO THE CONSTRUCTION OF THIS PROJECT.
6. SILT SHALL BE REMOVED FROM BEHIND BARRIERS IF GREATER THAN 6-INCHES DEEP OR AS NEEDED. SEDIMENT THAT IS COLLECTED IN STRUCTURES SHALL BE DISPOSED OF PROPERLY AND COVERED IF STORED ON-SITE.
7. DAMAGED OR DETERIORATED ITEMS WILL BE REPAIRED IMMEDIATELY AFTER IDENTIFICATION.
8. ALL DITCHES SHALL BE STABILIZED AS SOON AS IS PRACTICABLE TO MINIMIZE EROSION.
9. THE CONTRACTOR SHALL MAINTAIN ALL EROSION CONTROL DEVICES IN A GOOD, WORKING STATE OF REPAIR UNTIL THEIR USE IS NO LONGER WARRANTED. AT THAT TIME, THE EROSION CONTROL DEVICES SHALL BE REMOVED AND DISPOSED OF SO AS TO CAUSE NO OFF-SITE SILTATION.
10. INSPECT AND MAINTAIN CONSTRUCTION ENTRANCE STONE SUCH THAT SEDIMENT DOES NOT TRACK ONTO THE STREET. ANY SEDIMENT TRACKED ONTO THE STREET SHALL BE CLEANED DAILY.
11. AFTER CATCH BASINS HAVE BEEN CONSTRUCTED AND THE SITE HAS BEEN PAVED, THE CONTRACTOR SHALL PROTECT THE INLETS BY CONSTRUCTING INLET PROTECTION AS SHOWN ON THE PLANS. INLET PROTECTION TO REMAIN IN PLACE AND MAINTAINED UNTIL DISTURBED AREAS HAVE BEEN STABILIZED, LOAMED AND SEEDED.
12. EROSION CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL ALL DISTURBED EARTH HAS BEEN SUBSTANTIALLY STABILIZED. AFTER REMOVAL OF MEASURES, DISTURBED AREAS SHALL BE REGRADED AND STABILIZED AS NECESSARY.
13. THIS PLAN IS PROVIDED AS A BASIS FOR THE INITIAL SEDIMENTATION AND EROSION CONTROL MEASURES. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO UPDATE AND EXPAND THIS PLAN AS SITE CONDITIONS DICTATE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PREVENT THE OCCURRENCE OF SILTATION TO WETLAND RESOURCE AREAS AND THE MOVEMENT OF SEDIMENT BEYOND THE SITE BOUNDARIES.

CONSTRUCTION SEQUENCE

1. CONTACT THE TOWN OF AGAWAM AT LEAST FORTY-EIGHT HOURS PRIOR TO COMMENCEMENT OF ANY DEMOLITION, CONSTRUCTION, OR EARTHWORK ACTIVITY ON THIS PROJECT.
2. CONSTRUCT ANTI-TRACKING PAD AT ENTRANCE AND INSTALL ANY REQUIRED INLET PROTECTION AS DEPICTED ON THE PLAN.
3. INSTALL SILT FENCE AS SHOWN ON THE PLANS.
4. UPON COMPLETION OF EROSION CONTROL MEASURES, CLEARING AND GRUBBING AND EARTHWORK MAY COMMENCE.
5. CLEAR AND GRUB SITE. STOCKPILE ANY CHIPPING OR TOPSOIL MATERIAL TO REMAIN ON SITE FOR LONGER THAN 14 DAYS AND INSTALL SILT FENCE AROUND THE PERIMETER OF THE STOCKPILE.
6. COMMENCE EARTHWORK BY EXCAVATING FOR THE CUT/FILL SLOPES AS SHOWN ON THE PLANS. STABILIZE/SEED ANY SLOPES THAT HAVE ACHIEVED FINAL GRADE.
7. INSTALL UTILITIES AS SHOWN ON PLANS INCLUDING WATER SERVICE, SEWER SERVICE, GAS SERVICE, ELECTRICAL SERVICE AND STORMWATER MANAGEMENT SYSTEM.
8. GRADE THE ALIGNMENT OF THE ROADWAY TO ACCEPT PAVEMENT SECTION MATERIALS.
9. INSTALL PAVEMENT AS SPECIFIED ON THE PLANS.
10. UPON INSTALLATION OF PAVEMENT SURFACE, INSTALL INLET PROTECTION AS REQUIRED ON ANY NEW INLET STRUCTURES.
11. FINAL GRADING AND STABILIZATION OF ANY REMAINING EXPOSED AREAS.
12. AT THE DIRECTION OF THE TOWN, EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED.

PERMITTING

RLA
R LEVESQUE ASSOCIATES INC
Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants
ph: 413.568.0985 fax: 413.568.0986
40 School Street
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GRADING, EROSION & SEDIMENTATION CONTROL PLAN

0 Old River Street
Agawam, Massachusetts
Map J17 Parcel I-3

COMMONWEALTH OF MASSACHUSETTS
FILIPE J. CRAVO
CIVIL
No. 49376
REGISTERED PROFESSIONAL ENGINEER
1/30/26

PREPARED FOR:

Chuck Calabrese
Calabrese Construction, LLC

7 Brewster Road
West Springfield, MA.

ISSUANCE DATE:	January 30, 2026
REVISIONS:	**DATE:**
DRAFTED BY:	T.A. & F.C.

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SCALE:	As Noted
RLA PROJ. NUMBER:	220627
DRAWING#	**REV.**
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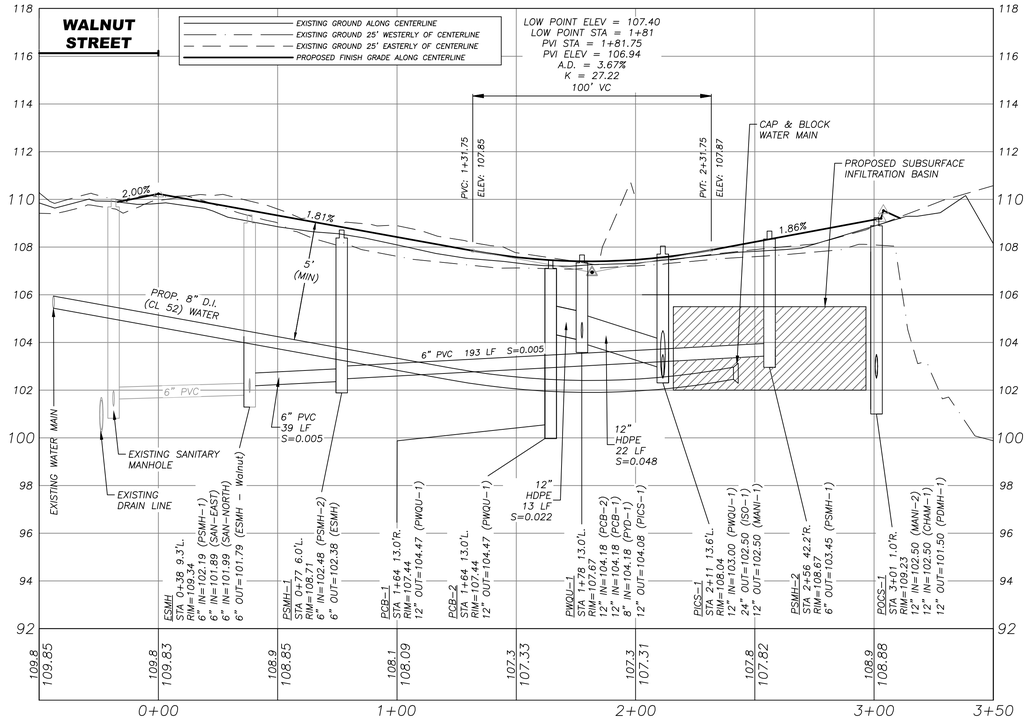
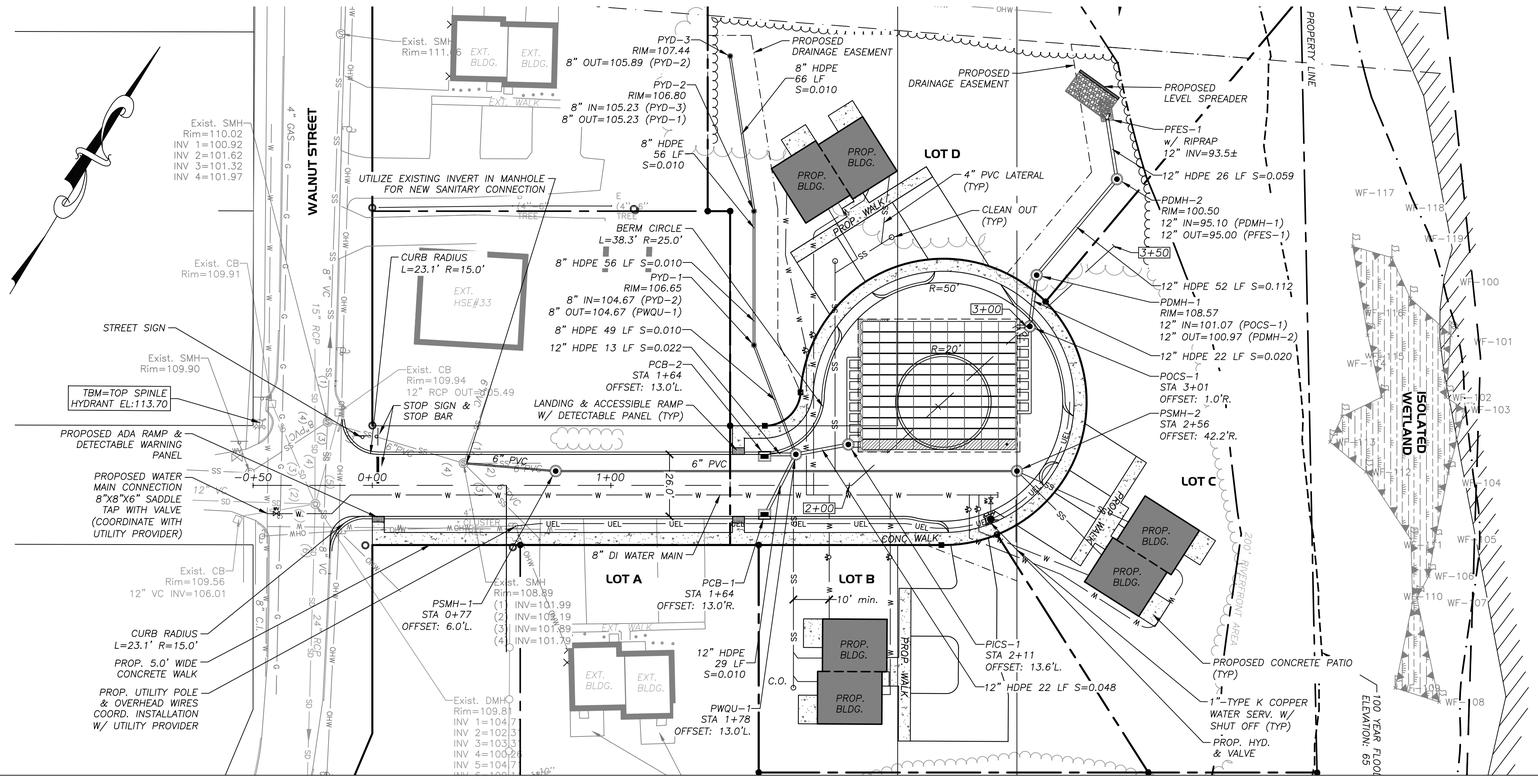


HIGH STREET · PROFILE ALONG CENTERLINE OF ROADWAY

HORIZONTAL 1" = 30'
VERTICAL 1" = 3'



PERMITTING

TOWN OF AGAWAM
PLANNING BOARD
APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS REQUIRED

_____ DATE

COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS.

_____
PROFESSIONAL LAND SURVEYOR

I, _____, CLERK OF THE TOWN OF AGAWAM HEREBY CERTIFY THAT NOTICE OF APPROVAL OF THIS PLAN BY THE AGAWAM PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING TWENTY DAYS AFTER SUCH RECEIPT AND RECORDED OF SAID NOTICE.

NOTES

1. THE RECORD OWNER OF THE SUBJECT PARCELS ARE CHARLES R. CALABRESE SEE HAMPDEN COUNTY REGISTRY OF DEEDS BOOK 2727 PAGE 258.
2. PROPERTY LINES SHOWN HEREON WERE DERIVED FROM PLAN BOOK 231 PAGE 47, PLAN BOOK 334 PAGE 8 AND PLAN BOOK 30 PAGE 4.
3. THE SUBJECT PROPERTIES SHOWN HEREON MAY BE SUBJECT TO RIGHTS AND EASEMENTS AS CONTAINED IN THE VARIOUS DEEDS OF RECORD DESCRIBING SAID PROPERTIES. THE LOCATION AND EXTENT OF ANY SUCH RIGHTS AND EASEMENTS IS NOT THE SUBJECT OF THIS PLAN.
4. PARTIAL WETLAND AND M.A.H.W. BOUNDARIES DELINEATED BY R. LEVESQUE ASSOCIATES, INC. (KATE BEDNAZ PWS# 1906) IN SEPTEMBER 2014. OFFSITE WETLANDS ARE NOT THE SUBJECT OF THIS FILING AND HAVE BEEN SHOWN TO DEPICT THE LIMITS OF BUFFER ZONE.
5. ADJACENT PROPERTY LINES AND ABUTTERS SHOWN HEREON ARE REFERENCED FROM THE ASSESSOR DATA.
6. SUBJECT PARCELS ARE ZONED AGRICULTURAL ACCORDING TO THE AGAWAM GIS ZONING MAP.
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CONSTRUCTION NOTES

1. UNDERGROUND UTILITIES SHOWN HEREON ARE BASED UPON SURFACE FEATURES AS LOCATED BY SURVEY AND AVAILABLE RECORD DATA AND ARE APPROXIMATE. ACTUAL FIELD LOCATIONS SHOULD BE VERIFIED WITH THE APPROPRIATE UTILITY COMPANY AND/OR MUNICIPAL DEPARTMENT PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO NOTIFY DIG SAFE A MINIMUM OF 72 HOURS PRIOR TO START OF CONSTRUCTION ACCORDING TO MA GENERAL LAWS.
3. APPROVED PLANS TO BE ON SITE AT ALL TIMES.
4. CHANGES TO THIS PLAN MAY OCCUR AS UNFORESEEN CONDITIONS ARISE. ALL CHANGES TO BE APPROVED BY DESIGN ENGINEER, FIELD INSPECTOR AND CITY/TOWN ENGINEER.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND SAFETY OF TRAFFIC ON THE PUBLIC AND PRIVATE WAYS AFFECTED BY THE CONSTRUCTION OF THIS PROJECT.
6. CONTRACTOR SHALL PROTECT ALL SLOPES, VEGETATION, PAVING, WALKS, AND IMPROVEMENTS OUTSIDE THE AREAS TO BE AFFECTED BY THE CONSTRUCTION OF THIS PROJECT.
7. TREES, BRUSH AND STUMPS REMOVED BY CLEARING AND GRUBBING OPERATIONS SHALL BE TRANSPORTED OFF THE PROJECT SITE TO AN APPROVED DISPOSAL LOCATION.
8. CALCIUM CHLORIDE/WATER FOR DUST CONTROL TO BE AVAILABLE AT ALL TIMES.
9. ALL CONSTRUCTION METHODS TO CONFORM TO TOWN PLANNING BOARD REGULATIONS AND DEPARTMENT OF PUBLIC WORKS SPECIFICATIONS.
10. TOWN DEPARTMENT OF PUBLIC WORKS APPROVAL IS NOT TO BE CONSTRUED AS AN ALL INCLUSIVE APPROVAL AS OTHER APPROVALS MAY BE NECESSARY, I.E. TOWN ENGINEER, CONSERVATION, FIRE DEPARTMENT, WATER DEPARTMENT, ETC.
11. ALL CATCH BASINS TO HAVE 48" SEALED SUMPS AND HOODS.
12. EROSION CONTROL MEASURES TO BE IN PLACE PRIOR TO START OF CONSTRUCTION.
13. WATER SERVICE TO HAVE A MINIMUM OF 60" OF COVER.
14. ALL WATER LINE CONNECTIONS SHALL HAVE MECHANICAL JOINTS.
15. SANITARY SEWER CONNECTION TO HAVE A MINIMUM OF 48" OF COVER. CLEAN-OUT SHALL BE REQUIRED EVERY 100 FEET AND AT ALL BENDS.

STREET NOTES

1. THE LENGTH OF THE PROPOSED STREET IS APPROXIMATELY 303 FEET THROUGH THE CENTER OF THE CUL-DE-SACE.
2. PROPOSED STREET IS CLASSIFIED AS A "PLACE" ACCORDING TO AGAWAM SUBDIVISION REGULATIONS.
3. THE ESTIMATED AVERAGE DAILY TRAFFIC (ADT) OF THE PROPOSED STREET IS 40 VEHICLES PER DAY.

BENCHMARK

TOP OF HYDRANT SPINDLE LOCATED ON SOUTHERLY SIDE OF WOODSIDE DRIVE APPROXIMATELY 75 FEET EASTERLY OF INTERSECTION WITH SAMUEL STREET.
ELEVATION = 125.10 (NAVD88)

30 0 15 30 60
1" = 30'

RLA
R LEVESQUE ASSOCIATES INC
Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants
ph: 413.568.0985 fax: 413.568.0986
40 School Street
Westfield, MA 01085
rlaland.com

PLAN & PROFILE
HIGH STREET
STA -0+50 to STA 3+25

0 Old River Street
Agawam, Massachusetts
Map J17 Parcel I-3

COMMONWEALTH OF MASSACHUSETTS
FILIPE J. CRAVO
CIVIL
No. 54376
REGISTERED PROFESSIONAL ENGINEER
1/30/26

PREPARED FOR:
Chuck Calabrese
Calabrese Construction, LLC
7 Brewster Road
West Springfield, MA.

ISSUANCE DATE: January 30, 2026	
REVISIONS:	**DATE:**
DRAFTED BY: T.A. & F.C.	

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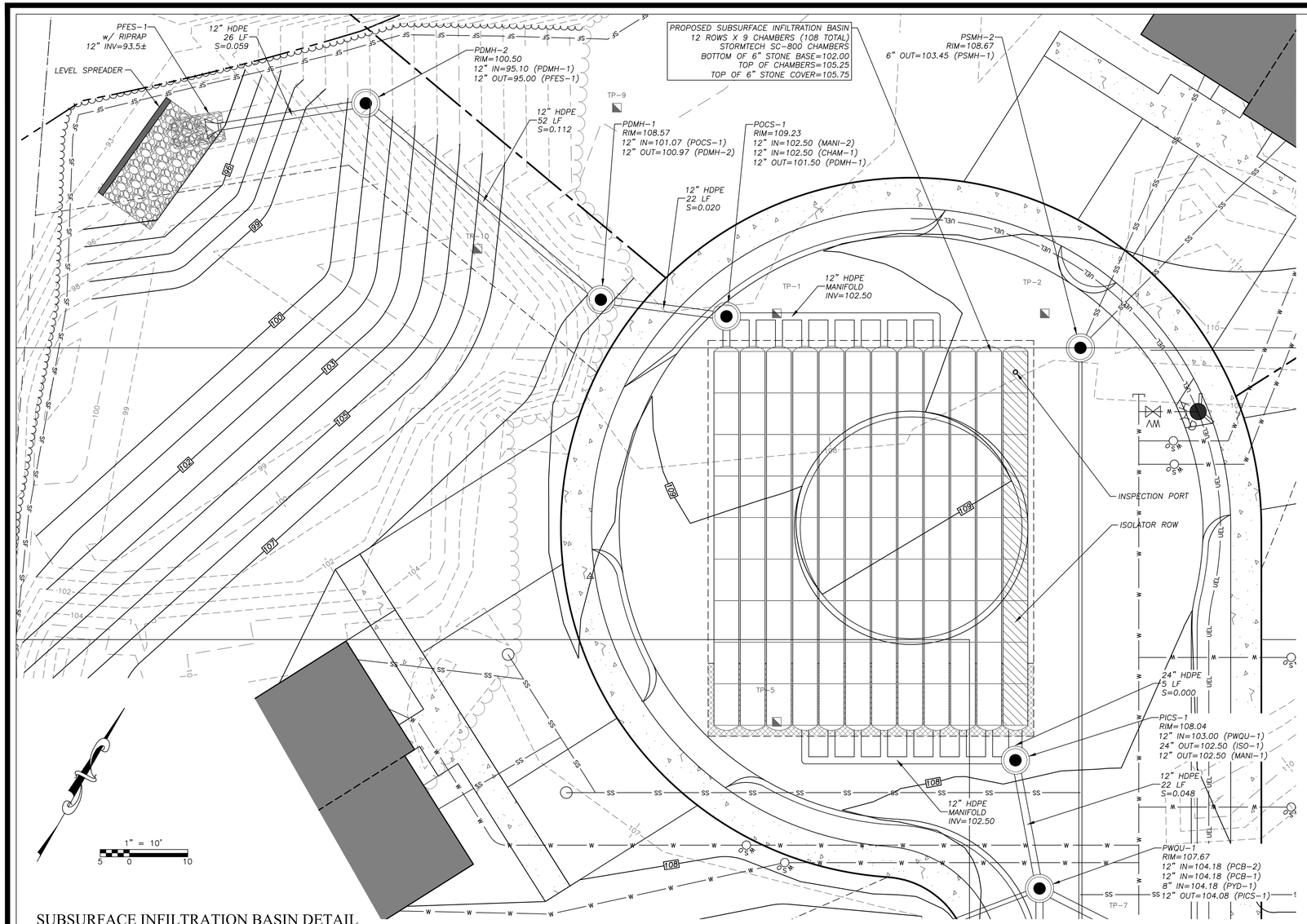
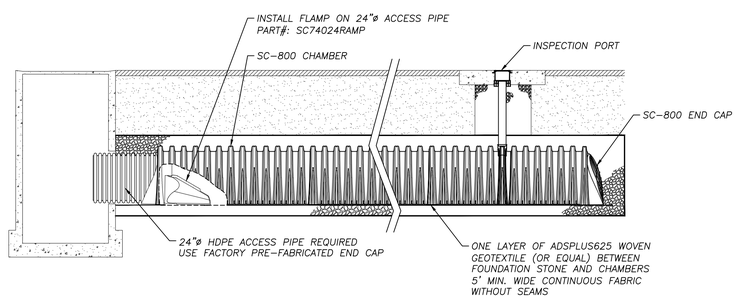


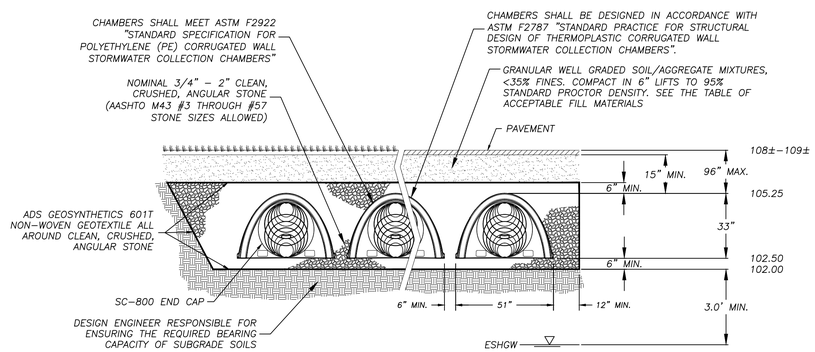
SUBSURFACE INFILTRATION BASIN DETAIL

1" = 10'



STORMTECH SC-800 ISOLATOR ROW DETAIL

NO SCALE



STORMTECH SC-800 CROSS-SECTION

NO SCALE

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS.

PROFESSIONAL LAND SURVEYOR

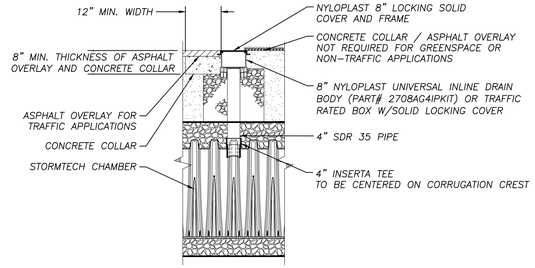
COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

TOWN OF AGAWAM PLANNING BOARD

APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS REQUIRED

DATE

I, _____, CLERK OF THE TOWN OF AGAWAM HEREBY CERTIFY THAT NOTICE OF APPROVAL OF THIS PLAN BY THE AGAWAM PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING TWENTY DAYS AFTER SUCH RECEIPT AND RECORDED OF SAID NOTICE.



STORMTECH SC-800 INSPECTION PORT DETAIL

NO SCALE

CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-800 OR APPROVED EQUAL.
2. CHAMBERS SHALL BE MANUFACTURED FROM VIRGIN POLYPROPYLENE OR POLYETHYLENE RESINS TESTED USING ASTM STANDARDS.
3. CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12 ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCE.
6. ONLY CHAMBERS THAT ARE APPROVED BY THE ENGINEER WILL BE ALLOWED. THE CONTRACTOR SHALL SUBMIT (3 SETS) OF THE FOLLOWING TO THE ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION BY A REGISTERED STRUCTURAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12 ARE MET. THE 50-YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2922 MUST BE USED AS A PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG-TERM PERFORMANCE.
7. CHAMBERS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.
8. ALL DESIGN SPECIFICATIONS FOR CHAMBERS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S LATEST DESIGN MANUAL.
9. THE INSTALLATION OF CHAMBERS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S LATEST INSTALLATION INSTRUCTIONS.

PERMITTING

RLA

R LEVESQUE ASSOCIATES INC

Landscape Architects
Civil Engineers · Land Surveyors
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ph: 413.568.0985 fax: 413.568.0986

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DETAILS

0 Old River Street
Agawam, Massachusetts
Map J17 Parcel I-3

COMMONWEALTH OF MASSACHUSETTS
FILIPE J. CRAVO
CIVIL
No. 43576
REGISTERED PROFESSIONAL ENGINEER
1/30/26

PREPARED FOR:

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Calabrese Construction, LLC

7 Brewster Road
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ISSUANCE DATE: January 30, 2026	
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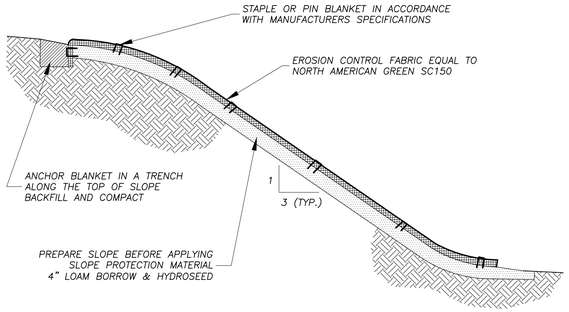
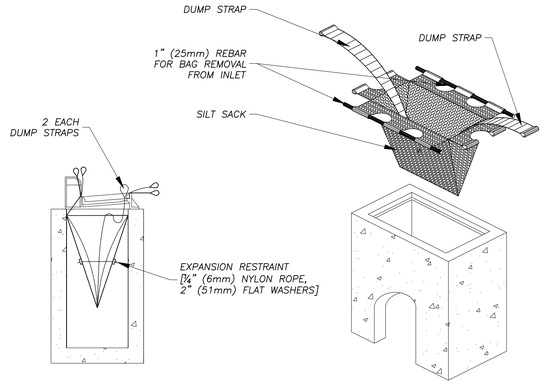


SLOPE PROTECTION MATERIAL INSTALLATION (AS REQ'D)

NO SCALE



INLET PROTECTION - SEDIMENT FILTER SACK

NO SCALE

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS.

PROFESSIONAL LAND SURVEYOR

COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

TOWN OF AGAWAM PLANNING BOARD

APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS REQUIRED

_____ DATE

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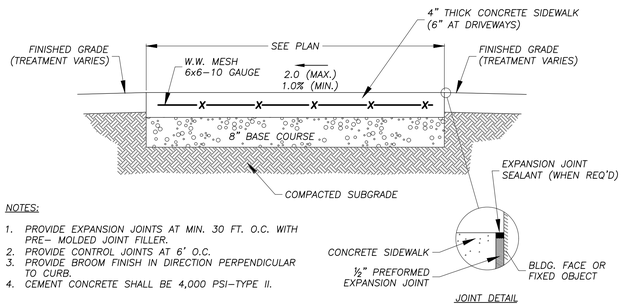
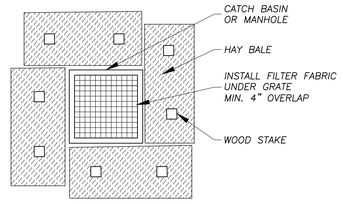


NOTES:

1. PROVIDE EXPANSION JOINTS AT MIN. 30 FT. O.C. WITH PRE– MOLDED JOINT FILLER.
2. PROVIDE CONTROL JOINTS AT 6' O.C.
3. PROVIDE BROOM FINISH IN DIRECTION PERPENDICULAR TO CURB.
4. CEMENT CONCRETE SHALL BE 4,000 PSI–TYPE II.

REINFORCED CONCRETE SIDEWALK SECTION

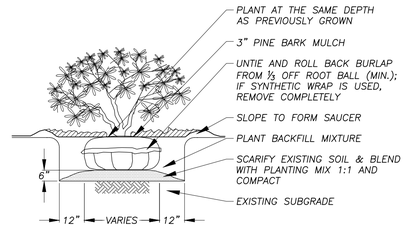
NO SCALE



NOTE
INSTALL BARRIER AT EACH CATCH BASIN AND DRAINAGE BASIN. CATCH BASINS IN PAVEMENT AREAS ARE TO RECEIVE ONLY THE FILTER FABRIC TREATMENT.

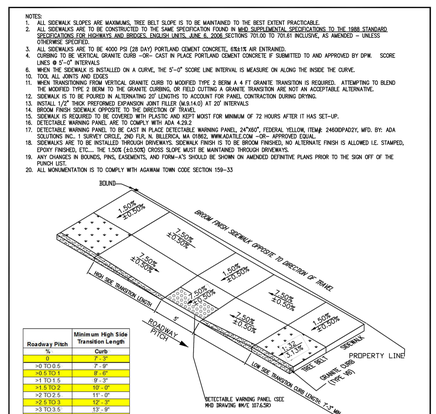
INLET PROTECTION - HAY BALES

NO SCALE



SHRUB PLANTING DETAIL

NO SCALE



Roadway Pitch %	Minimum High Side Transition Length Curb
0	7'-0"
>0 TO 0.5	7'-0"
>0.5 TO 1.0	8'-0"
>1 TO 1.5	9'-0"
>1.5 TO 2	10'-0"
>2 TO 2.5	11'-0"
>2.5 TO 3	12'-0"
>3 TO 3.5	13'-0"
>3.5 TO 4	15'-0"
>4	15'-0"

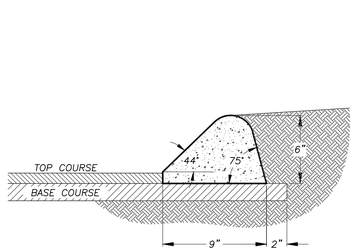
- THE ABOVE LENGTHS ARE CALCULATED USING THE 7.0ft PANEL SLOPE.
- USE OF SHALLOWER GRADES WILL REQUIRE LONGER HIGH AND LOW SIDE TRANSITION LENGTHS.
- CHECK WITH THE TOWN ENGINEER BEFORE USING ANY OTHER GRADES THOSE LISTED IN THE TABLE ABOVE.

SIDEWALK CURB CUT

N.T.S.

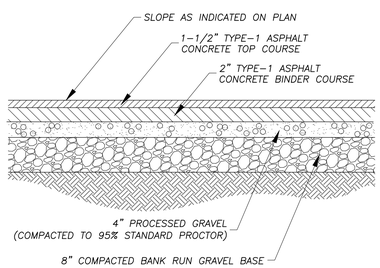
NOTES:
1. ALL SIDEWALK SLOPES ARE MAXIMUMS, TREE BELT SLOPE IS TO BE MAINTAINED TO THE BEST EXTENT PRACTICABLE.
2. ALL SIDEWALKS ARE TO BE CONSTRUCTED TO THE SAME SPECIFICATION FOUND IN MHD SUPPLEMENTAL SPECIFICATIONS TO THE 1988 STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, ENGLISH UNITS, JUNE 8, 2006 SECTIONS 701.00 TO 701.81 INCLUSIVE, AS AMENDED – UNLESS OTHERWISE SPECIFIED.
3. ALL SIDEWALKS ARE TO BE 4000 PSI (28 DAY) PORTLAND CEMENT CONCRETE, 6%±1% AIR ENTRAINED.
4. CURBING TO BE VERTICAL GRANITE CURB –OR– CAST IN PLACE PORTLAND CEMENT CONCRETE IF SUBMITTED TO AND APPROVED BY DPW. SCORE LINES @ 5'–0" INTERVALS
6. WHEN THE SIDEWALK IS INSTALLED ON A CURVE, THE 5'–0" SCORE LINE INTERVAL IS MEASURE ON ALONG THE INSIDE THE CURVE.
10. TOOL ALL JOINTS AND EDGES
11. WHEN TRANSITIONING FROM VERTICAL GRANITE CURB TO MODIFIED TYPE 2 BEING A 4 FT GRANITE TRANSITION IS REQUIRED. ATTEMPTING TO BLEND THE MODIFIED TYPE 2 BEING TO THE GRANITE CURBING, OR FIELD CUTTING A GRANITE TRANSITION ARE NOT AN ACCEPTABLE ALTERNATIVE.
12. SIDEWALK IS TO BE POURED IN ALTERNATING 20' LENGTHS TO ACCOUNT FOR PANEL CONTRACTION DURING DRYING.
13. INSTALL 1/2" THICK PREFORMED EXPANSION JOINT FILLER (W.R.14.02) AT 20' INTERVALS
14. BROOM FINISH SIDEWALK OPPOSITE TO THE DIRECTION OF TRAVEL.
15. SIDEWALK IS REQUIRED TO BE COVERED WITH PLASTIC AND KEPT MOIST FOR MINIMUM OF 72 HOURS AFTER IT HAS SET–UP.
16. DETECTABLE WARNING PANEL ARE TO COMPLY WITH ADA 4.29.2
17. DETECTABLE WARNING PANEL TO BE CAST IN PLACE DETECTABLE WARNING PANEL, 24"x60", FEDERAL YELLOW, ITEM#: 24600PADZY, MFD. BY: ADA SOLUTIONS INC., 1 SURVEY CIRCLE, 2ND FLR, N. BILLERICA, MA 01862, WWW.ADATILE.COM –OR– APPROVED EQUAL.
18. SIDEWALKS ARE TO BE INSTALLED THROUGH DRIVEWAYS. SIDEWALK FINISH IS TO BE BROOM FINISHED, NO ALTERNATE FINISH IS ALLOWED I.E. STAMPED, EPOXY FINISHED, ETC... THE 1.50% (±0.50%) CROSS SLOPE MUST BE MAINTAINED THROUGH DRIVEWAYS.
19. ANY CHANGES IN BOUNDS, PINS, EASEMENTS, AND FORM–A'S SHOULD BE SHOWN ON AMENDED DEFINITIVE PLANS PRIOR TO THE SIGN OFF OF THE PUNCH LIST.
20. ALL MONUMENTATION IS TO COMPLY WITH AGAWAM TOWN CODE SECTION 159–33

DRAWN BY: JGD	PROJECT	SHT. NAME	SHT. NO.
DATE: 05/27/08	TOWN OF AGAWAM CONSTRUCTION STANDARDS	SIDEWALK CURB CUT W/ DETECTABLE WARNING PANEL	H–7
DWG. NO.: 1			
APPROVED BY: MCC			



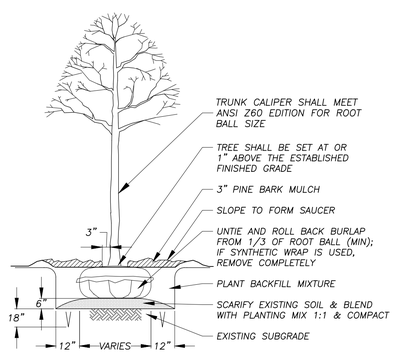
BITUMINOUS CONCRETE BERM (TYPE-2)

NO SCALE



BITUMINOUS CONCRETE PAVING DETAIL

NO SCALE



TREE PLANTING DETAIL

NO SCALE

PERMITTING

RLA
R LEVESQUE ASSOCIATES INC
Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants
ph: 413.568.0985 fax: 413.568.0986
40 School Street
Westfield, MA 01085
rlaland.com

DETAILS

0 Old River Street
Agawam, Massachusetts
Map J17 Parcel I-3

COMMONWEALTH OF MASSACHUSETTS
FILIPE J. CRAVO
CIVIL
No. 54376
REGISTERED PROFESSIONAL ENGINEER
1/30/26

PREPARED FOR:

Chuck Calabrese
Calabrese Construction, LLC

7 Brewster Road
West Springfield, MA.

ISSUANCE DATE: January 30, 2026

REVISIONS:	DATE:

DRAFTED BY: T.A. & F.C.

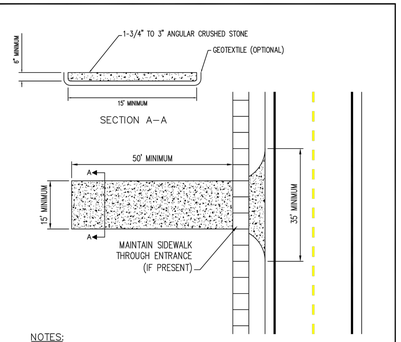
UNAUTHORIZED ALTERATION OF THIS DOCUMENT IS A VIOLATION OF MASSACHUSETTS STATE LAW

SCALE: As Noted

RLA PROJ. NUMBER: 220627

DRAWING#	REV.
D-1	-

S:\Projects\2022\220627 - Calabrese - 0 Old River St, Agawam, MA\05 Civil 3D\220627 - Defin.dwg

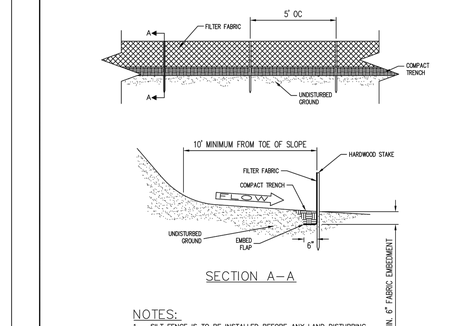


NOTES:

1. EACH SITE ENTRANCE IS TO HAVE A TEMPORARY CONSTRUCTION ENTRANCE.
2. STONE IS TO BE 1-3/4" TO 3" ANGULAR CRUSHED STONE.
3. ANY SEDIMENT TRACKED INTO THE ROADWAY NEEDS TO BE CLEANED IMMEDIATELY.
4. ADDITIONAL STONE IS TO BE ADDED TO THE PAD AS NEEDED TO MAINTAIN THE ORIGINAL DEPTH.
5. ANY SIDEWALK DAMAGED DURING CONSTRUCTION MUST BE REPLACED AT THE CONTRACTORS/DEVELOPERS EXPENSE.
6. SIDEWALK MUST REMAIN PASSABLE, IF THE SIDEWALK BECOMES UNSAFE OR IMPASSABLE, A TEMPORARY SIDEWALK/ SIDEWALK DETOUR MUST BE PROVIDED.

TEMPORARY CONSTRUCTION ENTRANCE
N.T.S

DRAWN BY: JGD DATE: 03/05/07 REV: 01/19/10 DWG. NO.: 1 APPROVED BY: MCC	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME TEMPORARY CONSTRUCTION ENTRANCE	SHT. NO. ES-1



SECTION A-A

NOTES:

1. SILT FENCE IS TO BE INSTALLED BEFORE ANY LAND DISTURBING ACTIVATES START AT THE CONSTRUCTION SITE –OR– AS DIRECTED IN THE SITE'S EROSION AND SEDIMENTATION PLAN.
2. INSPECT SILT FENCE ON WEEKLY BASIS AND AFTER EACH RAIN ANY DETERIORATED/DAMAGED SILT FENCE MUST BE REPLACED IMMEDIATELY.
3. REMOVE SILT FROM FENCE AS NEEDED –OR– WHEN THE SILT HAS ACCUMULATED TO HALF THE ORIGINAL HEIGHT OF THE FENCE.
4. WHEN JOINING TWO SECTIONS OF FENCE, ROLL THE END STAKES TOGETHER SUCH THAT THERE IS NO GAP IN THE FENCE, OVERLAPPING FENCE SECTIONS IS NOT AN ACCEPTABLE ALTERNATIVE

SILT FENCE
N.T.S

DRAWN BY: JGD DATE: 3/8/2007 DWG. NO.: 1 APPROVED BY: MCC	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME SILT FENCE	SHT. NO. ES-2

MINIMUM THICKNESS FOR PAVEMENT

TYPE OF STREET	HOT MIX ASPHALT			GRAVEL BASE & GRAVEL SUB-BASE	
	SURFACE COURSE (INCHES)	BINDER COURSE (INCHES)	BASE (INCHES)	BASE (INCHES) DENSE GRADED CRUSHED STONE (M 201.7)	SUB-BASE (INCHES) (M 1.03.0 TYPE B, 3" MAX.)
PLACE	1.5"	3.0"	NA	4.0"	8.0"
LANE	1.5"	3.0"	NA	4.0"	8.0"
SUBCOLLECTOR	1.5"	2.0"	3.0"	4.0"	8.0"
COLLECTOR	1.5"	2.0"	4.0"	4.0"	10.0"

NOTE: THE THICKNESSES ABOVE DO NOT APPLY TO INDUSTRIAL PARK ROADS

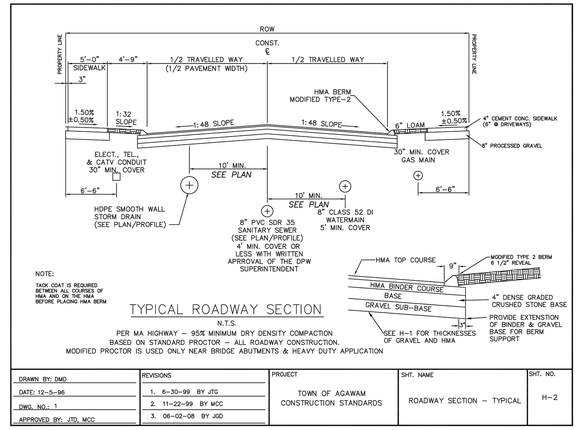
1. THE MATERIAL TO BE USED FOR THE GRAVEL BASE (THE 4" OF MATERIAL DIRECTLY UNDER THE BINDER COURSE OF PAVING) IS TO BE DENSE GRADED CRUSHED STONE (NOT PROCESSED GRAVEL OR OTHER NATURAL STONE PRODUCT.) MHD SPECIFICATION M2.01.7, WHICH MUST BE MET, STATES THAT COARSE AGGREGATE (#4 SIEVE AND LARGER) MUST BE CRUSHER RUN.
2. THE LINE, GRADE AND COMPACTION OF THE GRAVEL SUB-BASE (THE 8" LAYER OF GRAVEL BORROW DIRECTLY UNDER THE DENSE GRADED CRUSHED STONE) MUST BE APPROVED BY ENGINEERING BEFORE THE 4" LAYER OF DENSE GRADED CRUSHED STONE IS PLACED. IT IS IMPORTANT THAT ENOUGH TIME IS ALLOWED IN THE CONSTRUCTION SCHEDULE SO THAT FIELD DENSITY TESTS CAN BE MADE (AT DEVELOPER'S EXPENSE).
3. GRAVEL SAMPLES FOR THE SUB-BASE AND BASE WILL BE TAKEN BY THE ENGINEERING DIVISION FOR TESTING. THE SAMPLE MUST MEET ITS RESPECTIVE MHD SPECIFICATION AND BE APPROVED BY THE TOWN ENGINEER BEFORE ANY OF THE GRAVEL CAN BE SPREAD ON-SITE. THE TOWN ENGINEER OR THEIR AGENT ARE SOLELY RESPONSIBLE FOR CHAIN OF CUSTODY OF ALL SAMPLES; ANY TESTING PERFORMED OUTSIDE OF THE TOWN CHAIN OF CUSTODY WILL NOT BE ACCEPTED.
4. FIELD DENSITY TESTING IS TO BE MADE ON BOTH THE GRAVEL SUB-BASE AND GRAVEL BASE SEPARATELY. THE GRAVEL SUB-BASE IS TO BE TESTED BEFORE THE GRAVEL BASE WILL BE ALLOWED TO BE PLACED.
5. WHEN THE GRAVEL FOR THE SUB-BASE AND BASE IS SPREAD OUT, IT IS TO BE SPREAD INTO THE SITE STARTING AT THE SITE'S ENTRANCE AND WORKING INWARDS.
6. THE BINDER COURSE OF PAVING CANNOT BE LAID UNTIL THE ENGINEERING DIVISION HAS APPROVED THE GRADE FOR THE ROADWAY AND THE COMPACTION OF THE GRAVEL BASE.
7. PRIOR TO INSTALLING THE CURB, THE DEVELOPER SHALL HAVE THE LINES OF THE PROPOSED CURBING LAID OUT WITH RED PAINT OR OTHER MARKING AND THEN NOTIFY ENGINEERING THAT MARKING IS READY FOR INSPECTION. AFTER INSPECTION, ENGINEERING WILL NOTIFY THE DEVELOPER THAT CURBING IS EITHER READY FOR LAYING OR CORRECTIONS MUST BE MADE TO THE MARKINGS. IN THE LATTER CASE, THE DEVELOPER MUST MAKE THE CORRECTIONS PRIOR TO APPROVAL AND INSTALLATION. TACK COAT IS REQUIRED BEFORE PLACMENT OF HMA BERMS.
8. PRIOR TO LAYING THE TOP COURSE OF PAVEMENT, AND AFTER THE CURB IS INSTALLED, THE PAVEMENT MUST BE FLOODED SO THAT ENGINEERING CAN OBSERVE AND SURVEY THE GRADES OF BINDER COURSE TO DETECT ANY DISCREPANCIES IN GRADE. THIS INFORMATION MUST BE FURNISHED TO THE PAVING SUBCONTRACTOR BY THE DEVELOPER SO THAT ANY NECESSARY SHIMMING OF THE PAVEMENT CAN BE MADE. ENGINEERING WILL CHECK SHIMS.
9. AS NOTED IN THE SUBDIVISION REGULATIONS AND STANDARD PERFORMANCE AGREEMENTS, THE PRESENCE OF AN INSPECTOR WILL NOT RELIEVE THE DEVELOPER OF HIS OBLIGATIONS TO PROVIDE A SATISFACTORY INSTALLATION OF ALL FACILITIES WHICH ARE A PART OF THE SUBDIVISION.
10. TACK COAT WILL BE REQUIRED TO BE APPLIED AT A RATE OF 1/20 GAL/SY WHENEVER PLACING HMA OVER EXISTING PAVEMENT, OTHERWISE THE TACK COAT SHALL BE AS SPECIFIED IN SECTION 460.62 OF THE MHD STANDARD SPECIFICATIONS.

STREET DESIGN STANDARDS

TYPE OF STREET	RIGHT OF WAY WIDTH (FEET)	PAVEMENT WIDTH (FEET)
PLACE	✗ 50	26
LANE	50	30
SUBCOLLECTOR	60	36
COLLECTOR	66	40

REVISED 05/2008

DRAWN BY:DMD REV. BY: JTG, JGD DATE: 1/23/98 REV.: 01/19/10 DWG. NO.: 1 APPROVED BY:JTD, MCC	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME STREET STANDARDS	SHT. NO. H-1

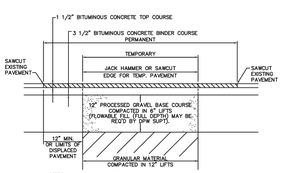


NOTE:
TACK COAT IS REQUIRED BETWEEN ALL COURSES OF HMA AND ON THE HMA BEFORE PLACING HMA BERM

TYPICAL ROADWAY SECTION
N.T.S.

PER MA HIGHWAY – 95% MINIMUM DRY DENSITY COMPACTION
BASED ON STANDARD PROCTOR – ALL ROADWAY CONSTRUCTION.
MODIFIED PROCTOR IS USED ONLY NEAR BRIDGE ABUTMENTS & HEAVY DUTY APPLICATION

DRAWN BY: DMD DATE: 12-5-96 DWG. NO.: 1 APPROVED BY: JTD, MCC	REVISIONS 1. 6-30-99 BY JTG 2. 11-22-99 BY MCC 3. 06-02-08 BY JGD	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME ROADWAY SECTION – TYPICAL	SHT. NO. H-2

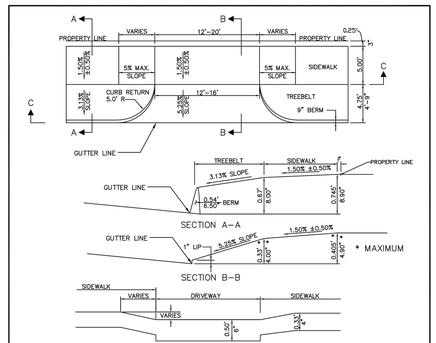


NOTES:

1. TEMPORARY PAVEMENT OVER TRENCHES IN STREET TO REMAIN FOR A MINIMUM OF 60 DAYS. TEMPORARY PAVEMENT 3" BINDER COURSE IN ONE LIFT – COLD PATCH KNOWN AS "DPW" MAYBE USED WHEN TYPE I-1 IS UNAVAILABLE.
2. REMOVE TEMPORARY PAVEMENT AND REPLACE WITH PERMANENT PAVEMENT
3. PAVEMENT THICKNESS TO BE 5" MINIMUM, OR GREATER TO MATCH EXISTING CONDITIONS.
4. WHERE PAVEMENT IS CUT 2'-0" OR LESS FROM EDGE OF ROAD, REPAVING TO EXTEND TO EDGE OF ROAD.
5. EDGE OF EXISTING PAVEMENT SHALL BE TREATED WITH A TACK COAT PRIOR TO PLACEMENT OF THE PERMANENT PATCH.
6. EXCEPT AS OTHERWISE DIRECTED BY THE D.P.W. SUPT., THE EDGE OF PAVEMENT ADJACENT TO PATCH SHALL BE HEATED WITH INFRARED EQUIPMENT TO SEAL THE JOINTS.

PERMANENT PAVEMENT REPLACEMENT DETAIL
N.T.S.

DRAWN BY: DMD DATE: 12-5-96 REV.: 3-15-98 DWG. NO.: 1 APPROVED BY: JTD	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME PERMANENT PAVEMENT REPLACEMENT DETAIL	SHT. NO. H-3



NOTES:

1. CONCRETE SIDEWALK IS TO RUN CONTINUOUSLY THROUGH DRIVEWAYS
2. CONCRETE USED SHALL BE 4000 PSI WITH A MAX. AGGREGATE SIZE OF 3/4" AND SHALL CONTAIN 5-7% ENTRAINED AIR.
3. CONCRETE DEPTH DEPTH SHALL BE A MINIMUM OF 4" WITH A MINIMUM DEPTH OF 6" @ DRIVEWAYS
4. SIDEWALKS SHOULD BE INSTALLED PRIOR TO THE APPLICATION FOR A BUILDING PERMIT UNLESS THE BUILDER REQUESTS IN WRITING THAT THE SIDEWALKS BE DELAYED AND GUARANTEES THAT THE SIDEWALK WILL CONFORM TO THE STANDARD DRIVEWAY DETAIL.
5. ALL DRIVEWAYS REQUIRE A DPW DRIVEWAY PERMIT
6. ALL GRADES ARE MAXIMUM, DRIVEWAYS ARE TO BE DESIGNED SUCH THAT WATER WILL NOT FLOW INTO DRIVEWAY FROM THE ROADWAY
7. DRIVEWAY SHALL BE PLACED SO THAT STREET INFRASTRUCTURE, SUCH AS: FIRE HYDRANTS, UTILITY POLES AND CATCH BASINS, ARE LOCATED NO CLOSER THAN 5FT TO THE POINT WHERE THE DRIVEWAY'S CURB RETURN MEETS WITH THE STREET'S CURB LINE.

STANDARD RESIDENTIAL DRIVEWAY
N.T.S.

DRAWN BY:DMD REV. BY: JTG, JGD DATE:12-5-96 REV.: 10-18-10 DWG. NO.: 1 APPROVED BY: MCC	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME STANDARD RESIDENTIAL DRIVEWAY	SHT. NO. H-6

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS

COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

PROFESSIONAL LAND SURVEYOR

TOWN OF AGAWAM
PLANNING BOARD
APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS REQUIRED

_____ DATE

I, _____, CLERK OF THE TOWN OF AGAWAM HEREBY CERTIFY THAT NOTICE OF APPROVAL OF THIS PLAN BY THE AGAWAM PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING TWENTY DAYS AFTER SUCH RECEIPT AND RECORDED OF SAID NOTICE.

RLA
R LEVESQUE ASSOCIATES INC
Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants
ph: 413.568.0985 fax: 413.568.0986
40 School Street
Westfield, MA 01085
rlaland.com

DETAILS

0 Old River Street
Agawam, Massachusetts
Map J17 Parcel I-3

COMMONWEALTH OF MASSACHUSETTS
FILIPE J. GRAVO
CIVIL
No. 54376
REGISTERED PROFESSIONAL ENGINEER
1/30/26

PREPARED FOR:

Chuck Calabrese
Calabrese Construction, LLC

7 Brewster Road
West Springfield, MA.

ISSUANCE DATE: January 30, 2026

REVISIONS:	DATE:

DRAFTED BY: T.A. & F.C.

UNAUTHORIZED ALTERATION OF THIS DOCUMENT IS A VIOLATION OF MASSACHUSETTS STATE LAW

SCALE: As Noted

RLA PROJ. NUMBER: 220627

DRAWING#	REV.
D-2	

PERMITTING

S:\Projects\2022\220627 - Calabrese - 0 Old River St, Agawam, MA\05 Civil 3D\220627 - Defin.dwg

COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS.

PROFESSIONAL LAND SURVEYOR

PLANNING BOARD

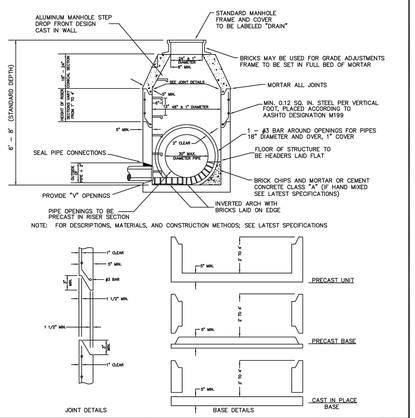
APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS REQUIRED

DATE

I, _____, CLERK OF THE TOWN OF AGAWAM HEREBY CERTIFY THAT NOTICE OF APPROVAL OF THIS PLAN BY THE AGAWAM PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING TWENTY DAYS AFTER SUCH RECEIPT AND RECORDED OF SAID NOTICE.

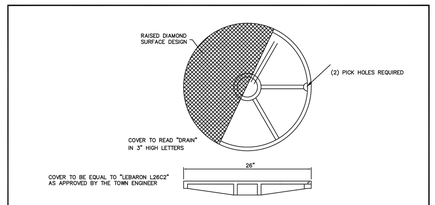
PRECAST CONCRETE DRAIN MANHOLE

N.T.S.
202.4.0



NOTE: FOR DESCRIPTIONS, MATERIALS, AND CONSTRUCTION METHODS; SEE LATEST SPECIFICATIONS

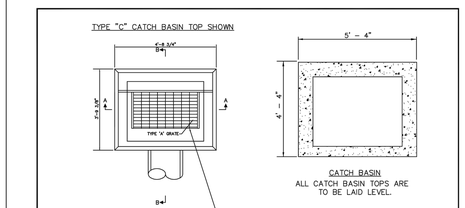
DRAWN BY: MCC DATE:12-30-98 DWG. NO.: 1 APPROVED BY: JTD	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME PRECAST DRAIN MANHOLE	SHT. NO. D-1



24" MANHOLE FRAME

N.T.S.
202.11

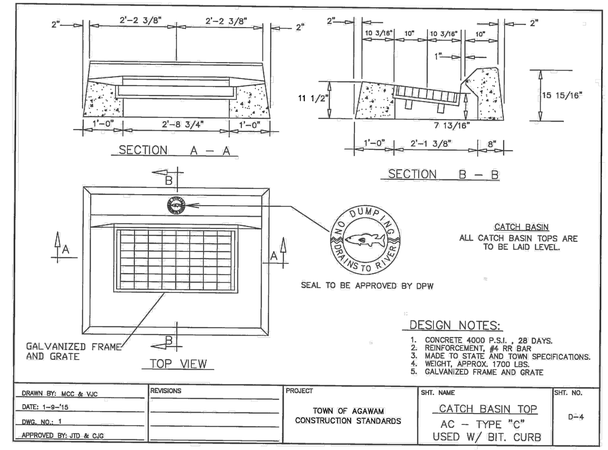
DRAWN BY:MCC/JTG DATE: 1-10-99/7-23-01 DWG. NO.: 1 APPROVED BY: JTD	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME DRAIN MANHOLE FRAME AND COVER	SHT. NO. D-2



PRECAST CATCH BASIN "TYPE C"

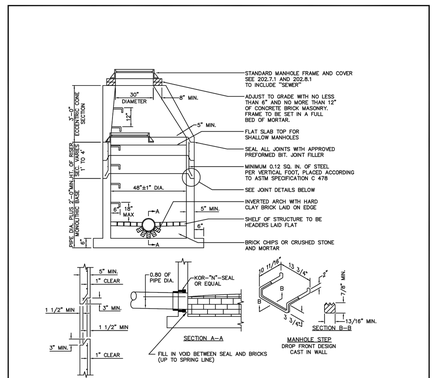
N.T.S.

DRAWN BYDMD REV. BY: JTG/MCC DATE: 12-5-96 REV.: 9/6/02 DWG. NO.: 1 APPROVED BY: JTD	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME CATCH BASIN	SHT. NO. D-3



DESIGN NOTES:
1. CONCRETE 4000 P.S.I. , 28 DAYS.
2. REINFORCEMENT, #4 RR BAR
3. MADE TO STATE AND TOWN SPECIFICATIONS.
4. WEIGHT, APPROX. 1700 LBS.
5. GALVANIZED FRAME AND GRATE

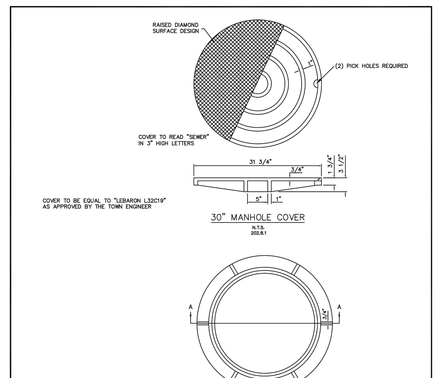
DRAWN BY: MCC & VJC DATE: 1-8-15 DWG. NO.: 1 APPROVED BY: JTD & CJC	REVISIONS	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME CATCH BASIN TOP AC – TYPE "C" USED W/ BIT. CURB	SHT. NO. D-4



STANDARD SANITARY SEWER MANHOLE

N.T.S.
202.6.1

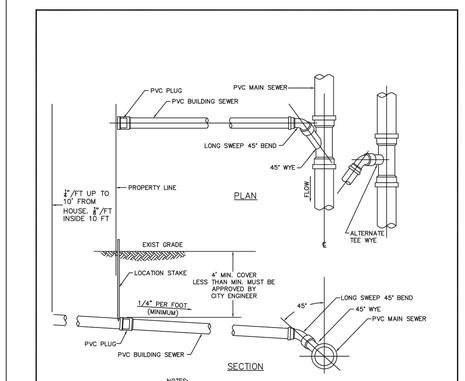
DRAWN BY: DMD REV. BY: JTG DATE: 12-5-96 REV: 6-30-99 DWG. NO.: 1 APPROVED BY: JTD	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME MANHOLE – SANITARY SEWER	SHT. NO. S-1



30" MANHOLE FRAME TYPE "C"

N.T.S.
202.7.1

DRAWN BY: DMD/JTG DATE:12-5-96/7-23-01 DWG. NO.: 1 APPROVED BY: JTD	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME SANITARY SEWER MANHOLE FRAME AND COVER	SHT. NO. S-3

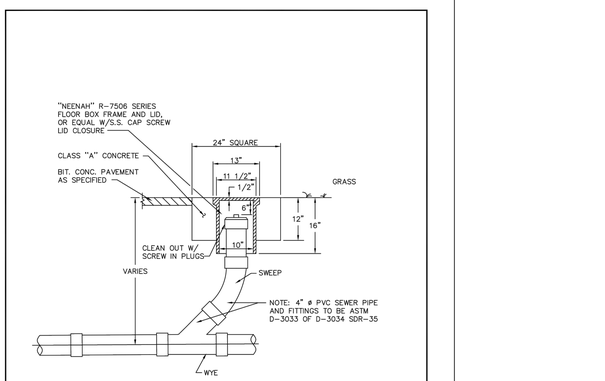


NOTES:
1. BUILDING SEWERS SHALL BE 4"ø EXCEPT AS DIRECTED BY THE ENGINEER
2. LOCATION AND DEPTHS OF BUILDING SEWERS TO BE DETERMINED IN THE FIELD BY THE ENGINEER
3. ALL PIPE TO BE "RING-TITE" (RUBBER GASKET)

BUILDING SEWER CONNECTION

N.T.S.

DRAWN BY: DMD/MCC DATE: 12-5-96 REV.: 8/1/03 DWG. NO.: 1 APPROVED BY: JTD	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME BUILDING SEWER CONNECTION	SHT. NO. S-4



SANITARY CLEANOUT

N.T.S.

CLEANOUT REQUIRED EVERY 100' OF LATERAL

DRAWN BY: DMD DATE: 12-5-96 DWG. NO.: 1 APPROVED BY: JTD	PROJECT TOWN OF AGAWAM CONSTRUCTION STANDARDS	SHT. NAME SANITARY CLEANOUT	SHT. NO. S-5

PERMITTING

RLA
R LEVESQUE ASSOCIATES INC
Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants
ph: 413.568.0985 fax: 413.568.0986
40 School Street
Westfield, MA 01085
rlaland.com

DETAILS

0 Old River Street
Agawam, Massachusetts
Map J17 Parcel I-3

COMMONWEALTH OF MASSACHUSETTS
FILIPE J. CRAVO
CIVIL
No. 49376
REGISTERED PROFESSIONAL ENGINEER
1/30/26

PREPARED FOR:

Chuck Calabrese
Calabrese Construction, LLC

7 Brewster Road
West Springfield, MA.

ISSUANCE DATE: January 30, 2026

REVISIONS:	DATE:

DRAFTED BY: T.A. & F.C.

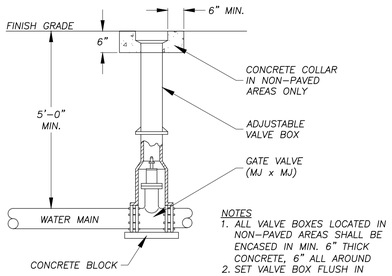
UNAUTHORIZED ALTERATION OF THIS DOCUMENT IS A VIOLATION OF MASSACHUSETTS STATE LAW

SCALE: As Noted

RLA PROJ. NUMBER: 220627

DRAWING#	REV.
D-3	

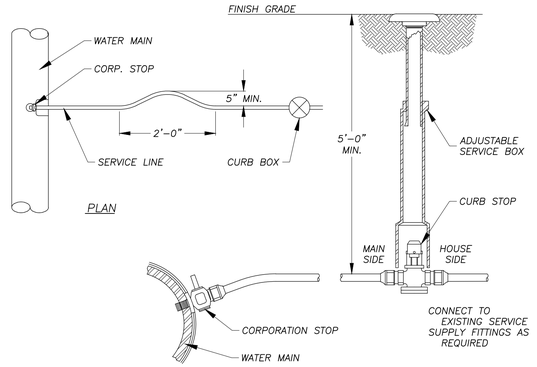
S:\Projects\2022\220627 - Calabrese - 0 Old River St, Agawam, MA\05 Civil 3D\220627 - Defin.dwg



NOTES
1. ALL VALVE BOXES LOCATED IN NON-PAVED AREAS SHALL BE ENCASED IN MIN. 6" THICK CONCRETE, 6" ALL AROUND
2. SET VALVE BOX FLUSH IN PAVED AREAS

TYPICAL BURIED VALVE

NO SCALE



TYPICAL WATER SERVICE CONNECTION

NO SCALE

PIPE RESTRAINT SCHEDULE FOR GROUND BURIED PRESSURE PIPES									
LENGTH OF RESTRAINT REQD (FEET)								DESIGN FORCE ON RESTRAINT REQ'D (KIPS) ③	
PIPE \ DEFLECT. ANGLE	2½°	3¾°	45°	56¼°	67½°	78¾°	90° OR TEE	45°	90° OR TEE
6"	3	6	11	16	23	29	37	2.0	5.0
8"	4	8	15	22	31	41	50	3	9.0
10"	5	11	18	28	38	49	61	4.0	14.0
12"	6	13	22	33	45	59	73	6.0	20.0

① THIS TABLE IS BASED ON A TEST PRESSURE OF 180 PSI (OPERATING PRESSURE + WATER HAMMER). FOR OTHER TEST PRESSURES, ALL VALUES TO BE INCREASED OR DECREASED PROPORTIONALLY

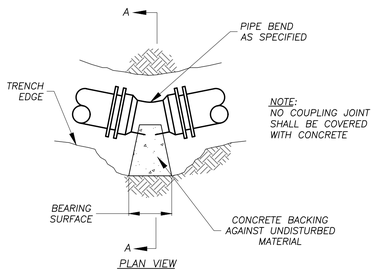
② IN EACH DIRECTION FROM POINT OF DEFLECTION EXCEPT FOR TEE AT WHICH ONLY THE BRANCH IN THE DIRECTION OF THE TEE STEM.

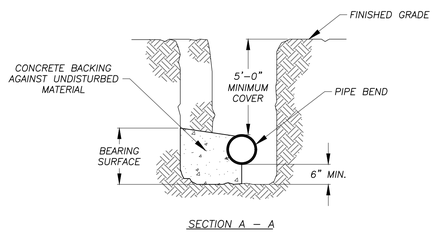
③ IF TIE RODS ARE USED, USE 4 RODS MINIMUM AND ADD ⅛" TO BAR DIA AS CORROSION ALLOWANCE.

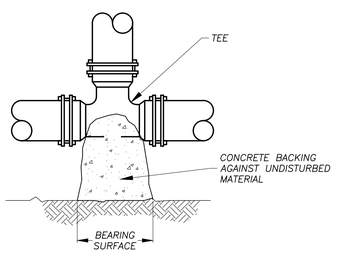
MINIMUM AREA OF BEARING FACE OF CONCRETE THRUST BLOCKS IN SQUARE FEET			
	SOIL BEARING		
PIPE SIZE (INCHES)	1,000 LBS./ SQ. FT.	2,000 LBS./ SQ. FT.	4,000 LBS./ SQ. FT.
DEAD END, TEE OR HYDRANT			
6	11	6	3
8	20	10	5
12	34	17	9
1/4 BEND – 90°			
6	16	8	4
8	28	14	7
12	56	28	14
1/8 BEND – 45°			
6	9	4	2
8	14	7	4
12	32	16	8
1/16 BEND – 22 1/2° OR LESS			
6	4	2	1
8	8	4	2
12	15	8	4

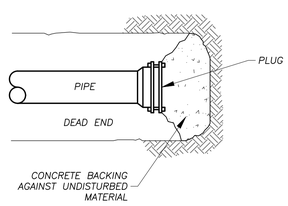
NOTES: THRUST BLOCKS

1. FIGURES BASED ON 300 PSI OPERATING PLUS SURGE PRESSURE
2. CONCRETE SHALL NOT BE DUMPED OVER THE FITTING. THE BLOCK MUST BE FORMED
3. RETAINING RODS OR RESTRAINED JOINT PIPE AS APPROVED BY THE ENGINEER MAY BE USED IN PLACE OF THRUST BLOCKS
4. PLACE 15 LB ROOF FELT BETWEEN PIPE AND CONCRETE
5. CONCRETE SHALL NOT COVER PIPE JOINTS
6. ALL BENDS, TEES, HYDRANTS AND DEAD ENDS SHALL BE BRACED WITH CONCRETE THRUST BLOCKS OR SUITABLE RESTRAINING DEVICES
7. BEARING AREA IS AREA OF CONCRETE IN CONTACT WITH WALL OF TRENCH = H x L
8. HEIGHT (H) AND LENGTH (L) AS REQUIRED TO OBTAIN AREA IN TABLE. LENGTH TO BE 2 TIMES HEIGHT
9. ESTIMATED SOIL BEARING LOAD IS 2000 LBS









WATER MAIN · HORIZONTAL THRUST BLOCK DETAILS

NO SCALE

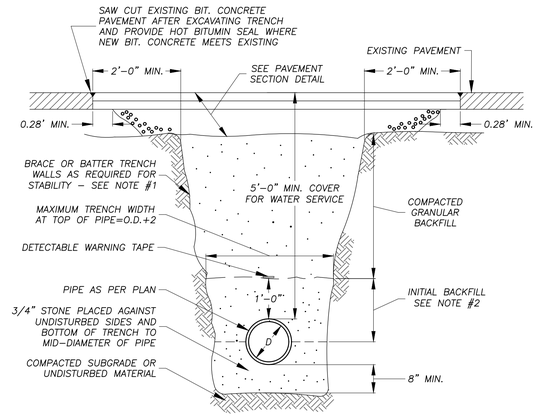
I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS.

PROFESSIONAL LAND SURVEYOR

I, _____, CLERK OF THE TOWN OF AGAWAM HEREBY CERTIFY THAT NOTICE OF APPROVAL OF THIS PLAN BY THE AGAWAM PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING TWENTY DAYS AFTER SUCH RECEIPT AND RECORDED OF SAID NOTICE.

TOWN OF AGAWAM
PLANNING BOARD
APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS REQUIRED

_____ DATE

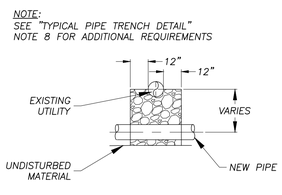


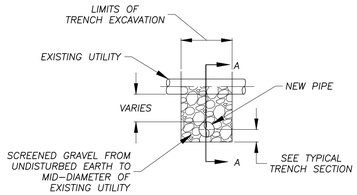
PIPE TRENCH DETAIL (STANDARD)

NO SCALE

TRENCH NOTES

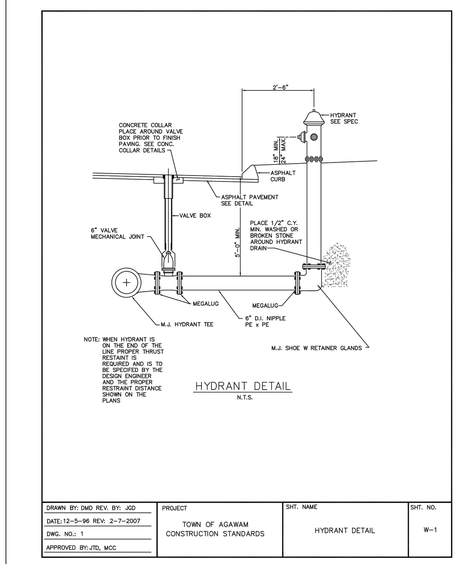
1. SHEETING, WHEN REQUIRED TO BE CUT OFF AT LEAST 5 FT. BELOW STREET AND A MINIMUM OF 1 FT. ABOVE TOP OF PIPE. WOOD SHEETING DRIVEN BELOW MID-DIAMETER OF THE PIPE SHALL BE LEFT IN PLACE. STEEL SHEETING DRIVEN BELOW MID-DIAMETER MAY BE WITHDRAWN IF APPROVED IN WRITING BY THE ENGINEER. FOR P.V.C. PIPE, ALL SHEETING DRIVEN BELOW MID-DIAMETER SHALL BE LEFT IN PLACE.
2. SELECTED COMMON FILL, HAND PLACED, FROM MID-DIAMETER OF PIPE TO 12" ABOVE, TOP OF PIPE.
3. TRENCHES LOCATED ON THE ROAD SHOULDER SHALL BE TREATED THE SAME AS STREET EXCEPT FOR PAVING.
4. PROVIDE AT LEAST ONE IMPERVIOUS DAM IN GRAVEL BEDDING BETWEEN EACH MANHOLE WHERE DIRECTED, OR EVERY 300 FT., WHICHEVER IS LESS.
5. COMPACT ALL BACKFILL MATERIAL WITH VIBRATORY PLATE EQUIPMENT (MINIMUM TWO PASSES) TO A MINIMUM DENSITY OF 95 PERCENT OF THE STANDARD PROCTOR DENSITY AS DETERMINED BY ASTM D698.
6. PLACE BACKFILL MATERIALS IN MAXIMUM ONE FOOT LIFTS.





UTILITY CROSSING DETAIL

NO SCALE



HYDRANT DETAIL
N.T.S.

DRAWN BY: DMD REV. BY: JGD	PROJECT	SHT. NAME	SHT. NO.
DATE:12-5-96 REV: 2-7-2007	TOWN OF AGAWAM CONSTRUCTION STANDARDS	HYDRANT DETAIL	W-1
DWG. NO.: 1			
APPROVED BY:JTD, MCC			

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PREPARED FOR:

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D-4	

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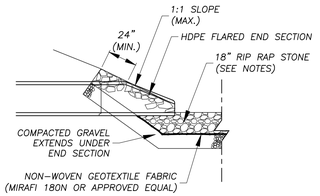
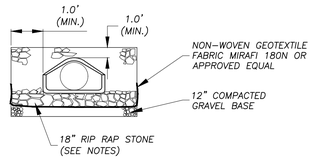
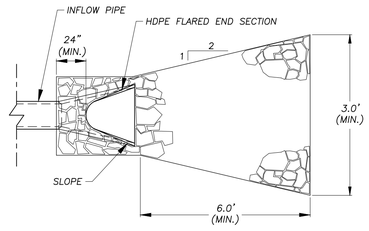


SIDE SECTION



FRONT SECTION



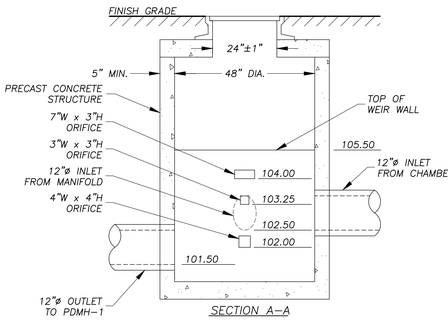
PLAN VIEW

NOTES

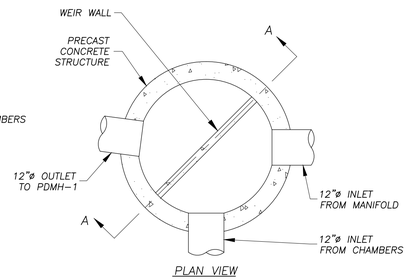
1. FLARED END SECTION PIPE JOINT SHALL BE SIMILAR TO THE MAIN RUN OF PIPE JOINTS
2. STONE RIPRAP SHALL NOT BE LESS THAN 50 POUNDS NOR MORE THAN 125 POUNDS AND AT LEAST 75% OF THE VOLUME SHALL BE AT LEAST 75 POUNDS

STANDARD RIP RAP PIPE OUTLET

NO SCALE



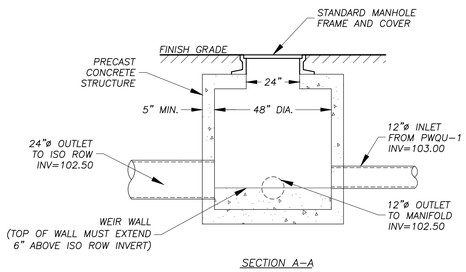
SECTION A-A



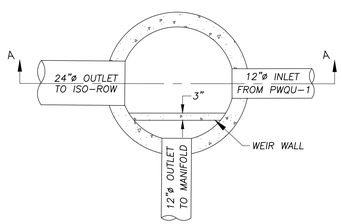
PLAN VIEW

OUTLET CONTROL STRUCTURE (POCS-1)

NO SCALE



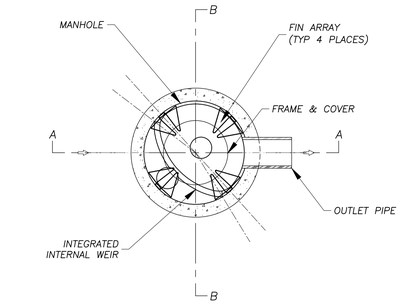
SECTION A-A



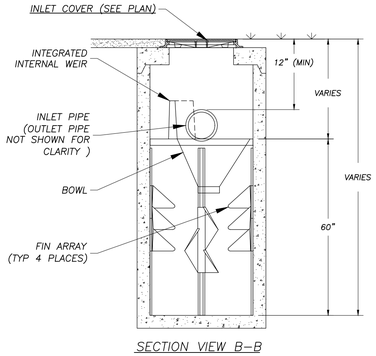
PLAN VIEW

INLET CONTROL STRUCTURE (PICS-4)

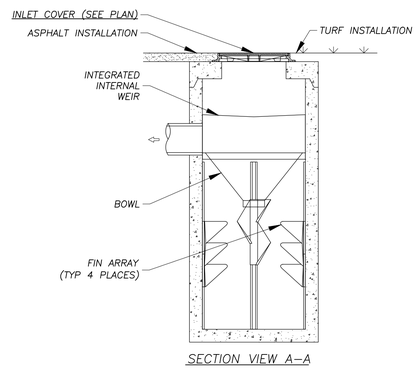
NO SCALE



PLAN VIEW



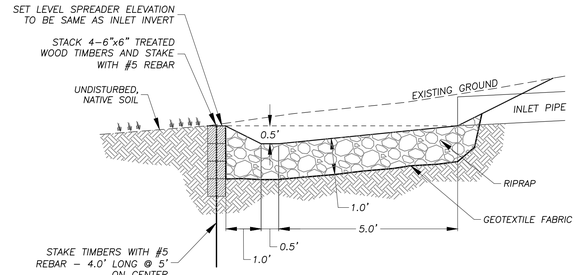
SECTION VIEW B-B



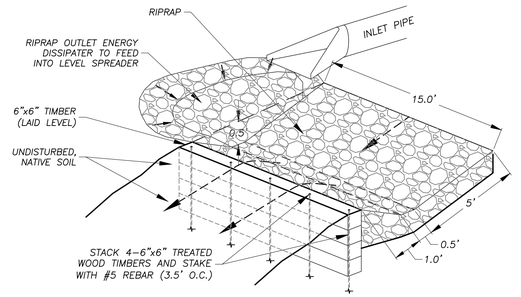
SECTION VIEW A-A

WATER QUALITY UNIT
BARRACUDA MAX S4 (PWQU-1)

NO SCALE



LEVEL SPREADER CROSS-SECTION

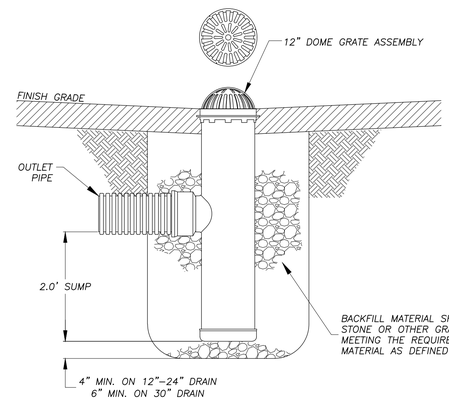


NOTES

1.) LEVEL SPREADER SHALL BE INSTALLED WITH A LEVEL INSTRUMENT. CONSTRUCT LEVEL UP TO 0% GRADE TO ENSURE UNIFORM SHEET FLOW. LEVEL SPREADER SHALL BE CONSTRUCTED ON UNDISTURBED SOIL.
2.) CONSTRUCTION OF LEVEL SPREADER SHALL BE FROM UPHILL SIDE ONLY. LEVEL LIP AND AREA BELOW SPREADER SHALL BE AT EXISTING GRADES AND UNDISTURBED BY EARTHWORK OR EQUIPMENT.
3.) CONSTRUCT SPREADER WITH LIP AT EXISTING GRADE AS SPECIFIED.
4.) DOWNGRADIENT RECEIVING AREA MUST BE NATURALLY WELL VEGETATED.

LEVEL SPREADER DETAIL

NO SCALE



ADS NYLOPLAST YARD DRAIN BASIN

NO SCALE

COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS.

PROFESSIONAL LAND SURVEYOR

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TOWN OF AGAWAM
PLANNING BOARD
APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS REQUIRED

_____ DATE

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COMMONWEALTH OF MASSACHUSETTS
FILIPE J. GRAVO
CIVIL
No. 56376
REGISTERED PROFESSIONAL ENGINEER
1/30/26

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D-5	-

S:\Projects\2022\220627 - Calabrese - 0 Old River St, Agawam, MA\05 Civil 3D\220627 - Defin.dwg

Planning Department
Definitive Plan Review

Reviewer: Taryn Egerton **Review Date:** February 27, 2026

Date Received: February 10, 2026 **Distribution Date**: February 12, 2026

Planning Board Public Hearing Date: March 5, 2026

Mandatory Date for Final Action: May 11, 2026 (Extensions may be made at the request of the applicant)

Name of Subdivision: High Street (alternative street name is required)

Location: Old River Street, 27 Walnut Street, & 17 High Street

Name of Owner: Charles R. Calabrese

Address: 7 Brewster Rd West Springfield, Ma 01089 **Tel. #**:

Name of Applicant: Same

Address: **Tel. #**

Engineer: R. Levesque Associates

Address: 40 School Street, Westfield, MA Tel. # 568-0985

I. **Preliminary Plan Approved**: November 6, 2025

II. **Definitive Plan conforms to zoning regulations**: O.K.

III. **Notice filed with Town Clerk (date)**: January 30, 2026

IV. **Filing Fee**: $875.00

V. **Contents of Application**:

A. **Statement of Interest in Land**: Provided.

B. **Attested Copy of Deed**: Provided

C. **Updated Environmental Study**: Provided

D. **Final Plans**

1. **Title Sheet (1" = 30'**): O.K.

2. **Lot survey with road layout and lot lines**: See II

a. **Subdivision name, boundaries, north point, date and scale**:
b. **name and address of record owner, subdivider, and engineer or surveyor with stamp**: O.K.
c. **Abutters as found on recent tax list**:
d. **Existing and proposed lines of streets, ways, lots, easements, and public common areas, new street names**: New street name is required
e. **Sufficient data to determine the location, direction and length of every street**: O.K.
f. **Location, names, and widths of streets bounding subdivision**: Width of Walnut Street not provided
g. **Signature Block**: Provided.

3. **Topo sheet at 2' intervals, spot elevations, center line for road, spot elevations for septic systems, location of building and final grade**: Provided.

4. **Road layout and profiles (utilities and curb cuts**): See Engineering comments.

5. **Detail Sheets**: See Engineering comments.

E. **Time development sequence**: O.K..

1. **Town utilities and services**: See Engineering comment.

2. **Sale price and square footage**: Not provided. The applicant should provide approximate square footage and sale price.

F. **Soil Borings**: Not provided. The applicant should provide Soil Boring Logs and locations

G. **Perc Test**: Not provided.

H. **Two (2) sets of originals/five (5) sets of copies**: Originals not needed until final approval is given

I. Number and type of requested waivers:

1. Section 159-23(A) Waiver from the requirement on both sides of the roadway. Sidewalks on one side are proposed.

2. Section 159-8(D) Waiver from the requirement to provide curbline radius of 25'. Curbline radius of 15' is proposed.

3. Section 159-20(A) Waiver from the requirement to provide an 8" sewer main. 6" is proposed.

4. Section 159-21(A) Waiver from the requirement to provide concrete pipe to reinforce storm drains. HDPE is proposed.

Taryn Egerton

From: Lauren Kennedy
Sent: Friday, February 27, 2026 9:49 AM
To: Taryn Egerton
Subject: RE: Definitive Plan - Old River Street, 27 Walnut Street, 17 High Street

The Agawam Health Dept has reviewed the Subdivision Plan and does not have any comments or concerns to make.

Lauren Kennedy, MPA, RS
Health Agent
Agawam Health Dept
36 Main St, Agawam, MA 01001
(413) 726-9721

From: Taryn Egerton <TEgerton@agawam.ma.us>
Sent: Wednesday, February 11, 2026 7:47 AM
To: Kevin Duquette <inspections@agawam.ma.us>; All_Engineering Department <All_Eng_Dept@agawam.ma.us>; Brian Machos <BMachos@agawam.ma.us>; Derek Myers <afdinsp@agawam.ma.us>; Lauren Kennedy <health@agawam.ma.us>
Cc: Stefanie Kesecker <SKesecker@agawam.ma.us>
Subject: Definitive Plan - Old River Street, 27 Walnut Street, 17 High Street

Good morning,
Please review and comment on the attached prior to the March 5, 2026 Planning Board public hearing. I'll be sending the Stormwater Report in a second email due to the size.

Thank you!

Taryn Egerton
Planning Director & Conservation Agent
Planning Department

413.726.9737 | tegerton@agawam.ma.us

TOWN OF Agawam MASSACHUSETTS

Please be aware that applications approved by the Town of Agawam are considered public information. Unfortunately, email spammers often monitor municipal records and attempt to compromise communications by sending fraudulent emails, many of which appear to be invoices from the town to applicants.

To avoid confusion or potential scams, please note that the Planning Office including the Planning Board, Zoning Board of Appeals, and Conservation Commission requires all application fees to be submitted at the time of application.

If you receive an invoice after submitting your application, we recommend you to contact our office at 413-726-9737 to determine the authenticity of the invoice.

Taryn Egerton

From: Derek Myers
Sent: Wednesday, February 11, 2026 9:38 AM
To: Taryn Egerton
Subject: RE: Definitive Plan - Old River Street, 27 Walnut Street, 17 High Street

Taryn,
We will need a swept path analysis for this project.
Thanks
Derek

From: Taryn Egerton <TEgerton@agawam.ma.us>
Sent: Wednesday, February 11, 2026 7:47 AM
To: Kevin Duquette <inspections@agawam.ma.us>; All_Engineering Department <All_Eng_Dept@agawam.ma.us>; Brian Machos <BMachos@agawam.ma.us>; Derek Myers <afdinsp@agawam.ma.us>; Lauren Kennedy <health@agawam.ma.us>
Cc: Stefanie Kesecker <SKesecker@agawam.ma.us>
Subject: Definitive Plan - Old River Street, 27 Walnut Street, 17 High Street

Good morning,
Please review and comment on the attached prior to the March 5, 2026 Planning Board public hearing. I'll be sending the Stormwater Report in a second email due to the size.

Thank you!

Taryn Egerton
Planning Director & Conservation Agent
Planning Department

413.726.9737 | tegerton@agawam.ma.us

TOWN OF Agawam MASSACHUSETTS

Please be aware that applications approved by the Town of Agawam are considered public information. Unfortunately, email spammers often monitor municipal records and attempt to compromise communications by sending fraudulent emails, many of which appear to be invoices from the town to applicants.

To avoid confusion or potential scams, please note that the Planning Office including the Planning Board, Zoning Board of Appeals, and Conservation Commission requires all application fees to be submitted at the time of application.

If you receive an invoice after submitting your application, we recommend you to contact our office at 413-726-9737 to determine the authenticity of the invoice.

Town of Agawam
Department Of Public Works

DPW
1000 Suffield Street
Agawam, MA 01001
Phone: 413-821-0600
Fax: 413-821-0631

MEMORANDUM

To: Planning Board
CC: File
From: Engineering Division
Date: March 5, 2026
Subject: Old River Street Subdivision – Definitive Plan Review

The Agawam Engineering Division has reviewed the Definitive Site Plan for the proposed subdivision to be located at Old River Street; prepared by R Levesque Associates, Inc; dated January 30, 2026 and has the following comments:

1. Engineering is highly recommending the sidewalks be extended along both sides of the street and all existing driveways be formalized to meet current Agawam Design Standards. Gravel driveways with no discernable limits are susceptible to tracking sediment into the roadway. The proposed project is calling for an infiltration drainage system which is costly to repair if it becomes clogged with sediment from stormwater runoff. Driveway aprons and a minimum of 10' beyond the back of sidewalk needs to be paved on all driveways on the proposed street to reduce sediment runoff into the roadway. In addition, informal driveways close to intersections can cause safety hazards and shall be moved as far away from the intersection with Walnut Street as possible.

2. The sidewalk shall extend into the Walnut Street right of way and a crosswalk with curb ramps installed within the proposed granite curbing across the proposed street (approx. STA -0+05 to 0+00). This will allow for the Town to easily extend the sidewalks on Walnut Street without having to adjust the curbing.

3. Crosswalks are required to be painted across the proposed street. Mid-block crosswalks are required to also have MUTCD signage.

4. Please add the existing house and driveway for #47 Walnut Street to the plans. This driveway location should be moved as far away from the intersection as possible for safety reasons.

5. The thickness of asphalt binder course shown on the Bituminous Concrete Paving Detail shall be 3", as per Town of Agawam standards.

6. The inlet control structure detail on Sheet D-5 shall be labeled PICS-1. It is currently labeled PICS-4.

7. Engineering requests that the directions of downspout flows are shown on the plans.

8. Engineering requests that the Developer submit soil boring logs and electronic HydroCAD files in order to continue our evaluation of stormwater calculations.

9. Engineering approves the usage of HDPE pipe for the proposed drainage system and recommends that the requested waiver be granted (if necessary).

Town of Agawam
Department Of Public Works

DPW
1000 Suffield Street
Agawam, MA 01001
Phone: 413-821-0600
Fax: 413-821-0631

10. Engineering is concerned about a possible utility conflict between the 6" sewer lateral from Lot D and the 12" drainage line between PWQU-1 and PICS-1. Based on our calculations, the separation between pipes appears to be inadequate. It is recommended that the Developer's Engineer re-evaluate the utility elevations at this location.

11. The hydrant is being proposed in a location that will be susceptible to being hit by vehicles and plows due to the proximity of the two driveways. In addition, the underground electric is in conflict with the hydrant.

12. Please confirm that the underground electric conduit ends at the eastern side of the cul-de-sac. How is electric service being delivered to Lot D?

13. Please add one Street light to the plans (in the treebelt around cul-de-sac).

14. Please label the proposed private water service easement on Lot B for Lot C.

15. The drainage easement on Lot D for the outfall needs to be revised to include the entirety of the proposed level spreader (and a minimum of 5' additional feet around it for maintenance).

16. The proposed yard drainage system located on Lot D shall be privately owned and maintained. The property owner will need to fill out a DPW Storm Drain Permit for this connection to the Town drainage system (when the street is accepted). The connection shall be made at the back of the PCB-2 instead of the PWQU-1 as this will provide additional TSS removal (sump/hood) and allow for quicker in field inspections.

17. Hay bales and silt sacks are required for the yard drains on Lot D and shall remain in place until vegetation is established. Connection to the drainage system in the road shall be plugged until vegetation is established.

18. The infiltration system shall be plugged until the base course of pavement and berm is installed.

19. The granite curb on the south side of the road entrance shall be tapered to match the existing HMA Berm. The north side shall match the existing granite curb.

20. Please include a planting detail for the center of cul-de-sac. No large trees with deep roots shall be proposed above the infiltration system.

Engineering reserves the right to make additional comments as new information is submitted. If you have any questions, please do not hesitate to contact this division.

Sincerely,

Michelle C. Chase, P.E.
Town Engineer

Ryan Rivest, E.I.T.
Civil Engineer I

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March 11, 2026

Taryn Egerton
Planning Director & Conservation Agent
Office of Planning and Community Development
Town of Agawam
Public Works and Municipal Annex
1000 Suffield Street
Agawam, MA 01001

RE: Responses to Comments #2 regarding the Application for Site Plan Approval for 769 Silver Street

Dear Ms. Egerton,

On January 29, 2026, our project team submitted an Application for Site Plan Approval for a Battery Energy Storage System (BESS) at 769 Silver Street. This application was then scheduled to be discussed by the Planning Board at their meeting on February 19, 2026. The matter was discussed and then continued to the Planning Board's meeting on March 5, 2026. In advance of that March 5, 2026 Planning Board meeting, comments regarding the application and project were received from the Engineering Division. These various comments are outlined below and are immediately followed by responses from our project team in red.

If you could please distribute this memorandum to the Engineering Division, the Planning Board, and any other entities you feel appropriate in advance of the March 19, 2026 Planning Board meeting, that would be appreciated. Here are the comments and the responses:

Engineering Division

The following questions were raised in a memorandum from the Engineering Division dated March 5, 2026:

1. Engineering requests the included Agawam Standard Details Accessible Parking Sign (A-1) and Accessing Parking Space (A-2) are added to the Site Plans.

   - Response: The requested details have been added to drawing AW1-C-302.

2. The orientation of the north arrow on the cover sheet is incorrect due to the angled locus image.

   - Response: The north arrow has been updated.

3. Engineering requests a callout note showing the elevation of Basin Overlow # 1 be added to Sheet AWl-C-202-1.

   - Response: The requested callout has been added to Sheet AW1-C-202-1.

4. The Level Spreader Section Detail should include the riprap protection for the overflow edge.

   - Response: The riprap protection has been added to the Level Spreader Section detail on Sheet AW1-C-301.

5. The Total Suspended Solids (TSS) removal calculations do not appear to follow the requirements stated within the Massachusetts Stormwater Handbook. Pretreatment of stormwater runoff must be provided prior to discharge into a grassed channel in order to claim TSS credit. Sediment forebays do not received a separate 25% TSS removal credit when constructed with an extended dry detention basin. In such cases, the forebay is considered to be a required part of the basin design.

   It appears that a maximum TSS removal credit of 50% for the combined sediment forebay and detention basin can be claimed for the proposed drainage system. This is less than the 80% TSS removal normally

required by Massachusetts standards. However, this project can be classified as a Redevelopment Project under Standard 7 of the Massachusetts Stormwater Handbook, which allows TSS removal requirements to be met to the maximum extent practicable. Engineering recognizes that the stormwater BMP's proposed for the project site and the overall decrease in impervious area will improve the water quality of discharged stormwater runoff.

Engineering requests that a revised set of TSS removal calculations be submitted for our record.

- Response: A revised set of TSS removal calculations have been included in the updated Stormwater Management Report. The updated TSS removal calculations show a maximum TSS removal of 50% for the sediment forebay and detention basin.

6. A Curve Number of 76 (instead of 55) should be used for the topping stone surface installed over Hydrologic Soil Group "A" as per Table 7.1 from Highway Hydrology Third Edition from the Federal Highway Administration (see attached).

   - Response: The Curve Number has been updated in the HydroCAD model, and the Stormwater Management Report has been updated to reflect the updated results. With the increase in Curve Number, some adjustments were made to the detention basin outlet elevations to ensure there was not an increase in peak flows and the 1-foot of freeboard was maintained in the basin for all events. Outlet elevations were updated on the plans and details.

7. Engineering requests a schedule for the inspection, maintenance and repair of the riprap areas within the forebay overflow, basin overflows and level spreaders be added to the Post-Construction Stormwater Inspection and Maintenance Plan.

   - Response: The Post-Construction Stormwater Inspection and Maintenance Plan has been updated to include inspection schedules for the riprap areas within the forebay overflow, basin overflows and level spreaders. Section 3.3 of the plan has been updated with additional language regarding inspection and repair of the riprap areas and Table 1 has been updated with required inspection frequency for the riprap areas. The Post-Construction Stormwater Inspection and Maintenance Plan is included as Attachment H of the updated Stormwater Management Report.

8. The openings shown on the Culvert End Bar Rack Detail are too large and would still allow trash and debris to enter the pipe. Engineering recommends that a flared-end style trash rack is used. Also, an anti-seep collar should be installed at the inlet of the outlet pipe.

   - Response: The pipe end details on Sheet AW1-C-301 have been updated to include a flared end section. The flared end section will include a bar rack. The bar rack spacing will be 4-inches on-center. An anti-seep collar has been added to the Basin Inlet/Outlet Detail on Sheet AW1-C-301.

9. An impermeable barrier must be installed within the berm of the extended dry detention basin. Engineering requests that a cross-section of the detention basin and berm is included in the Site Plans.

   - Response: An “Embankment Build Up” detail, illustrating the section of the basin embankment has been included on Sheet AW1-C-301. The section includes a specification for the soil to be used in construction of the embankment and a geomembrane liner on the inside slope of the embankment.

Please do not hesitate to contact our project team with any questions regarding any of the above responses. Thank you.

Sincerely,



Adam L. Duchesneau, AICP
Senior Planner
aduchesneau@bscgroup.com
617-896-4551

STORMWATER MANAGEMENT REPORT
AGAWAM ENERGY CENTER
769 SILVER STREET
AGAWAM, MASSACHUSETTS

Prepared for

AGAWAM ENERGY CENTER, LLC
C/O Longroad Development Company, LLC
125 High Street
Boston, MA 02210



January 2026
Revised March 2026
Rev 2

4 Blanchard Road
P.O. Box 85A
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Tel: 207.829.5016 sme-engineers.com

SME
SEVEE & MAHER ENGINEERS

TABLE OF CONTENTS

Section No.	Title	Page No.
1.0	**INTRODUCTION**	**1**
2.0	**PROJECT DESCRIPTION**	**1**
3.0	**SITE WATERSHED**	**4**
4.0	**STORMWATER MANAGEMENT STANDARDS**	**5**
4.1	Standard 1: No New Untreated Discharges	5
4.2	Standard 2: Peak Rate Attenuation	6
4.3	Standard 3: Recharge	8
4.4	Standard 4: Water Quality	9
4.5	Standard 5: Land Uses with Higher Potential Pollutant Loads	9
4.6	Standard 6: Critical Areas	10
4.7	Standard 7: Redevelopment and Other Projects Subject to the Standards only to the Maximum Extent Practicable	10
4.8	Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control	10
4.9	Standard 9: Operation and Maintenance Plan	11
4.10	Standard 10: Illicit Discharges	11
5.0	**CONCLUSION**	**11**

LIST OF ATTACHMENTS

ATTACHMENT A	NRCS SOIL SURVEY
ATTACHMENT B	STORMWATER DRAINAGE FIGURES
ATTACHMENT C	PRE-DEVELOPMENT HYDROCAD CALCULATIONS
ATTACHMENT D	POST-DEVELOPMENT HYDROCAD CALCULATIONS
ATTACHMENT E	TREATMENT VOLUME CALCULATIONS
ATTACHMENT F	LONG TERM POLLUTION PREVENTION PLAN
ATTACHMENT G	ILLICIT DISCHARGE STATEMENT
ATTACHMENT H	POST-CONSTRUCTION STORMWATER INSPECTION & MAINTENANCE PLAN
ATTACHMENT I	TSS REMOVAL CALCULATIONS
ATTACHMENT J	HYDRAULIC CONDUCTIVITY AND DRAWDOWN CALCULATION
ATTACHMENT K	RIP RAP SIZING CALCULATION FOR PIPE OUTLETS
ATTACHMENT L	GEOTECHNICAL REPORT

LIST OF FIGURES

Figure No.	Title	Page No.
1	SITE LOCATION MAP	3

STORMWATER MANAGEMENT REPORT
AGAWAM ENERGY CENTER
AGAWAM, MASSACHUSETTS

1.0 INTRODUCTION

This Stormwater Management Report was prepared by Sevee & Maher Engineers, Inc. (SME) to assess stormwater management for the construction of the proposed Agawam Energy Center project in Agawam, Massachusetts.

The Applicant proposes to develop an approximately 250-megawatt (MW), 4-megawatt hour (MWh), battery energy storage system (BESS) on the 17.2-acre site located at 769 Silver Street. The project will consist of battery containers, transformers, inverters, equipment pads, and associated infrastructure, including an interconnection substation. The proposed BESS site will be accessed from Silver Street. The battery containers will be surrounded by a combination of 18-foot-high solid wall, and 8-foot-high chain link and wood fencing that will act as physical, visual, and sound barriers as detailed in the attached plans. The BESS equipment will connect to the existing South Agawam Switching Station via the project's own substation and short transmission line.

The stormwater design is based on the water quality and quantity objectives identified in the stormwater management requirements pursuant to Chapter 175, §175-35 of the Code of the Town of Agawam and the Massachusetts Stormwater Management Standards.

The project will be located completely outside of all Areas Subject to Protection under M.G.L. c. 131, Section 40 listed in 310 CMR 10.02(1), as well as all buffer zones associated with Areas Subject to Protection. During construction, various Best Management Practices (BMPs) including erosion controls will be utilized to prevent impacts to adjacent resource areas and buffer zones.

2.0 PROJECT DESCRIPTION

The project property is an approximately 17-acre parcel on Silver Street in Agawam, Massachusetts. The property is zoned Industrial and is currently used for commercial/industrial purposes. The majority of the site being used for the project is currently developed with gravel and paved access roads, several buildings and other unvegetated gravel areas used or surface storage of equipment and materials. The Applicant plans to redevelop the site as an energy center with the addition of Battery Energy Storage Systems (BESS).

In accordance with the Chapter 175-35 Stormwater Management Plan, previously developed sites must meet the stormwater management standards to the maximum extent practicable. However, if it is not practicable to meet all the standards, the new system must be designed to improve existing conditions.

The addition of a washed crushed stone surface over much of the site, additional plantings and vegetation at the site entrance and around the perimeter of the site and the addition of grassed swale, sediment forebay and stormwater detention pond, the proposed conditions will improve upon existing conditions.

The site was identified for its gentle land slope, prior commercial/industrial use, as well as the commercial/industrial use of neighboring properties, as well as its proximity to the adjacent Eversource substation where it will make its electrical interconnection. The location of the project is shown in Figure 1, Site Location Map. More details on the project site are shown in the engineering drawing set submitted with this report.

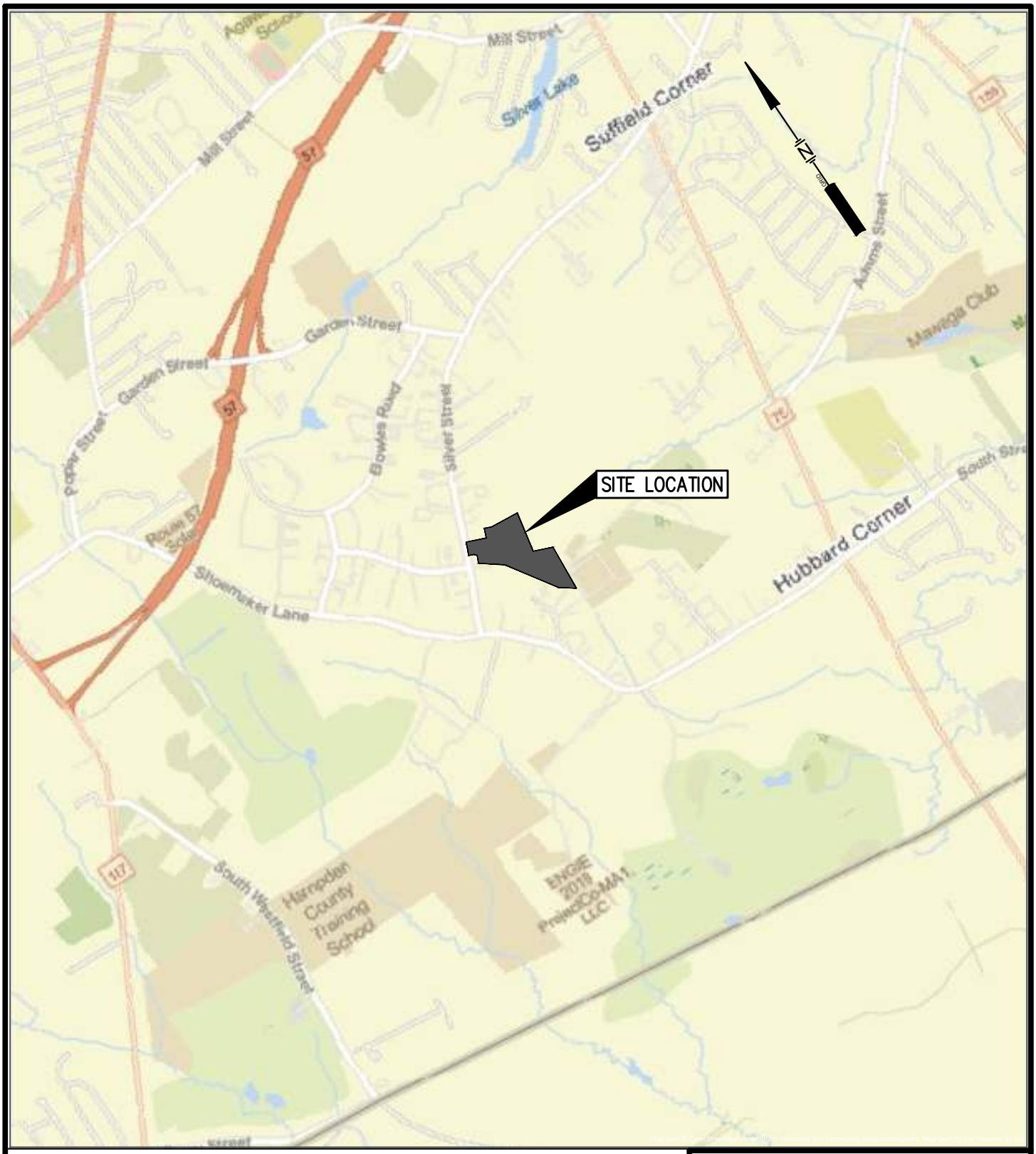
As noted above, most of the site has been previously developed and disturbed for previous commercial use. Much of the site consists of uncontrolled, exposed gravel surfaces. To prepare the site, several of the existing buildings will be removed and the site will be graded to provide a uniform grade across the site. The proposed grading plan was prepared to generally maintain existing drainage patterns and avoid large cuts and fills.

The finished surface within the BESS yard will include a combination of compacted gravel access roads and a crushed "topping stone" surface. The topping stone used in the BESS yard and the proposed substation is a washed crushed stone used in the electrical grounding system for the facility for high electrical resistivity but also provides significant benefits in stormwater management. This crushed stone surface performs differently than most common construction practices. The stone which is washed to remove fines and contains large void ratios provides permeability plus storage.

Any disturbed areas or existing unvegetated areas on the perimeter of the site that are not required for roads, or the BESS units will be restored with loam and seed and native plantings.

The area at the front of the site, immediately off Silver Street, will include the Operations and Maintenance building and the associated entrance and parking area. The Operations and Maintenance building will utilize one of the existing buildings on site. This area will include driveway and parking improvements and landscaping improvements including a visual screening berm and plantings.

As noted above, the site will be graded to maintain existing drainage patterns. Most of the site will drain to the east towards the wetlands. In the proposed condition a grass swale, forebay and detention pond will be added to provide additional treatment of stormwater and management of peak flows. The site drainage and stormwater management is discussed in more detail below.



0 1000 2000 4000

1 INCH = 2000 FEET

FIGURE 1
SITE LOCATION MAP
LONGROAD ENERGY
AGAWAM ENERGY CENTER
AGAWAM, MASSACHUSETTS

SME
SEVEE & MAHER ENGINEERS

DWG: SITE LOCATION PLAN LMN: NONE CTB: SME-STD.CTB JOB#: 250579.01 REV: 03-10-2026

3.0 SITE WATERSHED

On-site soils were identified using the Natural Resources Conservation Service (NRCS) soil information for Hampden County, Massachusetts, Central Part. A copy of the custom Soil Resource Report is included in Attachment A of this report. The report includes a soil map for the project area. Soil mapping information is also included in the watershed plans.

The soil within the area of work consists of Merrimac fine sandy loam (254A, 254B, 254C and 254D) and Amostown fine sandy loam (258B). Soil classifications for 254A, 254B, 254C and 254D are Hydrological Soil Group (HSG) A and were modeled as HSG A for purposes of water quantity calculations. Soil Classification 258B is HSG C/D and was modeled as HSG D for purposes of water quantity calculations.

Additional soils information is provided in a geotechnical report, which is included as Attachment L.

Existing Conditions

The ground surface on most of the property generally slopes towards the east in the direction of wetlands, with grades in the developed area ranging from less than 1 percent to 5 percent. The site is characterized by a low wetland area on the eastern side of the site, extending beyond the property line. The majority of the parcel is developed or previously disturbed except for the vegetated areas around the wetland areas which make up approximately 2 acres of the 17-acre site. Stormwater flows currently travel uncontrolled across the primarily unvegetated surface towards the wetlands.

Under existing conditions, stormwater runoff from most of the project area comes from Subcatchment 1 (SC-1). Stormwater generally flows from the higher areas to the wetlands, identified as Analysis Point (AP-1) for this report. The far eastern side of the site (east of the wetlands), still within the SC-1 drainage area, flows west towards the same AP-1 wetland area. This area on the east side of SC-1 is largely gravel and appears to be used for access and material storage.

There is a small drainage subarea at the front of the site that is modeled as Subcatchment 2 (SC-2), where flows from the existing driveway and parking area flows to Silver Street, which is identified as Analysis Point (AP-2) for this report.

There is a third small drainage area in the southwest corner of the site, that flows to the adjacent property to the south. The subarea is made of largely of existing buildings and driveways, with some lawn area. This is modeled as Subcatchment 3 (SC-3) and identified as Analysis Point (AP-3) at the property line.

Proposed Conditions

Under the proposed conditions, the overall site drainage patterns will be similar to existing conditions. The analysis points will be the same as those described in the existing conditions analysis to allow for easy comparison of pre- and post-development peak flows. The site will be graded to provide a more uniform

slope, approximately 1 to 1.5% over most of the site but still following similar drainage patterns. Under proposed conditions, all stormwater from the BESS yard (SC-1A and SC-1B) will be routed to a proposed sediment forebay and detention pond located on the east side of the site between the developed area and the wetlands. The pond and forebay are both designed with storage below the lowest outlet invert to provide space for storage of the "first flush" before any discharge. A vegetated drainage swale will be constructed along eastern edge of the BESS yard to intercept surface flow from a large portion of the site and direct it to the pond while providing additional opportunity for removal of sediment.

The eastern portion of the site that contains the proposed substation (SC-1C) will also maintain existing stormwater flow patterns with stormwater draining east to west towards the wetlands. The substation area will be graded to a consistent 1% slope. There is no stormwater treatment proposed in this area. The addition of the substation yard and its "topping stone" surface represent an overall improvement in this area, compared to the existing gravel an poorly vegetated surface that currently existing in the area. The topping stone provides some initial storage in the voids, helping to reduce peak flows and filter stormwater. This area is also extremely flat and the addition of additional ponds or treatment structures that require gravity would require significant cut/fill and additional disturbance of currently undisturbed areas and areas within 100 feet of the wetlands.

The drainage areas at the front of the site (SC-2 and SC-3) that flow to Silver Street and the adjacent parcels have changed slightly in size and shape but overall, there will be no net increase in peak flows to these areas and improvements partially due to changes in changes in the vegetated and landscaped areas.

Stormwater management plans identify the on-site drainage patterns before and after development (see Drawings D-100 and D-101). These drawings are included as Attachment B for reference.

4.0 STORMWATER MANAGEMENT STANDARDS

4.1 Standard 1: No New Untreated Discharges

The proposed project consists of new point source discharge locations associated with the proposed detention basin. The outlet from the proposed stormwater basin will include two level spreaders to disperse stormwater flows from broad crested overflow weir, and a single discharge pipe. Both the broad crested weir and the drainage pipe outlet will include rip rap protection to disperse stormwater at acceptable velocities and minimize erosive forces at the outfall. and erosive forces. Construction details of the level spreader, overflow structure and pipe inlets and outlets are included in the engineering plan set provided for the project.

All other areas not being directed to the pond will continue to flow overland, similar to existing conditions.

4.2 Standard 2: Peak Rate Attenuation

Stormwater peak flow rates were modeled for the 2, 10-, 25- and 100-year/24-hour storm events with Type III Soil Conservation Service rainfall distribution, using HydroCAD Version 10.20. HydroCAD is based on methodologies developed by the U.S. Department of Agriculture Soil Conservation Service (SCS), namely TR-55 and TR-20, to calculate runoff rates and volumes based on descriptions of land use, ground characteristics, and size, in combination with other hydraulic and hydrologic calculations.

Rainfall depths for each of storms identified above were obtained from NOAA Atlas 14 Volume 10 (Perica et al., 2015; Rev. 2019) and accessed via the NOAA Precipitation Frequency Data Server.

The time of concentration (Tc) for each subcatchment was calculated in HydroCAD using a combination of sheet flow and shallow concentrated flow. Sheet flow uses roughness coefficients (Manning's n) and watercourse slope to calculate travel time of stormwater runoff for each subcatchment. The site was modeled using a maximum 100 foot of sheet flow. The shallow concentrated flow method was used to determine the velocity factor along the flow path of the runoff and thereby derive a travel time. The time of concentration of each subcatchment is the combination of these travel times. A minimum time of concentration of 6 minutes was used for all subcatchments, for both existing and proposed conditions.

Site drainage from the proposed development will generally follow the pre-development flow patterns.

As discussed in Section 3 above, the site was divided into the following subcatchments and analysis points. The subcatchments are shown on the Figures included in Attachment B.

Existing Conditions
Analysis Point 1 (AP-1) – Wetlands on east side of the site.
Subcatchment (SC-1) - Represents most of the site, including area to the east and west of the wetland that represents AP-1. This includes some area beyond the property line that flows onto the site.

Analysis Point 2 (AP-2) – Area along Silver Street
Subcatchment 2 (SC-2) – This area is largely made of the "front yard" of the property, including driveways and parking areas.

Analysis Point 3 (AP-3) - Southwest corner of the property.
Subcatchment 3 (SC-3) – This area is made up largely of adjacent buildings and driveway.

Proposed Conditions
Analysis Point 1 (AP-1) – Wetlands on east side of the site.
SC-1A – Northern portion of the BESS yard and a portion of the main access.

SC-1B – Southern portion of the BESS yard and a portion of the Operations and Maintenance Building and entrance area.
SC-1C – The northern and eastern perimeter areas of the site, including the wetlands and the substation area.

Analysis Point 2 (AP-2) – Area along Silver Street
SC-2 – The front of the property including landscaped and parking areas that flow to Silver Street.

Analysis Point 3 (AP-3) – Southern Side of the property.
SC-3 – Area on the southwest corner of the property that includes existing buildings and driveways and a small portion of the BESS yard.
SC-1D – A small area on the southeast corner. Part of SC-1 but represents a small area that will follow to the south due to the addition of a screening berm. Overall no increase in flow to the south.

A comparison of peak flows to the three analysis points is summarized in Table 1. As shown in Table 1, our model indicates that there will be no increase in peak flow rates to any of the three analysis points under the proposed conditions for the 2-year storm, 10-year storm, 25-year and 100-year storm. The proposed detention pond before AP-1 is adequately sized to handle the stormwater flows and control the discharge rate. There is a nominal increase (0.09 cfs) in at AP-1 during the 2-year storm which is within the numerical resolution and inherent uncertainty of the hydrologic model not considered to be hydrologically significant. There is a decrease in flows for all other storm events.

SC-2 contributing to AP-2 will remain largely the same in post-development conditions with updated landscaping and plantings between the project and Silver Street. The model yields a nominal increase towards Silver Street.

SC-3 will be decreased in size in the post-development condition, with more drainage directed to the east. As a result, AP-3 will see a decrease in flows and there will be no risk of an increase in flows to adjacent properties.

TABLE 1
STORMWATER QUANTITY SUMMARY

	2-Year Storm		10-Year Storm		25-Year Storm		100-year Storm	
	Existing	**Proposed**	**Existing**	**Proposed**	**Existing**	**Proposed**	**Existing**	**Proposed**
Analysis Point 1 (cfs)	4.28	4.37	17.41	16.58	27.74	24.89	45.42	40.40
Analysis Point 2 (cfs)	<1	<1	1.29	1.54	2.12	2.33	3.57	3.83
Analysis Point 3 (cfs)	4.15	1.22	7.86	3.33	10.2	5.09	13.78	8.09

Copies of the calculations for the pre-development runoff are in Attachment C and post-development runoff is provided in Attachment D.

4.3 Standard 3: Recharge

The soil within the area of work consists of Merrimac fine sandy loam (254A, 254B, 254C and 254D) and Amostown fine sandy loam (258B). Soil classifications for 254A, 254B, 254C and 254D are Hydrological Soil Group (HSG) A and were modeled as HSG A for purposes of water quantity calculations. Soil Classification 258B is HSG C/D and was modeled as HSG D for purposes of water quantity calculations.

For A-type soils, the Stormwater Management Guidelines require that a recharge device be provided with capacity equal to 0.60-inches the impervious area. To evaluate this re-development project we looked at each subarea to confirm if there was an increase in the impervious area, to calculate the recharge volume for new impervious area.

For SC-1, a large portion of the site in proposed conditions, including the BESS area and the substation yard, will be covered with a 6-inch layer of the crushed “topping stone”, as part of the electrical grounding system. Although these areas are “stone” or “gravel” they do not behave the same as the compacted gravel surfaces that currently exist on the site and are proposed for the access roads at the site. The washed crushed stone mix overlaying 18-inches of gravel fill will provide improved permeability as well as storage in this stone, given its high void ratio. For this reason, this material was not considered impervious for the purposes of the recharge calculation. As a result, for SC-1 there is a net decrease in impervious area in the proposed conditions. In addition, the 6-inch layer of crushed stone with a void ratio of approximately 0.3, will provide 1.8 inches of initial storage in the stone. As a result, no recharge volume was calculated.

For SC-2 and SC-3 there was a reduction in impervious area in the proposed condition. As a result, no recharge volume was calculated.

4.4 Standard 4: Water Quality

The minimum required water quality treatment volume for the proposed development is one half inch of runoff times the impervious surface area. As discussed in 4.3 above, there is a net decrease in impervious area for the project when considering the characteristics of the topping stone. In addition, the topping stone also has the benefits of being a washed stone with little or no sediment load and also helps to trap sediment from other areas.

However, when determining a treatment volume for stormwater from SC-1A and SC-1B that will be flowing to the proposed detention based we included all paved and gravel areas, including the topping stone, to provide a conservative volume.

A calculation of the required treatment volume as well as a comparison of the treatment volume to the proposed volume provided below the lowest outlet from the pond is included in Attachment E. The storage below the lowest invert will provide additional opportunities for sediment removal and infiltration.

The topping stone, perimeter vegetated buffer strip and vegetated drainage swale will provide removal of sediment from stormwater flows along the path to the pond, providing pre-treatment.

The proposed detention basin and the vegetated swale along the east side of the BESS yard will provide an improvement in the quality of the stormwater runoff compared to the uncontrolled runoff from the large unvegetated gravel yard in the existing conditions.

Similar to the discussion in Section 4.3, no stormwater treatment was provided for SC-2 and SC-3 due to the net decrease in impervious surface in these areas.

As required by the Stormwater Management Standards, a Long-Term Pollution Prevention Plan is provided in Attachment F. In short, the plan identifies suitable practices for source control and pollution prevention measures.

4.5 Standard 5: Land Uses with Higher Potential Pollutant Loads

The proposed facility is not considered a Land Use with Higher Potential Pollutant Loads. No exterior machinery, heavy equipment or fleet storage is proposed and projected daily vehicle traffic volumes are estimated to be very low. The precautions and procedures for maintenance of battery storage equipment will be outlined in the Operations and Maintenance Plan for the facility. Overall, the proposed site

improvements will result in a more controlled environment with a lower sediment load. Therefore, Standard 5 does not apply to this project.

4.6 Standard 6: Critical Areas

The project is not located within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges are not located near or to any other critical area requiring the use of the specific source control and pollution prevention measures.

4.7 Standard 7: Redevelopment and Other Projects Subject to the Standards only to the Maximum Extent Practicable

The site was historically used as a lumber and yard for storage of various materials. Most of the site is a combination of various impervious and unvegetated surfaces, including a paved entrance driveway and parking near Silver Street, compacted gravel driveways and storage yard and several buildings. The total impervious area under current conditions for the area analyzed, which includes some off-site areas is approximately 15 acres.

Under the proposed conditions, there will be additional plantings and landscaped areas at the entrance and on the perimeter of the site. Gravel access roads to provide access to equipment and substation will be more defined and existing unvegetated areas that are not proposed for development will be revegetated. Several existing buildings will be removed. The area around the battery storage units and within the substation yard will be finished with a washed "Topping Stone" as part of the grounding system for the equipment. Due to the nature of the rough surface and high void ratio of the topping stone will provide initial storage and improve infiltration of stormwater and initial treatment compared to the existing gravel surface. The total impervious area under proposed conditions (gravel roads, buildings, equipment foundations) not counting the topping stone is approximately 7 acres.

The change in surface materials and the addition of the grassed swale, sediment forebay, detention basin, and increased landscaping in the proposed redevelopment will result in improved stormwater quality.

4.8 Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control

In accordance with the Massachusetts Stormwater Management Standards and the NPDES General Permit, a SWPPP will be prepared prior to construction. The erosion control notes and details included in the engineering plan set submitted for the project will cover most of the SWPPP requirements. A copy of the SWPPP will be provided to the Town prior to construction.

4.9 Standard 9: Operation and Maintenance Plan

An Operations & Maintenance plan has been prepared for the project and submitted as part of the Site Plan Approval Application. In addition, a Post-Construction Stormwater Inspection & Maintenance Plan is included in Attachment H.

4.10 Standard 10: Illicit Discharges

The submitted Long-Term Stormwater Pollution Prevention Plan (Attachment F) specifies measures to prevent illicit discharges from entering the stormwater management system. Source control and response plans are also specified to prevent illicit discharges from being conveyed through the stormwater management system.

Consistent with the Massachusetts Stormwater Handbook, a signed Illicit Discharge Compliance Statement prior to discharging stormwater to the post-construction stormwater BMP's. A draft copy of the Illicit Discharge Statement is provided in Attachment G.

5.0 CONCLUSION

The stormwater management for the Agawam Energy Center was designed in accordance with Massachusetts Stormwater Standards and Town of Agawam requirements. Stormwater runoff will be controlled through the addition of stormwater detention pond and the stabilization of existing gravel and unvegetated areas with new vegetative cover and native plantings and a "topping stone" surface. As a result, we do not anticipate any adverse impacts anticipated on downstream drainage or abutting properties.

ATTACHMENT A

NRCS SOIL SURVEY

SME
SEVEE & MAHER
ENGINEERS

United States Department of Agriculture

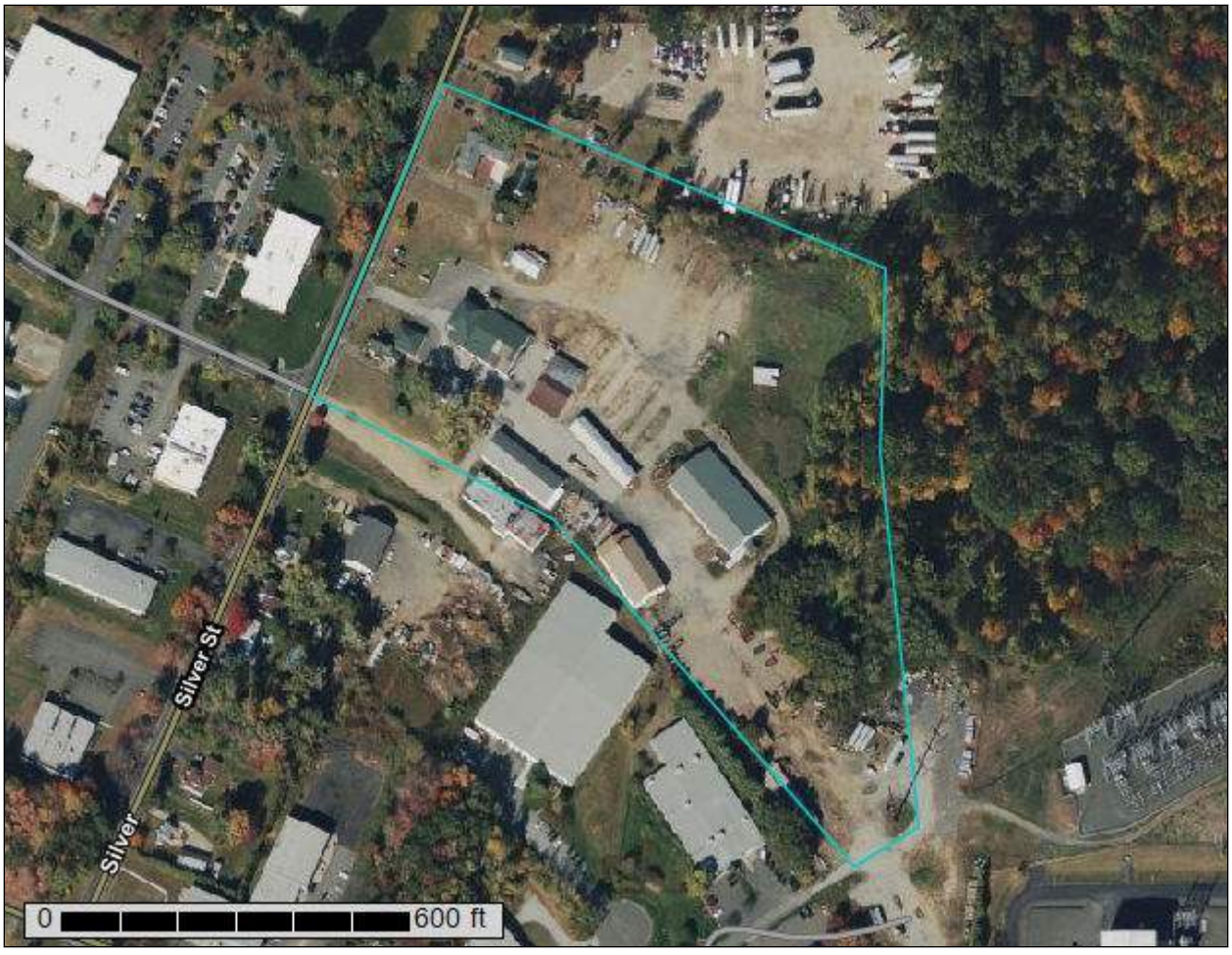
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Hampden County, Massachusetts, Central Part

Silver Street



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....12
Map Unit Descriptions.....12
Hampden County, Massachusetts, Central Part.....14
254A—Merrimac fine sandy loam, 0 to 3 percent slopes.....14
254B—Merrimac fine sandy loam, 3 to 8 percent slopes.....15
254C—Merrimac fine sandy loam, 8 to 15 percent slopes.....17
258B—Amostown fine sandy loam, 0 to 6 percent slopes.....19
References.....21

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,480 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hampden County, Massachusetts, Central Part
Survey Area Data: Version 19, Sep 5, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	9.8	59.5%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	5.9	35.8%
254C	Merrimac fine sandy loam, 8 to 15 percent slopes	0.4	2.6%
258B	Amostown fine sandy loam, 0 to 6 percent slopes	0.4	2.2%
Totals for Area of Interest		**16.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Hampden County, Massachusetts, Central Part

254A—Merrimac fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyqr
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash

Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Walpole

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqs
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Walpole

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

254C—Merrimac fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2tyqt
Elevation: 0 to 1,030 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Eskers, outwash plains, moraines, kames, outwash terraces
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash plains, dunes, deltas, outwash terraces

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

258B—Amostown fine sandy loam, 0 to 6 percent slopes

Map Unit Setting

National map unit symbol: 99ms
Elevation: 0 to 1,000 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Amostown and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Amostown

Setting

Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable sandy glaciofluvial deposits over hard silty glaciolacustrine deposits

Typical profile

H1 - 0 to 10 inches: fine sandy loam
H2 - 10 to 32 inches: fine sandy loam
H3 - 32 to 60 inches: silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F145XY005MA - Moist Lake Plain
Hydric soil rating: No

Minor Components

Pollux

Percent of map unit: 10 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Enosburg

Percent of map unit: 10 percent
Landform: Terraces, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

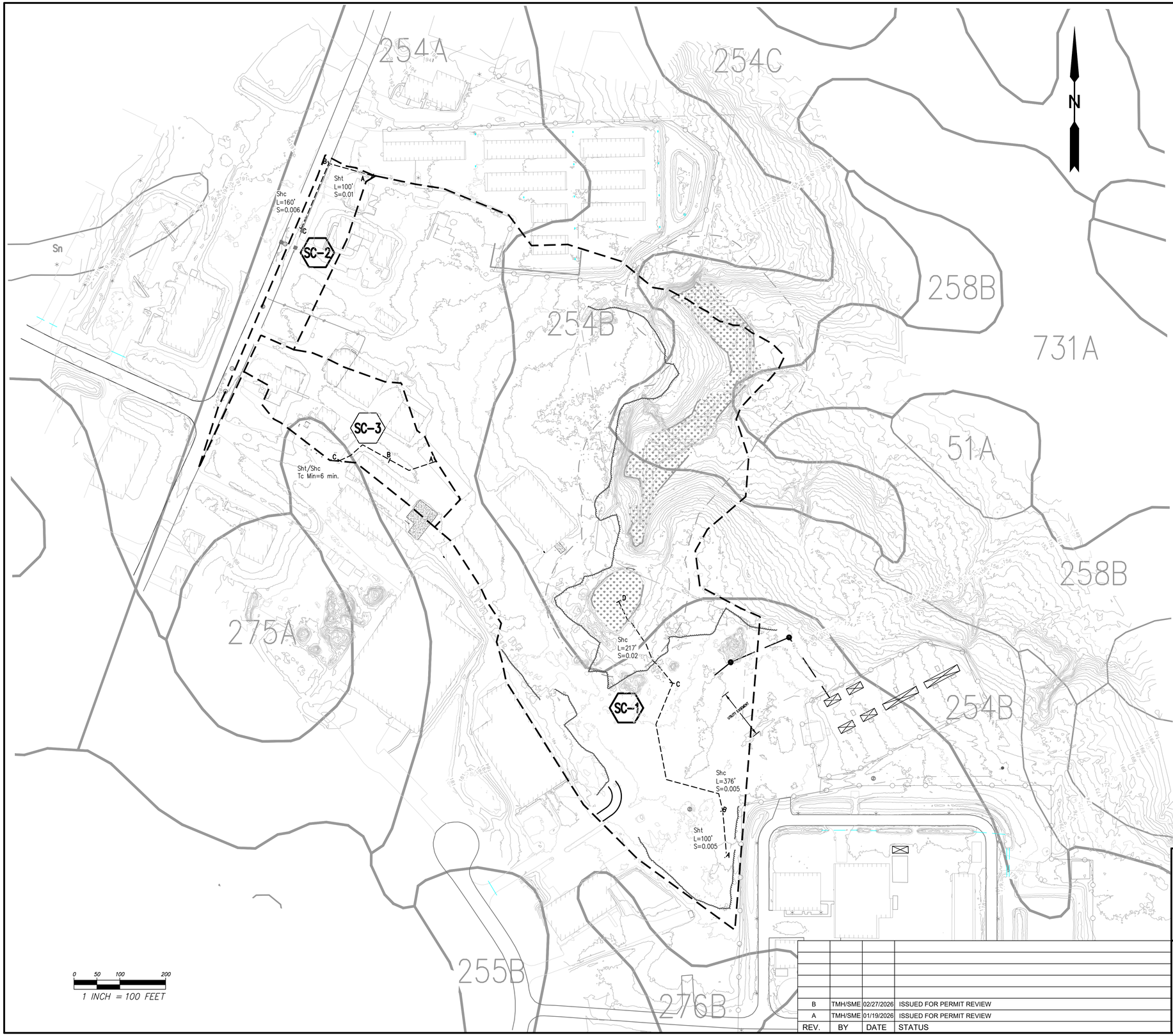
United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

ATTACHMENT B

STORMWATER DRAINAGE FIGURES

SME
SEVEE & MAHER
ENGINEERS



LEGEND

- PROPERTY LINE
- 100' PROPERTY SETBACK
- LIMIT OF WETLANDS
- 100' WETLAND BUFFER
- UTILITY EASEMENT
- EXISTING 1-FOOT CONTOUR (181)
- EXISTING 5-FT CONTOUR (180)
- EXISTING TREE LINE
- LIMIT OF WORK

NOTES

1. EXISTING CONDITIONS SURVEY CONDUCTED BY MILLSTONE LLC.

STORMWATER MANAGEMENT LEGEND

- SC-1 — SUBCATCHMENT DESIGNATION
- SUBCATCHMENT BOUNDARY
- A B C — TIME OF CONCENTRATION SEGMENT DESIGNATION / TIME OF CONCENTRATION PATH
- Sht L=50' S=0.005 — TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE.
- Sht — SHEET FLOW
- Shc — SHALLOW CONCENTRATED FLOW
- Cf — CHANNEL FLOW
- P9 — POND/STRUCTURE DESIGNATION (HYDROCAD)
- SOIL TYPE BOUNDARY
- Sn — SOIL TYPE DESIGNATION

REV.	BY	DATE	STATUS
B	TMH/SME	02/27/2026	ISSUED FOR PERMIT REVIEW
A	TMH/SME	01/19/2026	ISSUED FOR PERMIT REVIEW

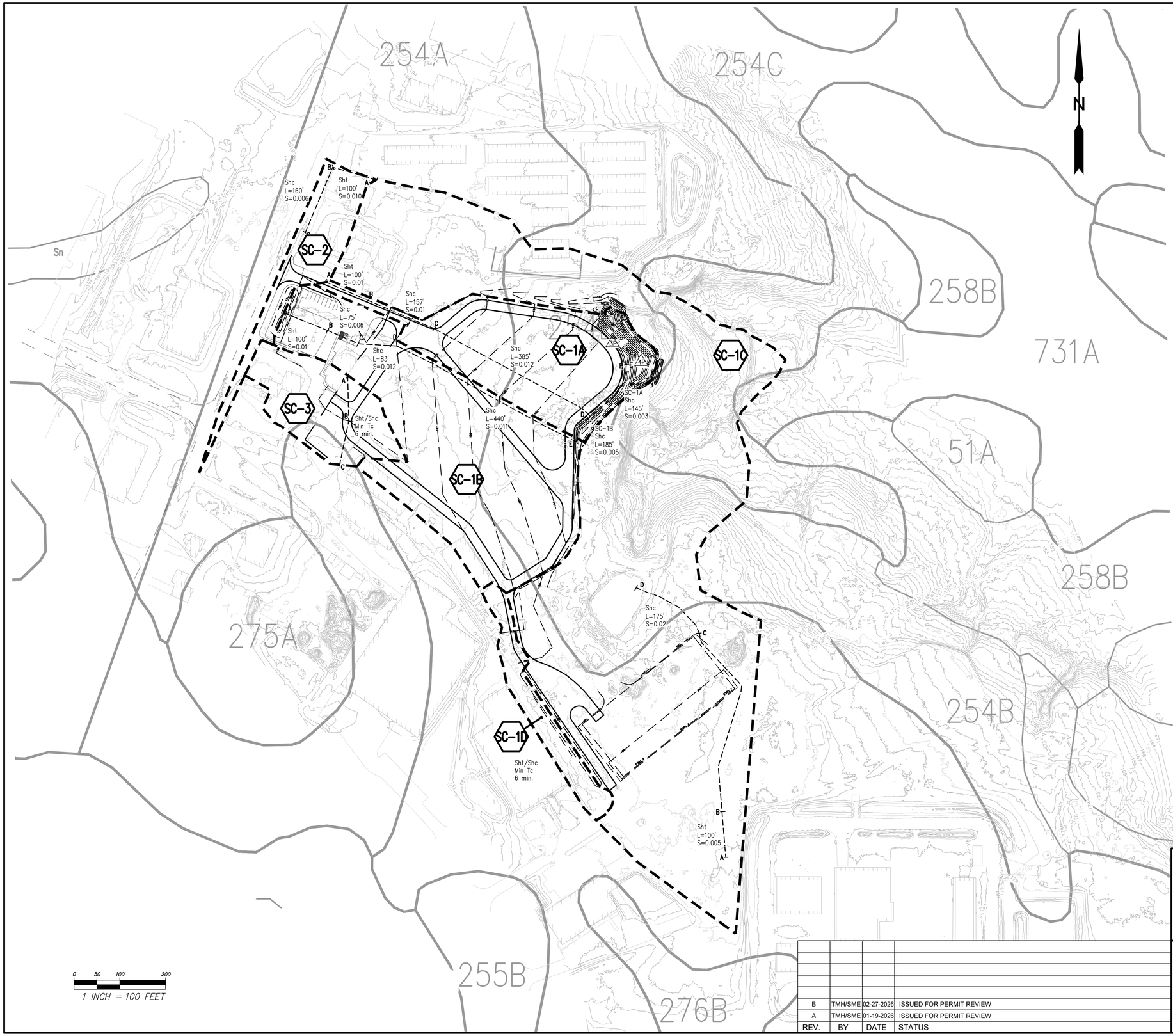
LONGROAD ENERGY
AGAWAM ENERGY CENTER
AGAWAM, MA

STORMWATER MANAGEMENT PLAN
PRE-DEVELOPMENT CONDITIONS

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	11/14/2025
SCALE:	1"=100'

JOB NO. 250741 DWG FILE AW1-D-100 REV B



LEGEND

- PROPERTY LINE
- 100' PROPERTY SETBACK
- LIMIT OF WETLANDS
- 100' WETLAND BUFFER
- UTILITY EASEMENT
- EXISTING 1-FOOT CONTOUR (181)
- EXISTING 5-FT CONTOUR (180)
- EXISTING TREE LINE
- LIMIT OF WORK

NOTES

1. EXISTING CONDITIONS SURVEY CONDUCTED BY MILLSTONE LLC.

STORMWATER MANAGEMENT LEGEND

- SC-2 — SUBCATCHMENT DESIGNATION
- SUBCATCHMENT BOUNDARY
- A B C — TIME OF CONCENTRATION SEGMENT DESIGNATION / TIME OF CONCENTRATION PATH
- Sht L=50' S=0.005 — TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE.
- SlSht — SHEET FLOW
- SlShc — SHALLOW CONCENTRATED FLOW
- ClCf — CHANNEL FLOW
- P9 — POND/STRUCTURE DESIGNATION (HYDROCAD)
- SOIL TYPE BOUNDARY
- Sn — SOIL TYPE DESIGNATION

REV.	BY	DATE	STATUS
B	TMH/SME	02-27-2026	ISSUED FOR PERMIT REVIEW
A	TMH/SME	01-19-2026	ISSUED FOR PERMIT REVIEW

LONGROAD ENERGY
AGAWAM ENERGY CENTER
AGAWAM, MA

STORMWATER MANAGEMENT PLAN
POST DEVELOPMENT CONDITIONS

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

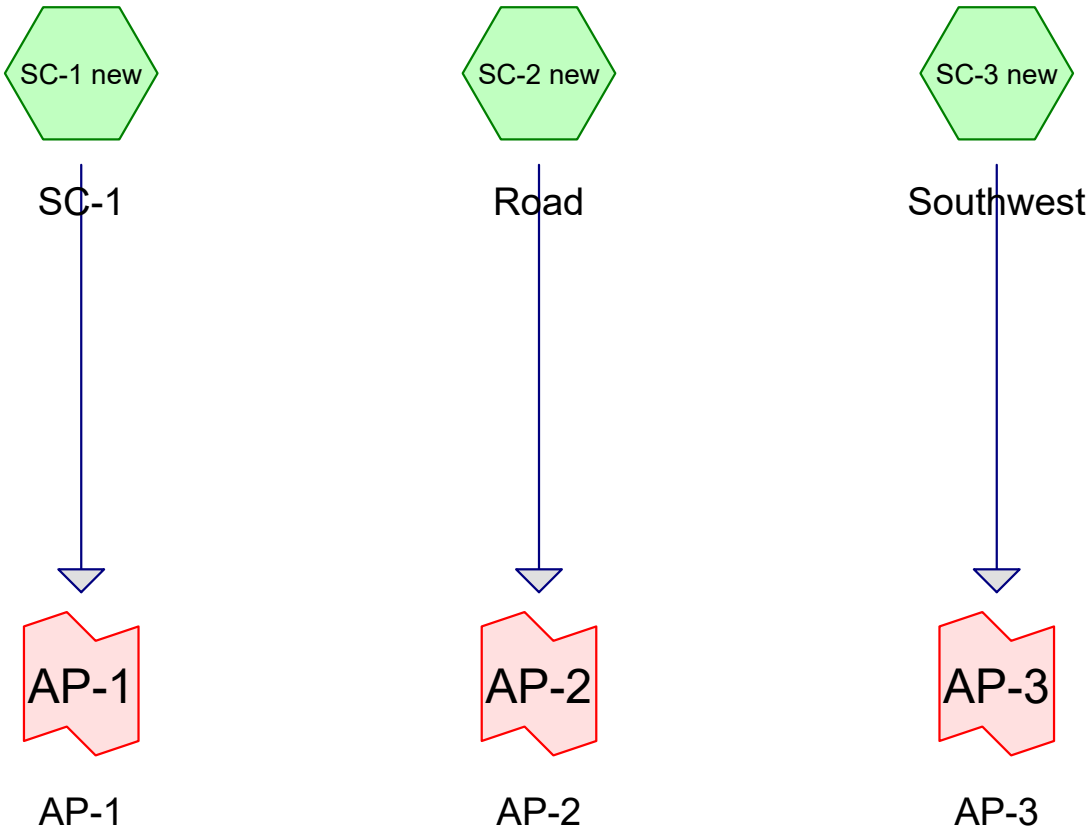
DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	11/14/2025
SCALE:	1"=100'

JOB NO. 250741 DWG FILE AW1-D-101 REV B

ATTACHMENT C

PRE-DEVELOPMENT HYDROCAD CALCULATIONS

SME
SEVEE & MAHER
ENGINEERS



Subcat Reach Pond Link

Routing Diagram for Pre-Conditions - 02-27-27
Prepared by Sevee & Maher Engineers, Printed 3/1/2026
HydroCAD® 10.20-7a s/n 01260 © 2025 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.537	96	Gravel surface, HSG A (SC-1 new)
7.211	39	Pasture/grassland/range, Good, HSG A (SC-1 new, SC-2 new, SC-3 new)
0.145	80	Pasture/grassland/range, Good, HSG D (SC-3 new)
1.535	98	Paved parking, HSG A (SC-1 new, SC-2 new, SC-3 new)
1.421	98	Roofs, HSG A (SC-1 new, SC-2 new, SC-3 new)
4.878	30	Woods, Good, HSG A (SC-1 new)
22.728	**64**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
22.584	HSG A	SC-1 new, SC-2 new, SC-3 new
0.000	HSG B	
0.000	HSG C	
0.145	HSG D	SC-3 new
0.000	Other	
22.728		**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1 new: SC-1 Runoff Area=858,864 sf 5.79% Impervious Runoff Depth>0.42"
Flow Length=693' Tc=35.4 min CN=62 Runoff=4.26 cfs 0.693 af

Subcatchment SC-2 new: Road Runoff Area=49,610 sf 35.64% Impervious Runoff Depth>0.36"
Flow Length=260' Tc=14.6 min CN=60 Runoff=0.25 cfs 0.034 af

Subcatchment SC-3 new: Southwest Runoff Area=81,572 sf 75.20% Impervious Runoff Depth>1.81"
Tc=6.0 min CN=87 Runoff=4.15 cfs 0.282 af

Link AP-1: AP-1 Inflow=4.26 cfs 0.693 af
Primary=4.26 cfs 0.693 af

Link AP-2: AP-2 Inflow=0.25 cfs 0.034 af
Primary=0.25 cfs 0.034 af

Link AP-3: AP-3 Inflow=4.15 cfs 0.282 af
Primary=4.15 cfs 0.282 af

Total Runoff Area = 22.728 ac Runoff Volume = 1.010 af Average Runoff Depth = 0.53"
86.99% Pervious = 19.772 ac 13.01% Impervious = 2.956 ac

Summary for Subcatchment SC-1 new: SC-1

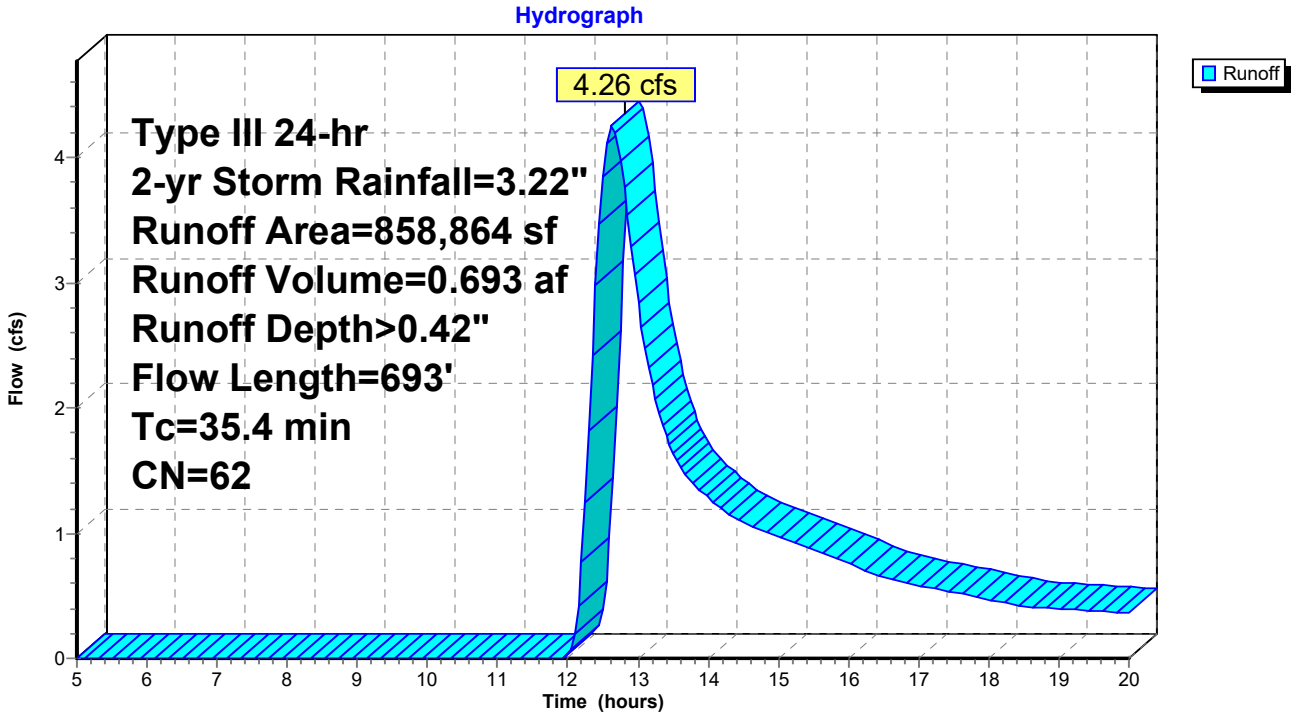
Runoff = 4.26 cfs @ 12.63 hrs, Volume= 0.693 af, Depth> 0.42"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

Area (sf)	CN	Description
268,264	39	Pasture/grassland/range, Good, HSG A
212,505	30	Woods, Good, HSG A
328,330	96	Gravel surface, HSG A
11,012	98	Paved parking, HSG A
38,753	98	Roofs, HSG A
858,864	62	Weighted Average
809,099		94.21% Pervious Area
49,765		5.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0050	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.22"
5.5	376	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.1	217	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.4	693	Total			

Subcatchment SC-1 new: SC-1



Summary for Subcatchment SC-2 new: Road

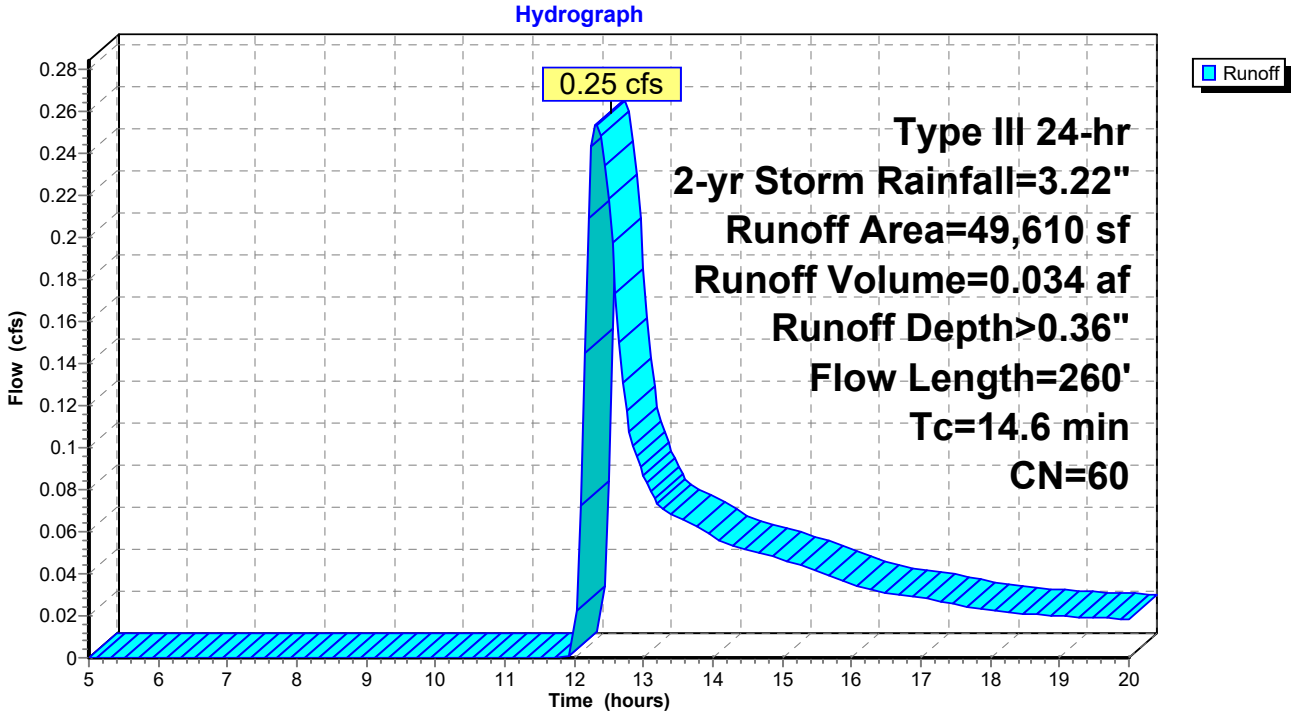
Runoff = 0.25 cfs @ 12.32 hrs, Volume= 0.034 af, Depth> 0.36"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

Area (sf)	CN	Description
14,423	98	Paved parking, HSG A
31,930	39	Pasture/grassland/range, Good, HSG A
3,257	98	Roofs, HSG A
49,610	60	Weighted Average
31,930		64.36% Pervious Area
17,680		35.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.7	160	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.6	260	Total			

Subcatchment SC-2 new: Road



Summary for Subcatchment SC-3 new: Southwest

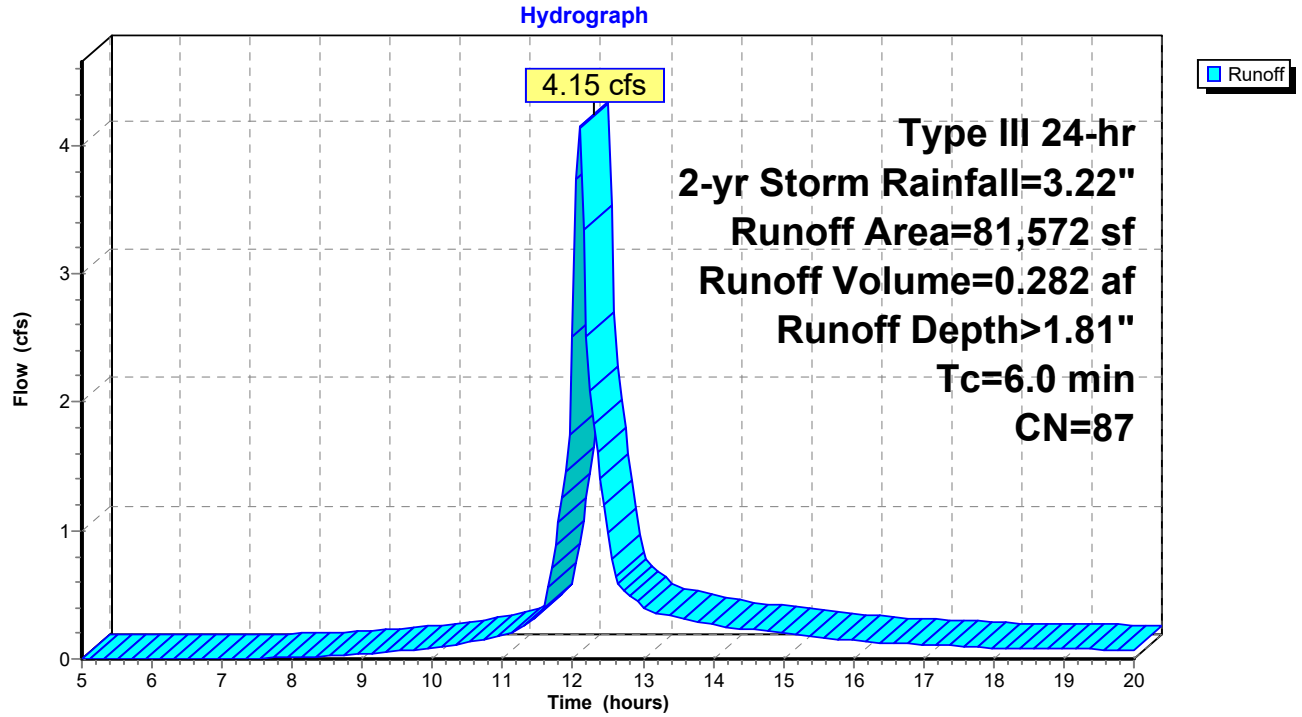
Runoff = 4.15 cfs @ 12.09 hrs, Volume= 0.282 af, Depth> 1.81"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

Area (sf)	CN	Description
41,439	98	Paved parking, HSG A
13,932	39	Pasture/grassland/range, Good, HSG A
6,300	80	Pasture/grassland/range, Good, HSG D
19,901	98	Roofs, HSG A
81,572	87	Weighted Average
20,232		24.80% Pervious Area
61,340		75.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3 new: Southwest

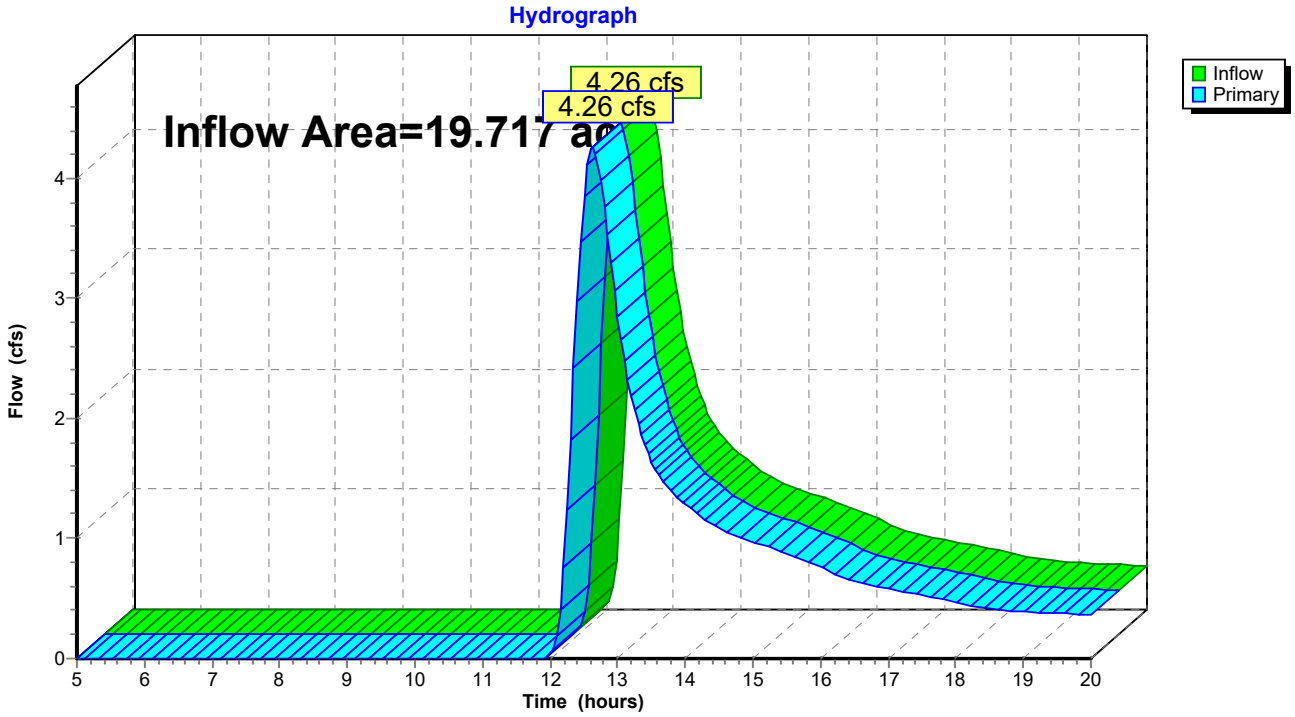


Summary for Link AP-1: AP-1

Inflow Area = 19.717 ac, 5.79% Impervious, Inflow Depth > 0.42" for 2-yr Storm event
Inflow = 4.26 cfs @ 12.63 hrs, Volume= 0.693 af
Primary = 4.26 cfs @ 12.63 hrs, Volume= 0.693 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-1: AP-1

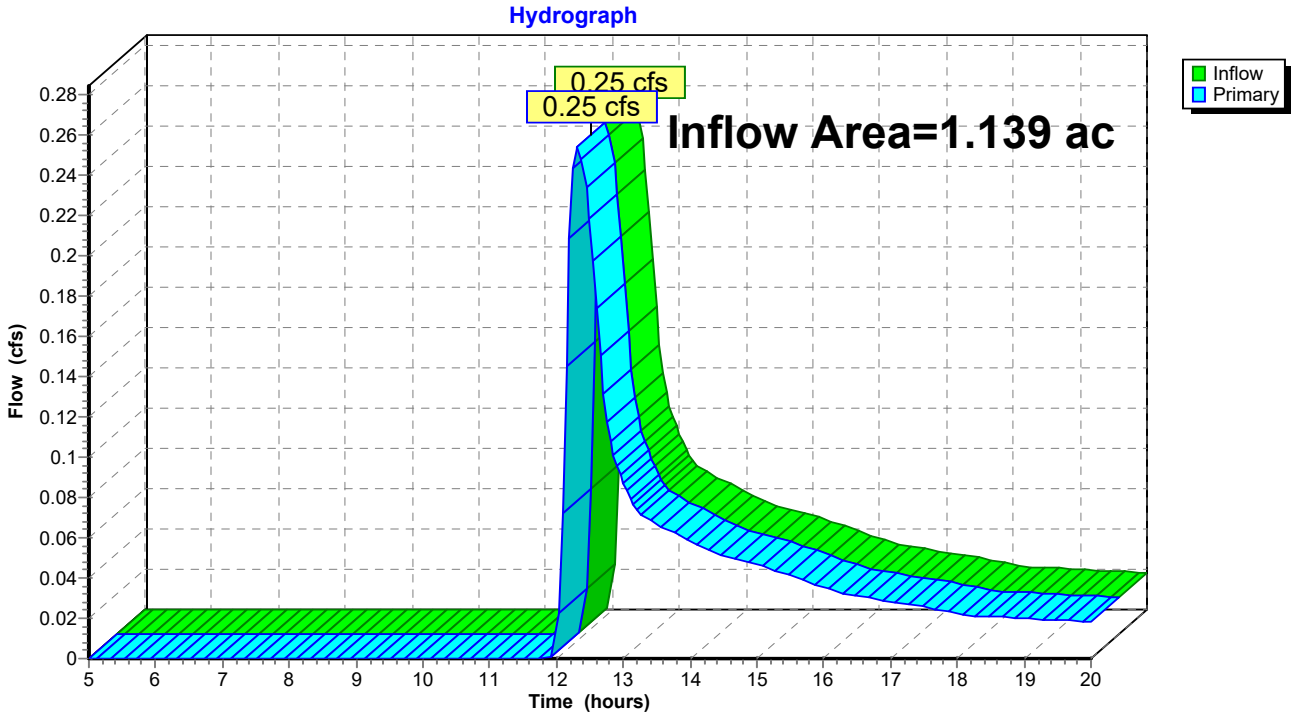


Summary for Link AP-2: AP-2

Inflow Area = 1.139 ac, 35.64% Impervious, Inflow Depth > 0.36" for 2-yr Storm event
Inflow = 0.25 cfs @ 12.32 hrs, Volume= 0.034 af
Primary = 0.25 cfs @ 12.32 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-2: AP-2

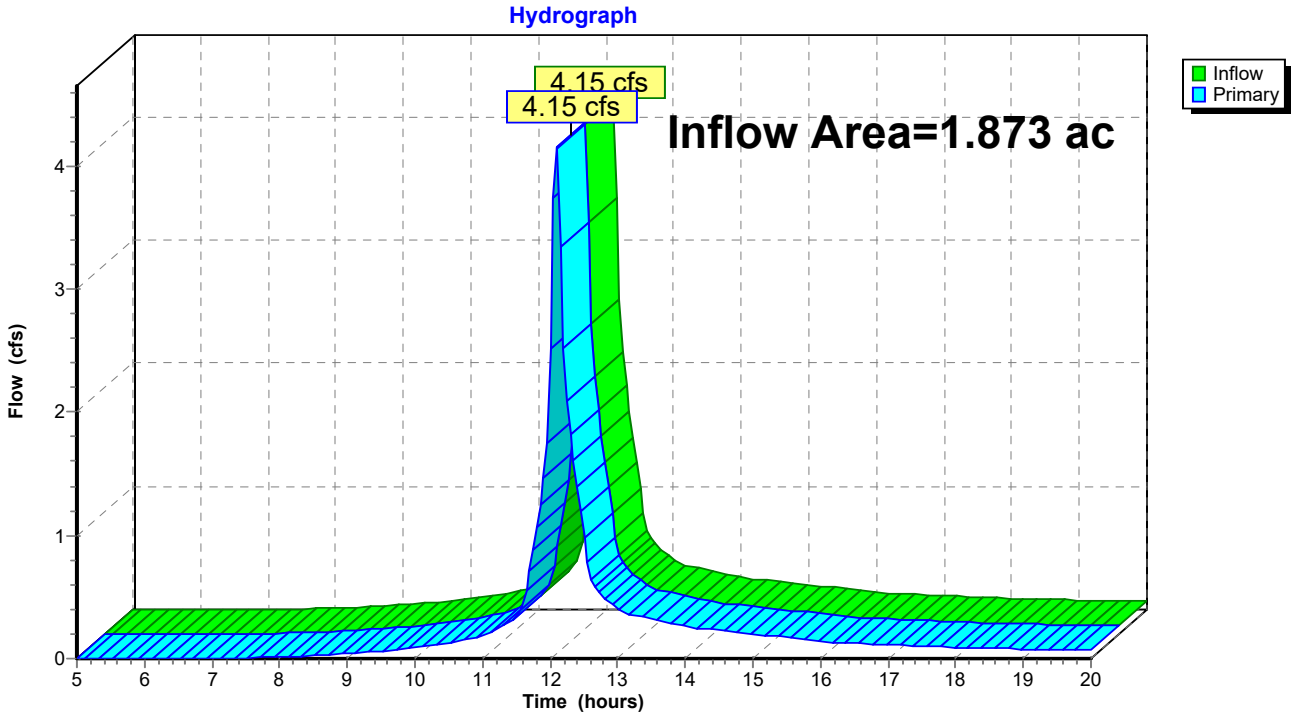


Summary for Link AP-3: AP-3

Inflow Area = 1.873 ac, 75.20% Impervious, Inflow Depth > 1.81" for 2-yr Storm event
Inflow = 4.15 cfs @ 12.09 hrs, Volume= 0.282 af
Primary = 4.15 cfs @ 12.09 hrs, Volume= 0.282 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-3: AP-3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1 new: SC-1 Runoff Area=858,864 sf 5.79% Impervious Runoff Depth>1.39"
Flow Length=693' Tc=35.4 min CN=62 Runoff=17.41 cfs 2.283 af

Subcatchment SC-2 new: Road Runoff Area=49,610 sf 35.64% Impervious Runoff Depth>1.27"
Flow Length=260' Tc=14.6 min CN=60 Runoff=1.29 cfs 0.120 af

Subcatchment SC-3 new: Southwest Runoff Area=81,572 sf 75.20% Impervious Runoff Depth>3.52"
Tc=6.0 min CN=87 Runoff=7.86 cfs 0.550 af

Link AP-1: AP-1 Inflow=17.41 cfs 2.283 af
Primary=17.41 cfs 2.283 af

Link AP-2: AP-2 Inflow=1.29 cfs 0.120 af
Primary=1.29 cfs 0.120 af

Link AP-3: AP-3 Inflow=7.86 cfs 0.550 af
Primary=7.86 cfs 0.550 af

Total Runoff Area = 22.728 ac Runoff Volume = 2.954 af Average Runoff Depth = 1.56"
86.99% Pervious = 19.772 ac 13.01% Impervious = 2.956 ac

Summary for Subcatchment SC-1 new: SC-1

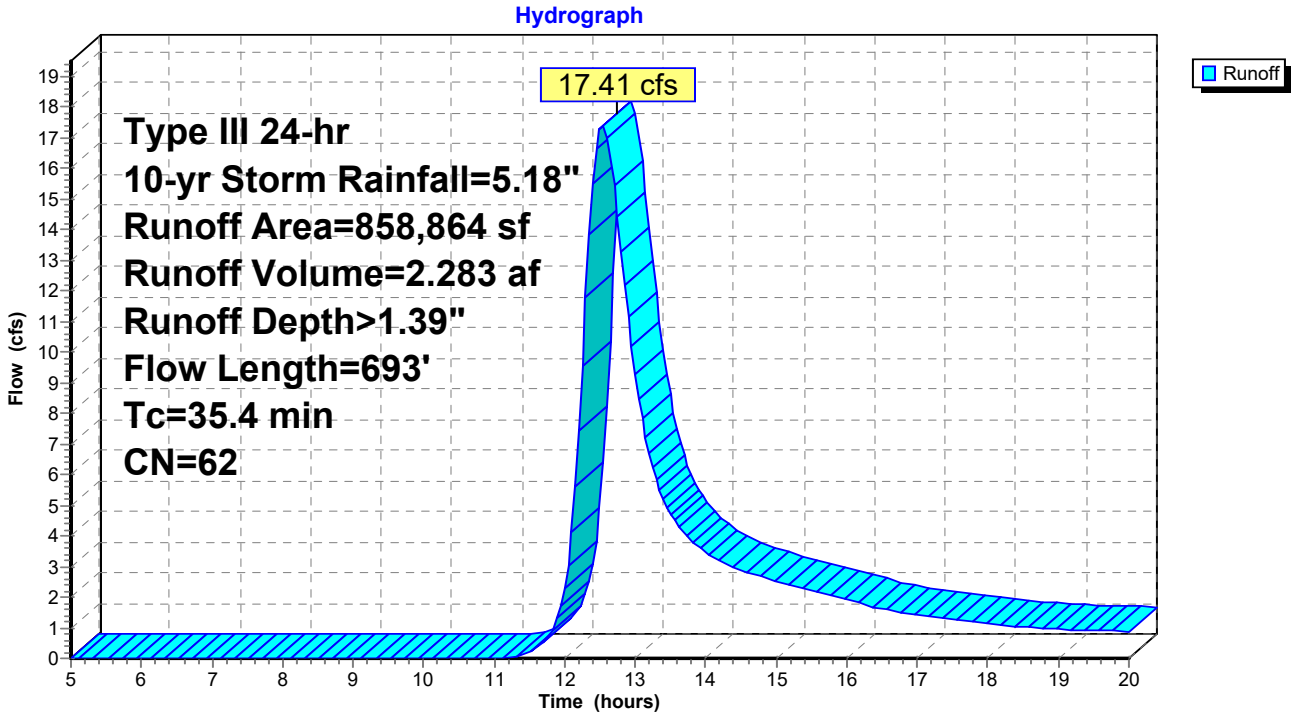
Runoff = 17.41 cfs @ 12.54 hrs, Volume= 2.283 af, Depth> 1.39"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

Area (sf)	CN	Description
268,264	39	Pasture/grassland/range, Good, HSG A
212,505	30	Woods, Good, HSG A
328,330	96	Gravel surface, HSG A
11,012	98	Paved parking, HSG A
38,753	98	Roofs, HSG A
858,864	62	Weighted Average
809,099		94.21% Pervious Area
49,765		5.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0050	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.22"
5.5	376	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.1	217	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.4	693	Total			

Subcatchment SC-1 new: SC-1



Summary for Subcatchment SC-2 new: Road

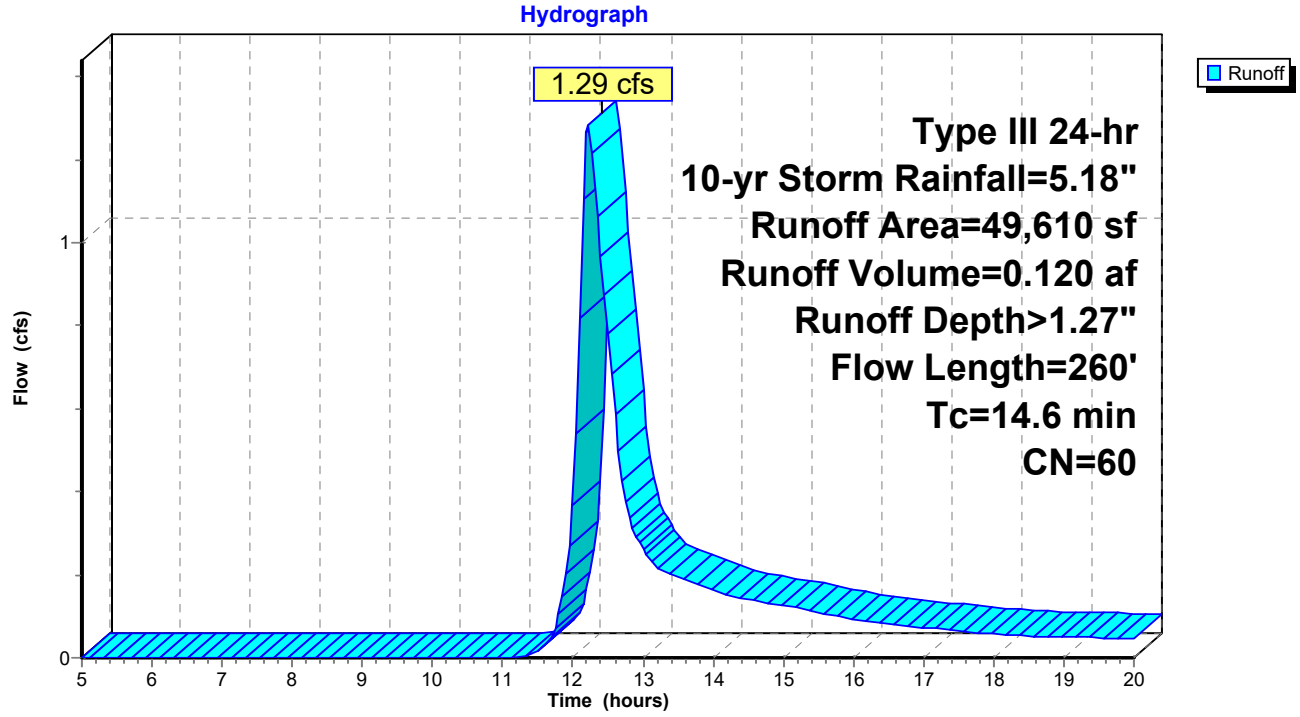
Runoff = 1.29 cfs @ 12.22 hrs, Volume= 0.120 af, Depth> 1.27"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

Area (sf)	CN	Description
14,423	98	Paved parking, HSG A
31,930	39	Pasture/grassland/range, Good, HSG A
3,257	98	Roofs, HSG A
49,610	60	Weighted Average
31,930		64.36% Pervious Area
17,680		35.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.7	160	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.6	260	Total			

Subcatchment SC-2 new: Road



Summary for Subcatchment SC-3 new: Southwest

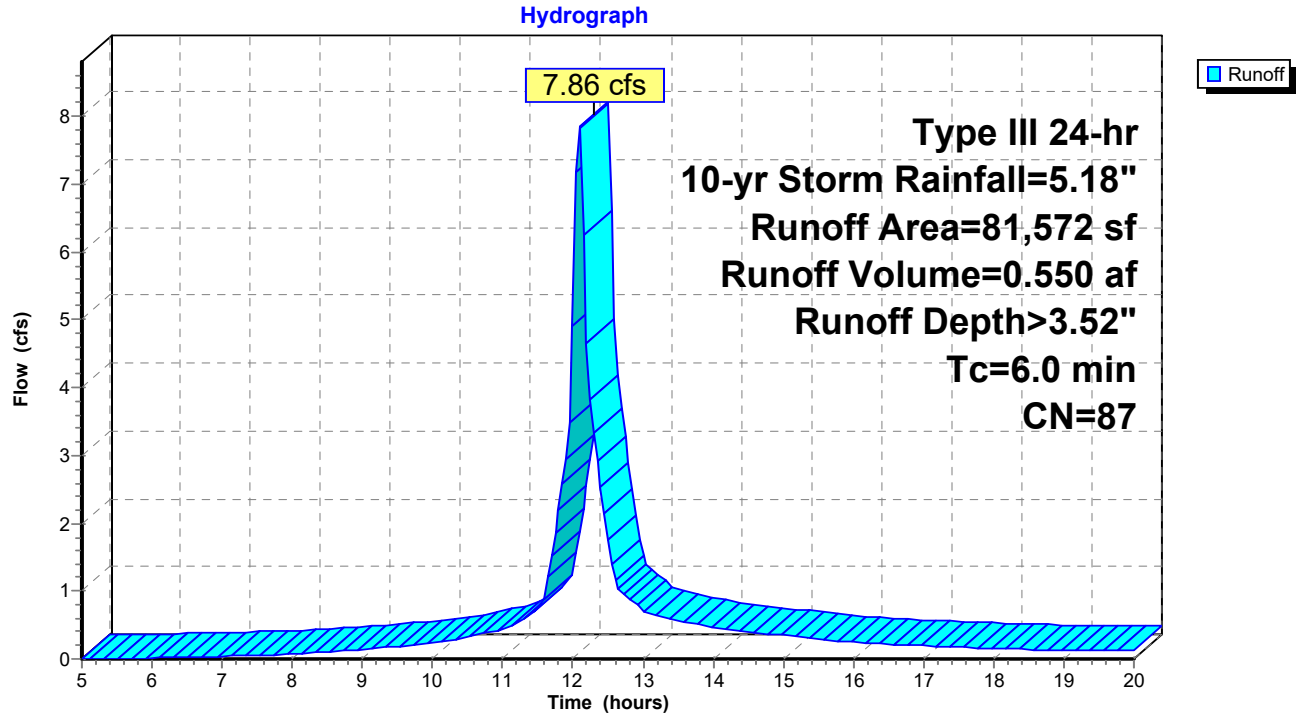
Runoff = 7.86 cfs @ 12.09 hrs, Volume= 0.550 af, Depth> 3.52"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

Area (sf)	CN	Description
41,439	98	Paved parking, HSG A
13,932	39	Pasture/grassland/range, Good, HSG A
6,300	80	Pasture/grassland/range, Good, HSG D
19,901	98	Roofs, HSG A
81,572	87	Weighted Average
20,232		24.80% Pervious Area
61,340		75.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3 new: Southwest

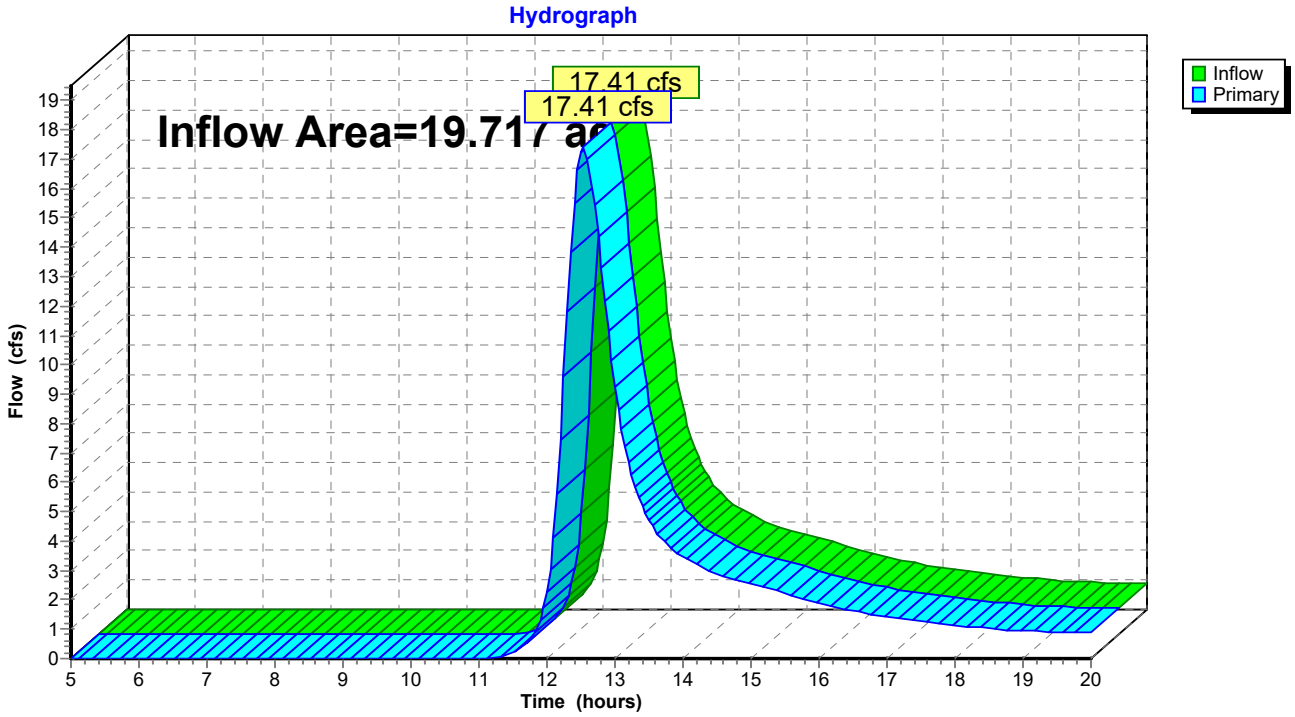


Summary for Link AP-1: AP-1

Inflow Area = 19.717 ac, 5.79% Impervious, Inflow Depth > 1.39" for 10-yr Storm event
Inflow = 17.41 cfs @ 12.54 hrs, Volume= 2.283 af
Primary = 17.41 cfs @ 12.54 hrs, Volume= 2.283 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-1: AP-1

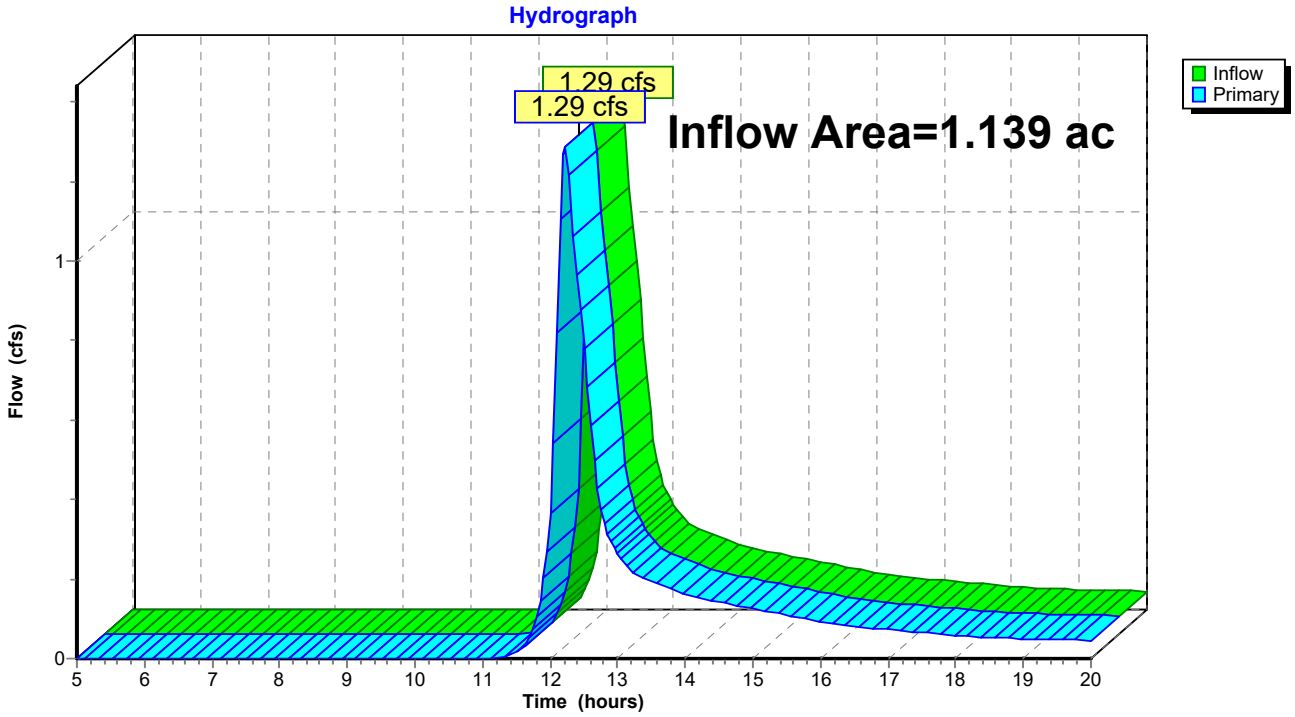


Summary for Link AP-2: AP-2

Inflow Area = 1.139 ac, 35.64% Impervious, Inflow Depth > 1.27" for 10-yr Storm event
Inflow = 1.29 cfs @ 12.22 hrs, Volume= 0.120 af
Primary = 1.29 cfs @ 12.22 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-2: AP-2

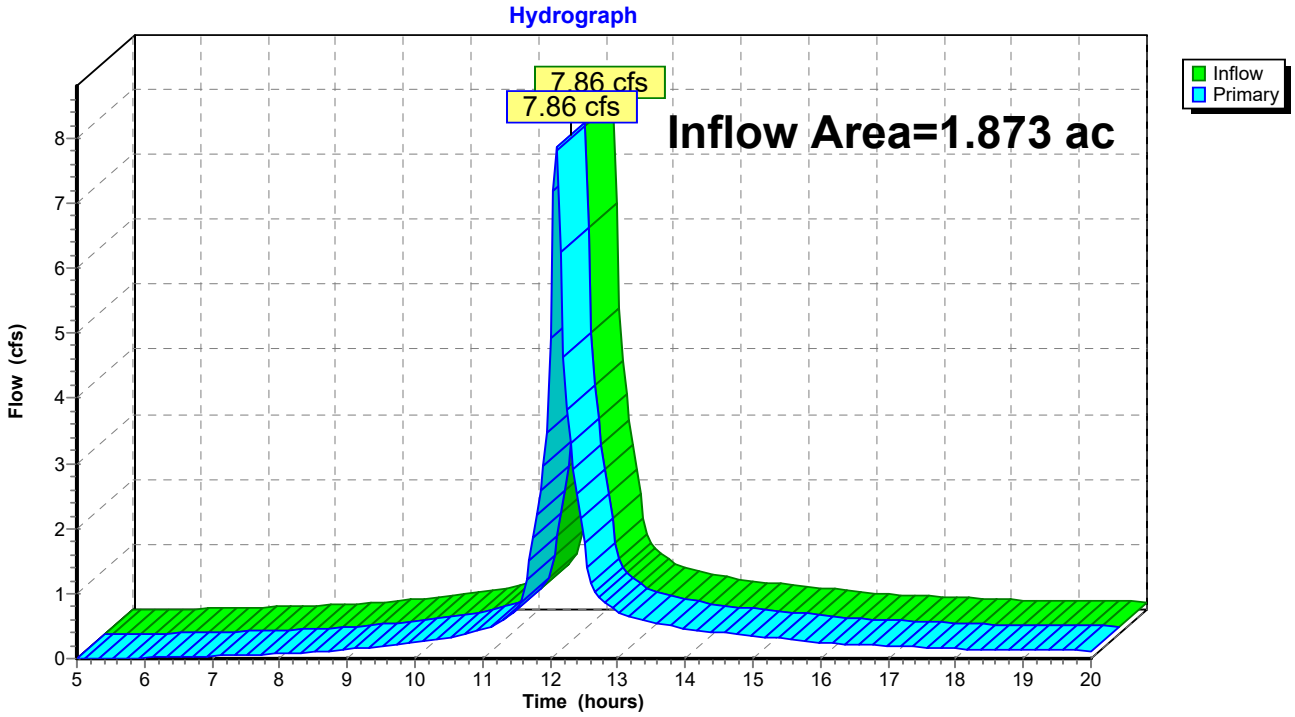


Summary for Link AP-3: AP-3

Inflow Area = 1.873 ac, 75.20% Impervious, Inflow Depth > 3.52" for 10-yr Storm event
Inflow = 7.86 cfs @ 12.09 hrs, Volume= 0.550 af
Primary = 7.86 cfs @ 12.09 hrs, Volume= 0.550 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-3: AP-3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1 new: SC-1 Runoff Area=858,864 sf 5.79% Impervious Runoff Depth>2.15"
Flow Length=693' Tc=35.4 min CN=62 Runoff=27.74 cfs 3.535 af

Subcatchment SC-2 new: Road Runoff Area=49,610 sf 35.64% Impervious Runoff Depth>2.00"
Flow Length=260' Tc=14.6 min CN=60 Runoff=2.12 cfs 0.190 af

Subcatchment SC-3 new: Southwest Runoff Area=81,572 sf 75.20% Impervious Runoff Depth>4.64"
Tc=6.0 min CN=87 Runoff=10.20 cfs 0.724 af

Link AP-1: AP-1 Inflow=27.74 cfs 3.535 af
Primary=27.74 cfs 3.535 af

Link AP-2: AP-2 Inflow=2.12 cfs 0.190 af
Primary=2.12 cfs 0.190 af

Link AP-3: AP-3 Inflow=10.20 cfs 0.724 af
Primary=10.20 cfs 0.724 af

Total Runoff Area = 22.728 ac Runoff Volume = 4.449 af Average Runoff Depth = 2.35"
86.99% Pervious = 19.772 ac 13.01% Impervious = 2.956 ac

Summary for Subcatchment SC-1 new: SC-1

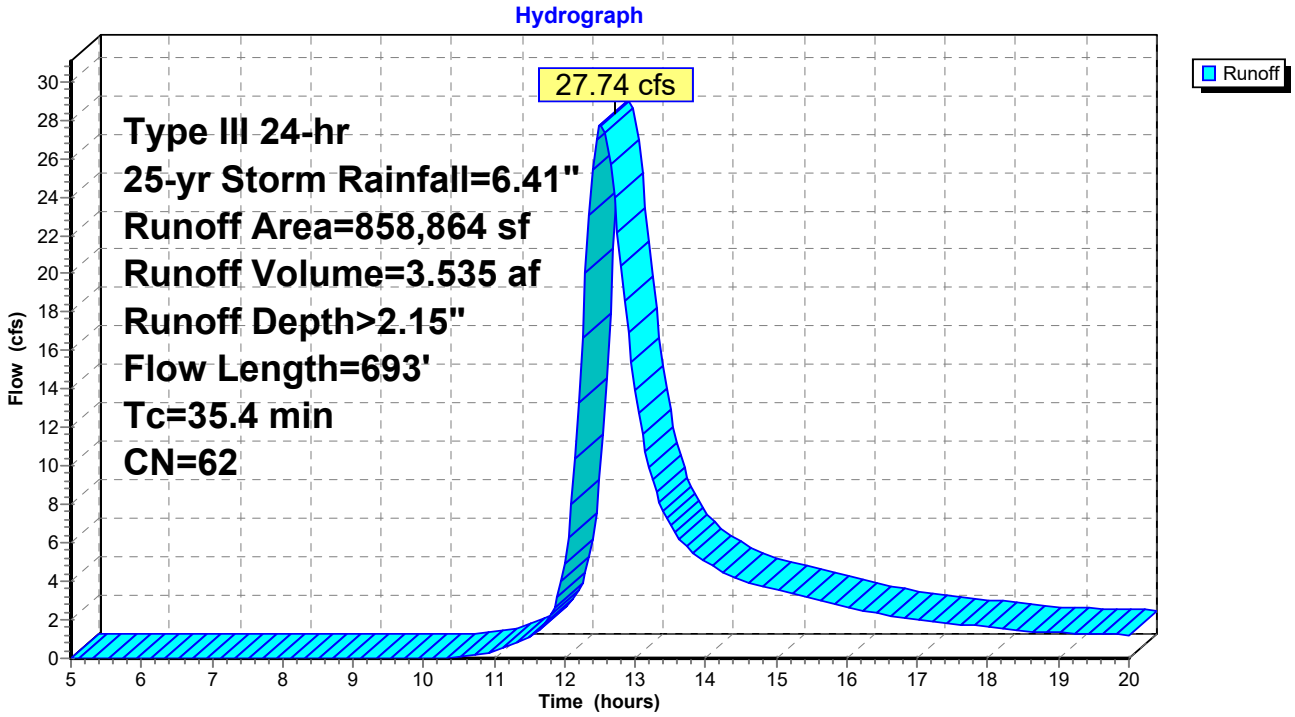
Runoff = 27.74 cfs @ 12.52 hrs, Volume= 3.535 af, Depth> 2.15"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

Area (sf)	CN	Description
268,264	39	Pasture/grassland/range, Good, HSG A
212,505	30	Woods, Good, HSG A
328,330	96	Gravel surface, HSG A
11,012	98	Paved parking, HSG A
38,753	98	Roofs, HSG A
858,864	62	Weighted Average
809,099		94.21% Pervious Area
49,765		5.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0050	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.22"
5.5	376	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.1	217	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.4	693	Total			

Subcatchment SC-1 new: SC-1



Summary for Subcatchment SC-2 new: Road

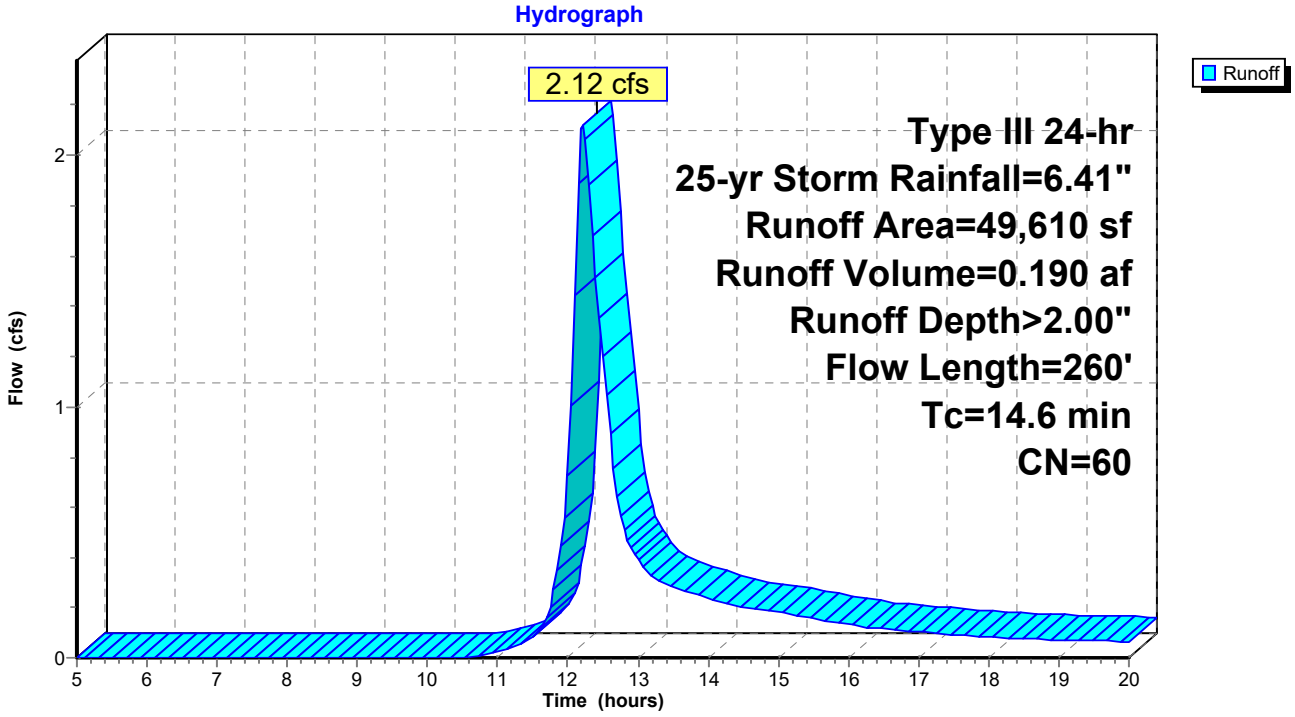
Runoff = 2.12 cfs @ 12.22 hrs, Volume= 0.190 af, Depth> 2.00"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

Area (sf)	CN	Description
14,423	98	Paved parking, HSG A
31,930	39	Pasture/grassland/range, Good, HSG A
3,257	98	Roofs, HSG A
49,610	60	Weighted Average
31,930		64.36% Pervious Area
17,680		35.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.7	160	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.6	260	Total			

Subcatchment SC-2 new: Road



Summary for Subcatchment SC-3 new: Southwest

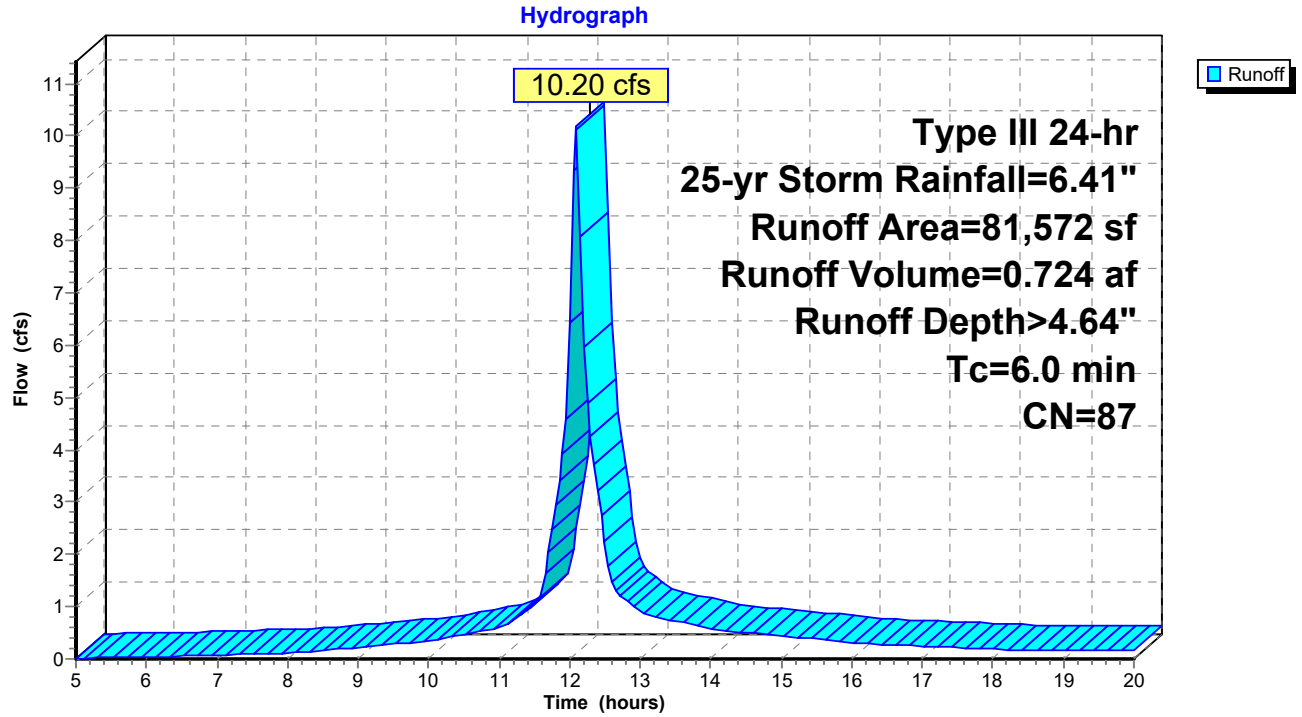
Runoff = 10.20 cfs @ 12.09 hrs, Volume= 0.724 af, Depth> 4.64"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

Area (sf)	CN	Description
41,439	98	Paved parking, HSG A
13,932	39	Pasture/grassland/range, Good, HSG A
6,300	80	Pasture/grassland/range, Good, HSG D
19,901	98	Roofs, HSG A
81,572	87	Weighted Average
20,232		24.80% Pervious Area
61,340		75.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3 new: Southwest

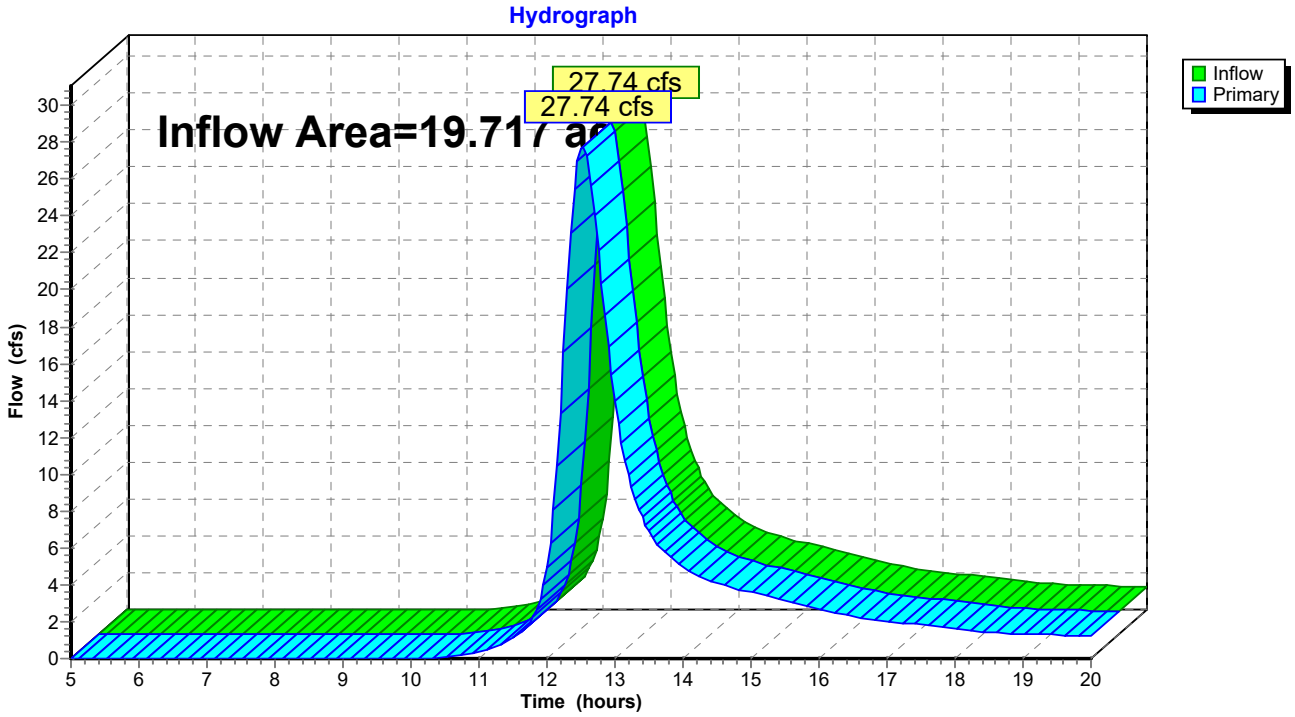


Summary for Link AP-1: AP-1

Inflow Area = 19.717 ac, 5.79% Impervious, Inflow Depth > 2.15" for 25-yr Storm event
Inflow = 27.74 cfs @ 12.52 hrs, Volume= 3.535 af
Primary = 27.74 cfs @ 12.52 hrs, Volume= 3.535 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-1: AP-1

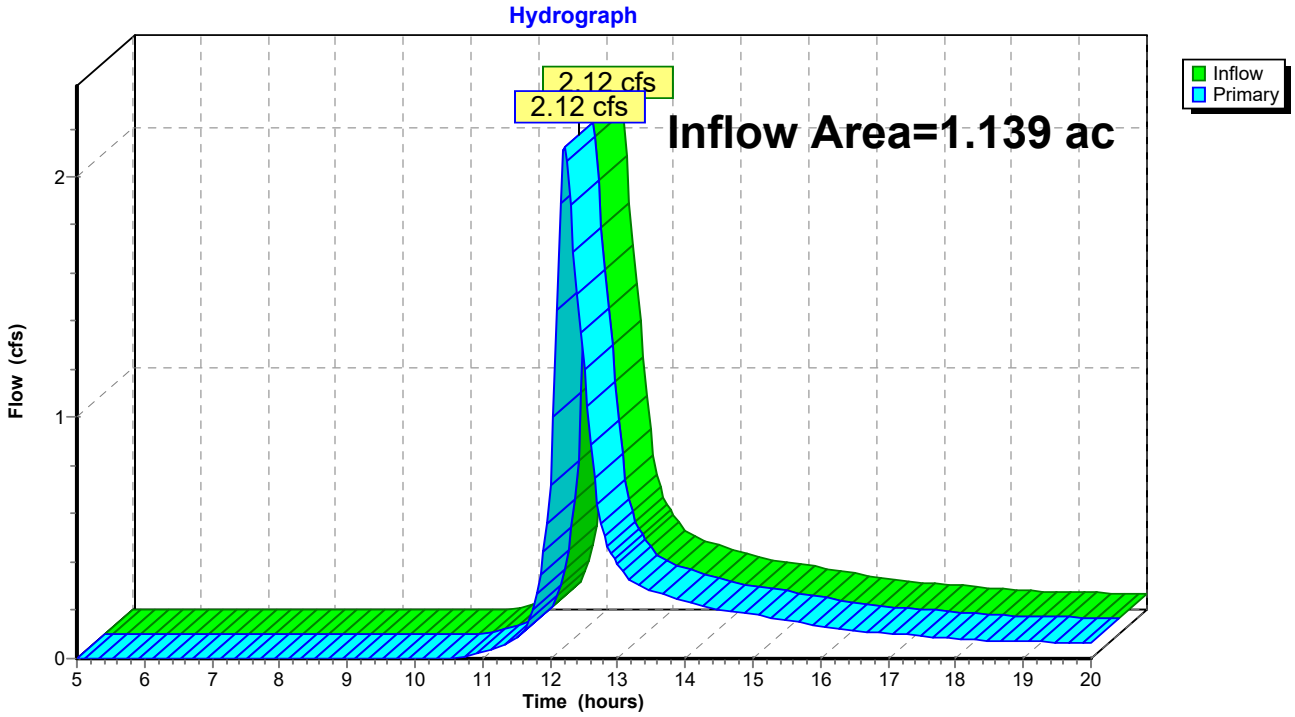


Summary for Link AP-2: AP-2

Inflow Area = 1.139 ac, 35.64% Impervious, Inflow Depth > 2.00" for 25-yr Storm event
Inflow = 2.12 cfs @ 12.22 hrs, Volume= 0.190 af
Primary = 2.12 cfs @ 12.22 hrs, Volume= 0.190 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-2: AP-2

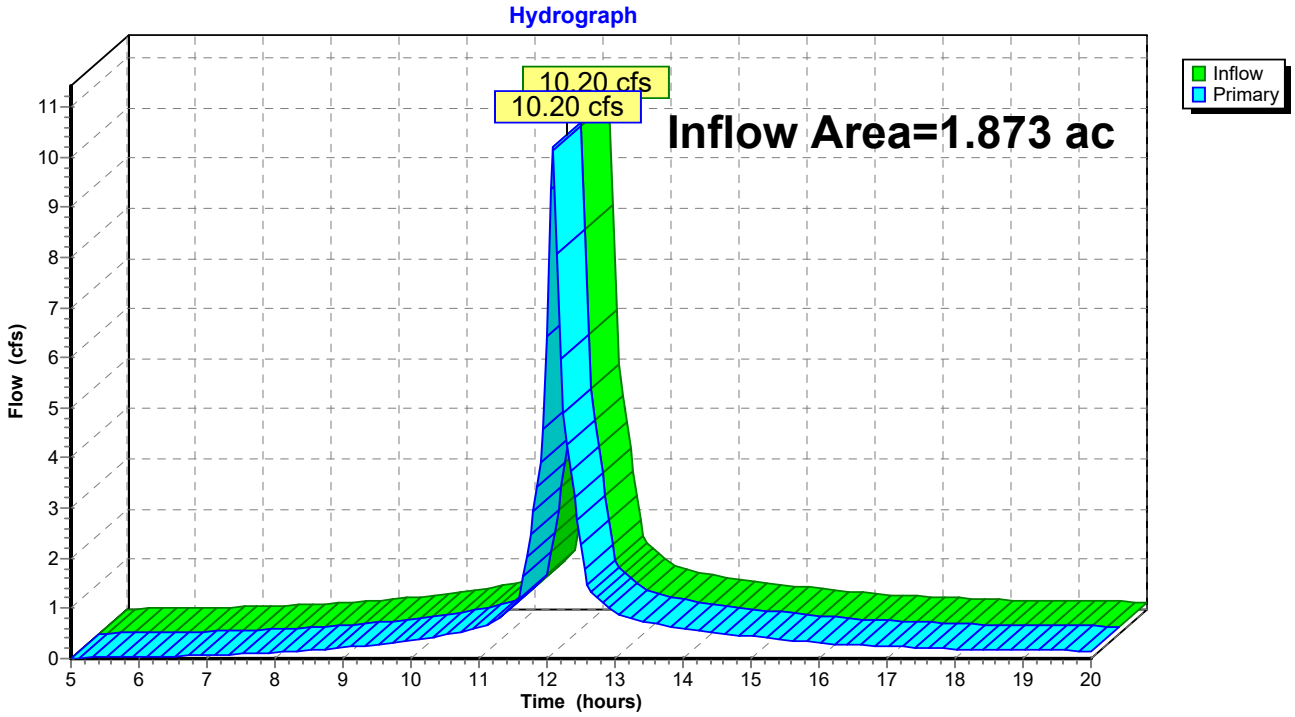


Summary for Link AP-3: AP-3

Inflow Area = 1.873 ac, 75.20% Impervious, Inflow Depth > 4.64" for 25-yr Storm event
Inflow = 10.20 cfs @ 12.09 hrs, Volume= 0.724 af
Primary = 10.20 cfs @ 12.09 hrs, Volume= 0.724 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-3: AP-3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1 new: SC-1 Runoff Area=858,864 sf 5.79% Impervious Runoff Depth>3.47"
Flow Length=693' Tc=35.4 min CN=62 Runoff=45.42 cfs 5.709 af

Subcatchment SC-2 new: Road Runoff Area=49,610 sf 35.64% Impervious Runoff Depth>3.28"
Flow Length=260' Tc=14.6 min CN=60 Runoff=3.57 cfs 0.311 af

Subcatchment SC-3 new: Southwest Runoff Area=81,572 sf 75.20% Impervious Runoff Depth>6.38"
Tc=6.0 min CN=87 Runoff=13.78 cfs 0.996 af

Link AP-1: AP-1 Inflow=45.42 cfs 5.709 af
Primary=45.42 cfs 5.709 af

Link AP-2: AP-2 Inflow=3.57 cfs 0.311 af
Primary=3.57 cfs 0.311 af

Link AP-3: AP-3 Inflow=13.78 cfs 0.996 af
Primary=13.78 cfs 0.996 af

Total Runoff Area = 22.728 ac Runoff Volume = 7.016 af Average Runoff Depth = 3.70"
86.99% Pervious = 19.772 ac 13.01% Impervious = 2.956 ac

Summary for Subcatchment SC-1 new: SC-1

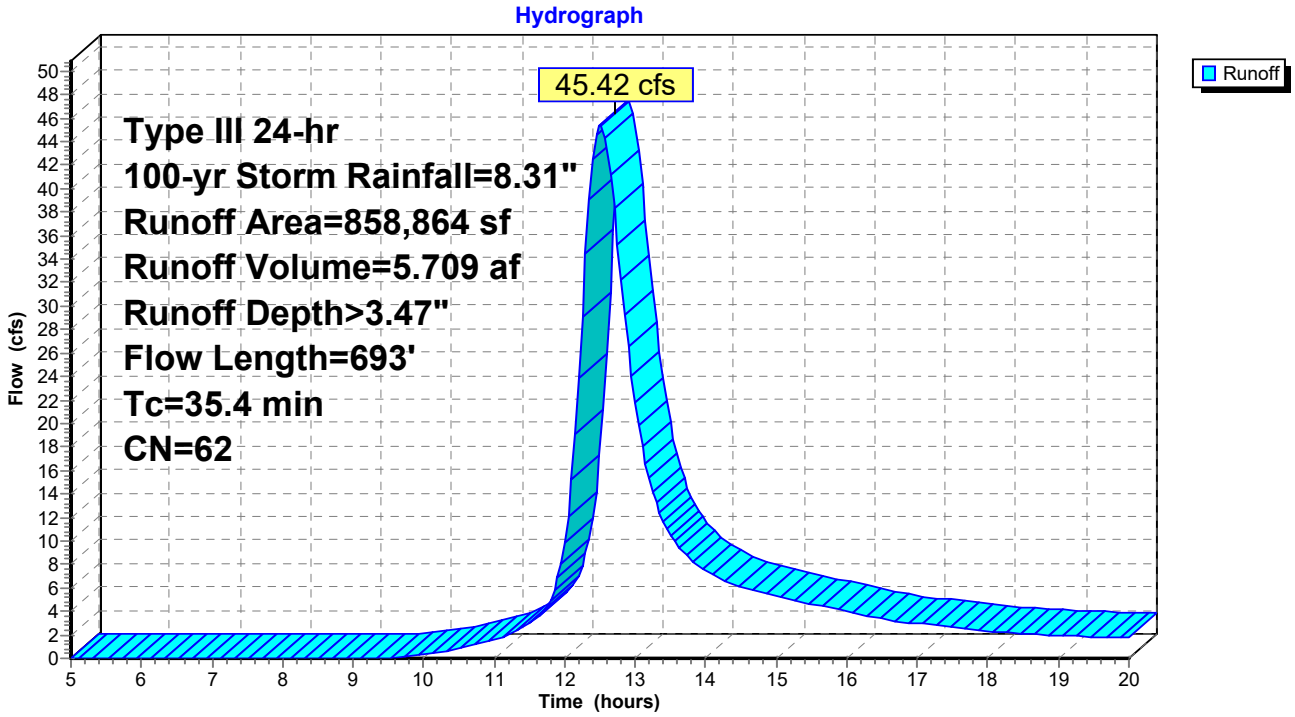
Runoff = 45.42 cfs @ 12.51 hrs, Volume= 5.709 af, Depth> 3.47"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

Area (sf)	CN	Description
268,264	39	Pasture/grassland/range, Good, HSG A
212,505	30	Woods, Good, HSG A
328,330	96	Gravel surface, HSG A
11,012	98	Paved parking, HSG A
38,753	98	Roofs, HSG A
858,864	62	Weighted Average
809,099		94.21% Pervious Area
49,765		5.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0050	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.22"
5.5	376	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.1	217	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.4	693	Total			

Subcatchment SC-1 new: SC-1



Summary for Subcatchment SC-2 new: Road

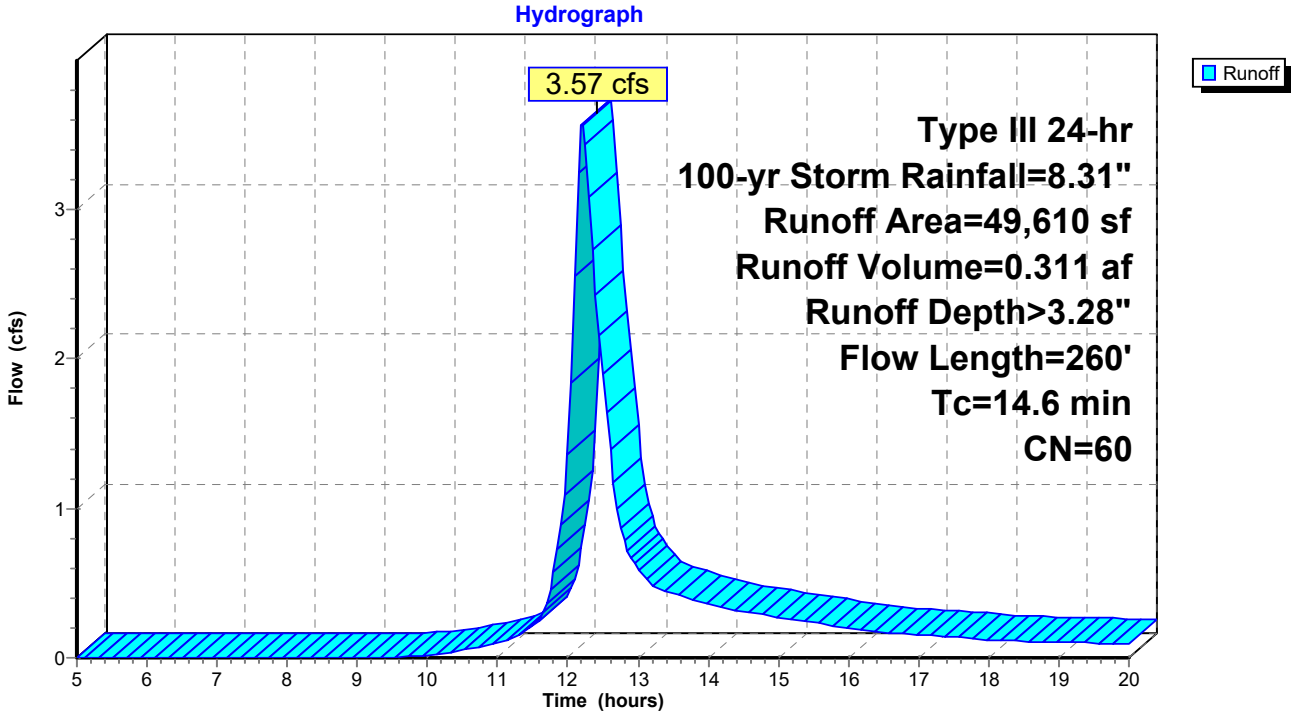
Runoff = 3.57 cfs @ 12.21 hrs, Volume= 0.311 af, Depth> 3.28"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

Area (sf)	CN	Description
14,423	98	Paved parking, HSG A
31,930	39	Pasture/grassland/range, Good, HSG A
3,257	98	Roofs, HSG A
49,610	60	Weighted Average
31,930		64.36% Pervious Area
17,680		35.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.7	160	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.6	260	Total			

Subcatchment SC-2 new: Road



Summary for Subcatchment SC-3 new: Southwest

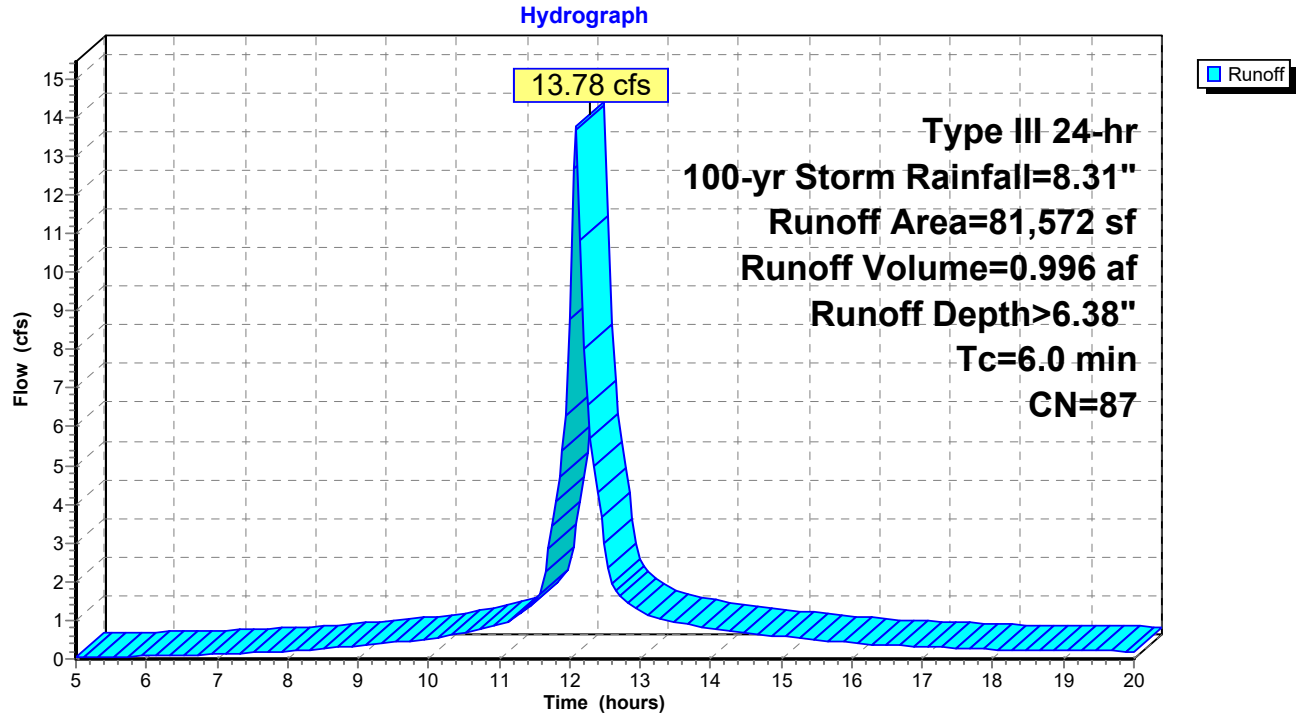
Runoff = 13.78 cfs @ 12.09 hrs, Volume= 0.996 af, Depth> 6.38"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

Area (sf)	CN	Description
41,439	98	Paved parking, HSG A
13,932	39	Pasture/grassland/range, Good, HSG A
6,300	80	Pasture/grassland/range, Good, HSG D
19,901	98	Roofs, HSG A
81,572	87	Weighted Average
20,232		24.80% Pervious Area
61,340		75.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3 new: Southwest

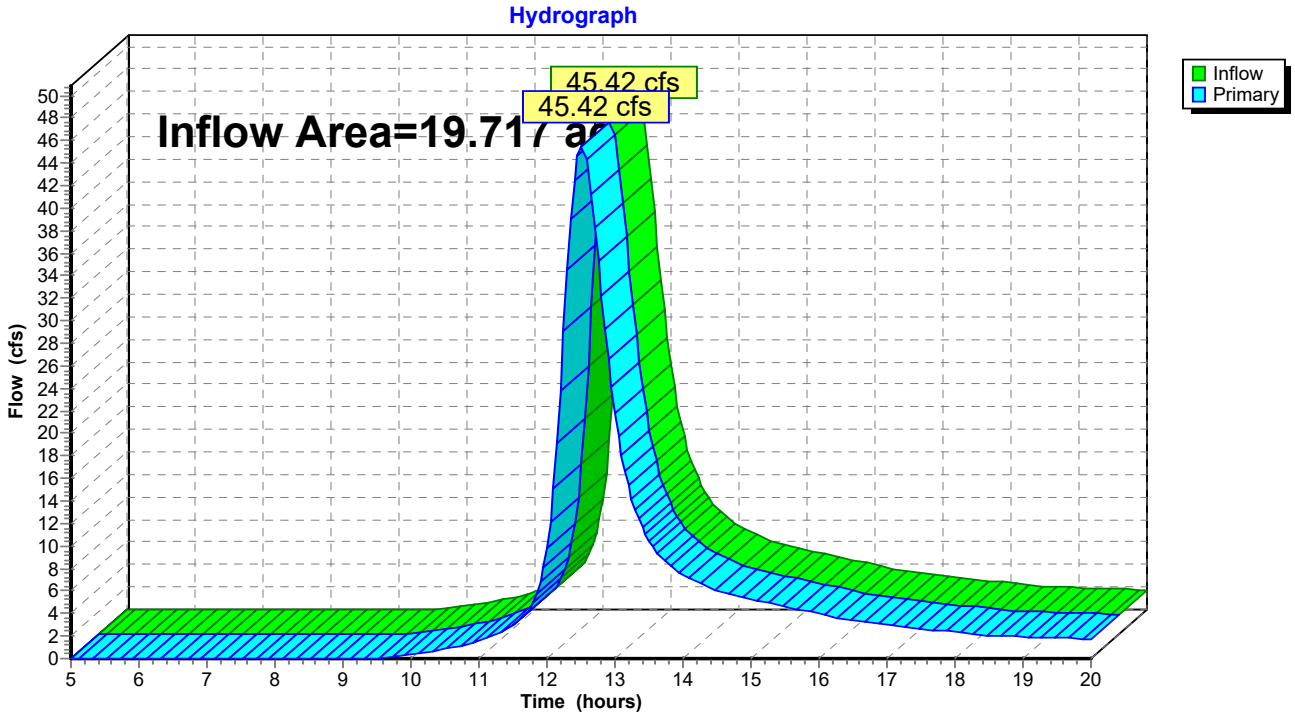


Summary for Link AP-1: AP-1

Inflow Area = 19.717 ac, 5.79% Impervious, Inflow Depth > 3.47" for 100-yr Storm event
Inflow = 45.42 cfs @ 12.51 hrs, Volume= 5.709 af
Primary = 45.42 cfs @ 12.51 hrs, Volume= 5.709 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-1: AP-1

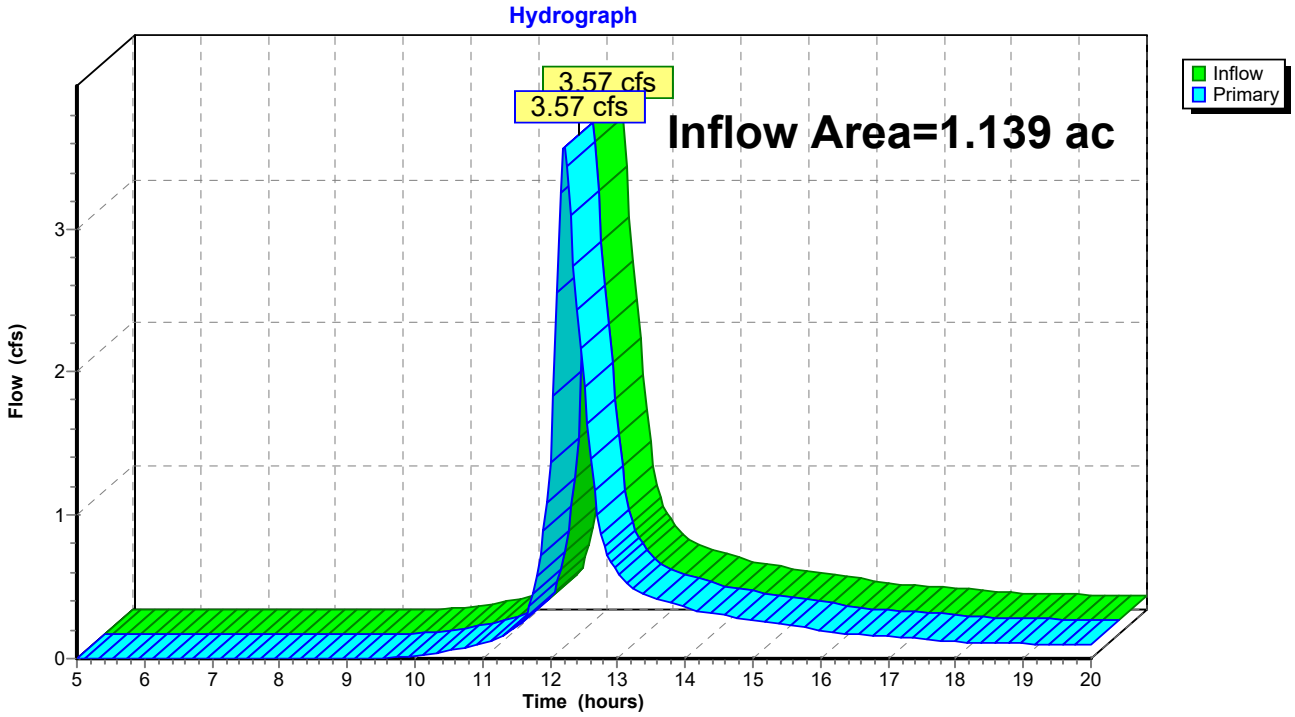


Summary for Link AP-2: AP-2

Inflow Area = 1.139 ac, 35.64% Impervious, Inflow Depth > 3.28" for 100-yr Storm event
Inflow = 3.57 cfs @ 12.21 hrs, Volume= 0.311 af
Primary = 3.57 cfs @ 12.21 hrs, Volume= 0.311 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-2: AP-2

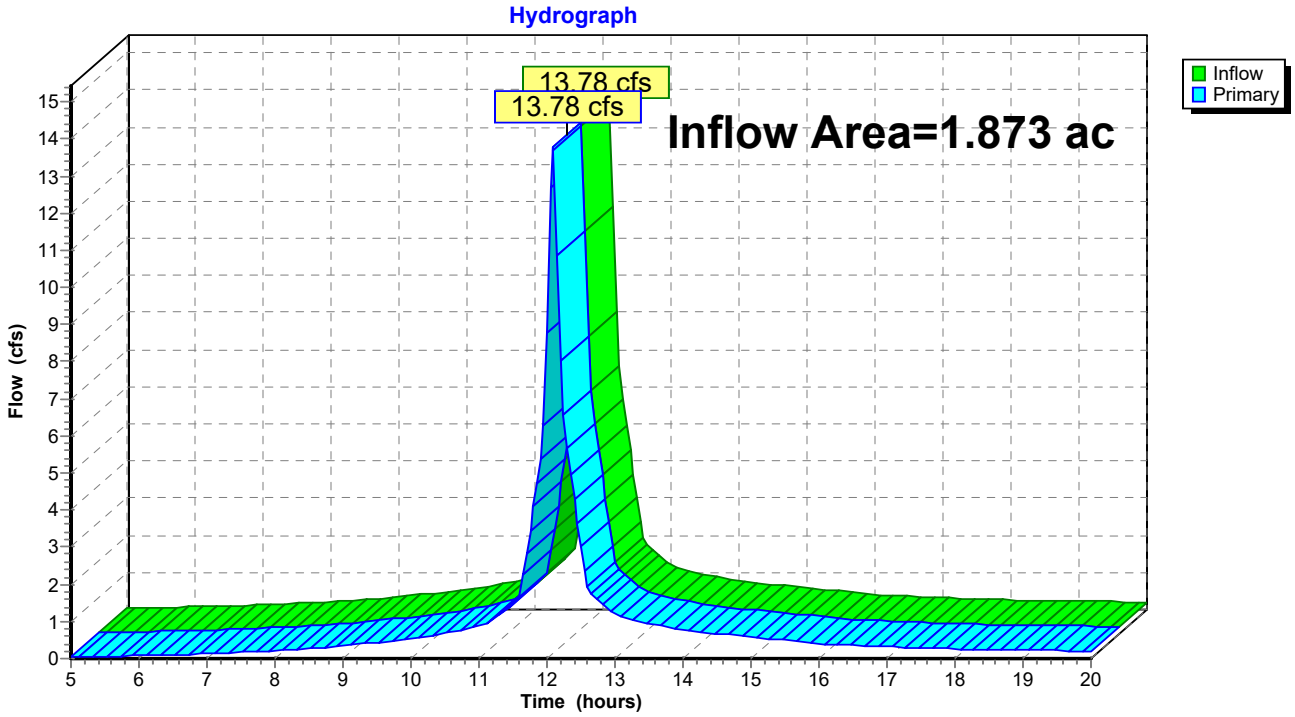


Summary for Link AP-3: AP-3

Inflow Area = 1.873 ac, 75.20% Impervious, Inflow Depth > 6.38" for 100-yr Storm event
Inflow = 13.78 cfs @ 12.09 hrs, Volume= 0.996 af
Primary = 13.78 cfs @ 12.09 hrs, Volume= 0.996 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

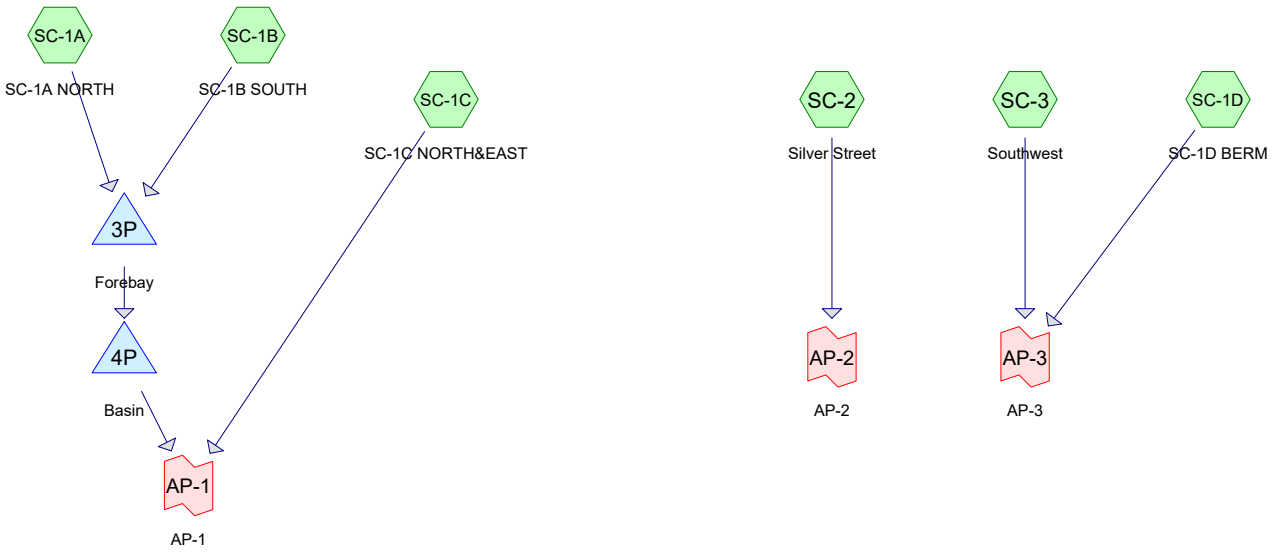
Link AP-3: AP-3



ATTACHMENT D

POST-DEVELOPMENT HYDROCAD CALCULATIONS

SME
SEVEE & MAHER
ENGINEERS



Subcat Reach Pond Link

Routing Diagram for Post-Conditions - 03-09-2026
Prepared by Sevee & Maher Engineers, Printed 3/11/2026
HydroCAD® 10.20-7a s/n 01260 © 2025 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.403	98	Foundations/Equipment (SC-1A, SC-1B, SC-3)
3.434	96	Gravel (SC-1A, SC-1B, SC-1C, SC-1D, SC-3)
8.486	39	Pasture/grassland/range, Good, HSG A (SC-1A, SC-1B, SC-1C, SC-1D, SC-2, SC-3)
0.145	80	Pasture/grassland/range, Good, HSG D (SC-3)
0.891	98	Paved parking, HSG A (SC-1A, SC-1B, SC-1C, SC-2, SC-3)
0.647	98	Roofs, HSG A (SC-1B, SC-1C, SC-2, SC-3)
2.968	76	Topping Stone (Gravel) (SC-1A, SC-1B, SC-3)
4.760	30	Woods, Good, HSG A (SC-1C)

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
14.784	HSG A	SC-1A, SC-1B, SC-1C, SC-1D, SC-2, SC-3
0.000	HSG B	
0.000	HSG C	
0.145	HSG D	SC-3
7.805	Other	SC-1A, SC-1B, SC-1C, SC-1D, SC-3

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	1.403	1.403	Foundations/Equipment	SC-1A, SC-1B, SC-3
0.000	0.000	0.000	0.000	3.434	3.434	Gravel	SC-1A, SC-1B, SC-1C, SC-1D, SC-3
8.486	0.000	0.000	0.145	0.000	8.630	Pasture/grassland/range, Good	SC-1A, SC-1B, SC-1C, SC-1D, SC-2, SC-3
0.891	0.000	0.000	0.000	0.000	0.891	Paved parking	SC-1A, SC-1B, SC-1C, SC-2, SC-3
0.647	0.000	0.000	0.000	0.000	0.647	Roofs	SC-1B, SC-1C, SC-2, SC-3

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	2.968	2.968	Topping Stone (Gravel)	SC-1A, SC-1B, SC-3
4.760	0.000	0.000	0.000	0.000	4.760	Woods, Good	SC-1C

Time span=1.00-48.00 hrs, dt=0.01 hrs, 4701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1A: SC-1A NORTH Runoff Area=108,582 sf 14.61% Impervious Runoff Depth=1.05"
Flow Length=787' Tc=23.1 min CN=74 Runoff=1.84 cfs 0.218 af

Subcatchment SC-1B: SC-1B SOUTH Runoff Area=192,952 sf 32.22% Impervious Runoff Depth=1.63"
Flow Length=885' Tc=22.7 min CN=83 Runoff=5.38 cfs 0.600 af

Subcatchment SC-1C: SC-1C Runoff Area=569,133 sf 2.50% Impervious Runoff Depth=0.06"
Flow Length=705' Tc=35.2 min CN=46 Runoff=0.10 cfs 0.066 af

Subcatchment SC-1D: SC-1D BERM Runoff Area=27,040 sf 0.00% Impervious Runoff Depth=0.03"
Tc=5.0 min CN=44 Runoff=0.00 cfs 0.002 af

Subcatchment SC-2: Silver Street Runoff Area=40,523 sf 47.20% Impervious Runoff Depth=0.70"
Flow Length=260' Tc=14.8 min CN=67 Runoff=0.48 cfs 0.054 af

Subcatchment SC-3: Southwest Runoff Area=52,065 sf 32.15% Impervious Runoff Depth=1.11"
Tc=6.0 min CN=75 Runoff=1.49 cfs 0.110 af

Pond 3P: Forebay Peak Elev=182.31' Storage=1,207 cf Inflow=7.21 cfs 0.818 af
Outflow=7.20 cfs 0.794 af

Pond 4P: Basin Peak Elev=182.23' Storage=9,989 cf Inflow=7.20 cfs 0.794 af
Outflow=4.37 cfs 0.717 af

Link AP-1: AP-1 Inflow=4.37 cfs 0.783 af
Primary=4.37 cfs 0.783 af

Link AP-2: AP-2 Inflow=0.48 cfs 0.054 af
Primary=0.48 cfs 0.054 af

Link AP-3: AP-3 Inflow=1.49 cfs 0.112 af
Primary=1.49 cfs 0.112 af

Summary for Subcatchment SC-1A: SC-1A NORTH

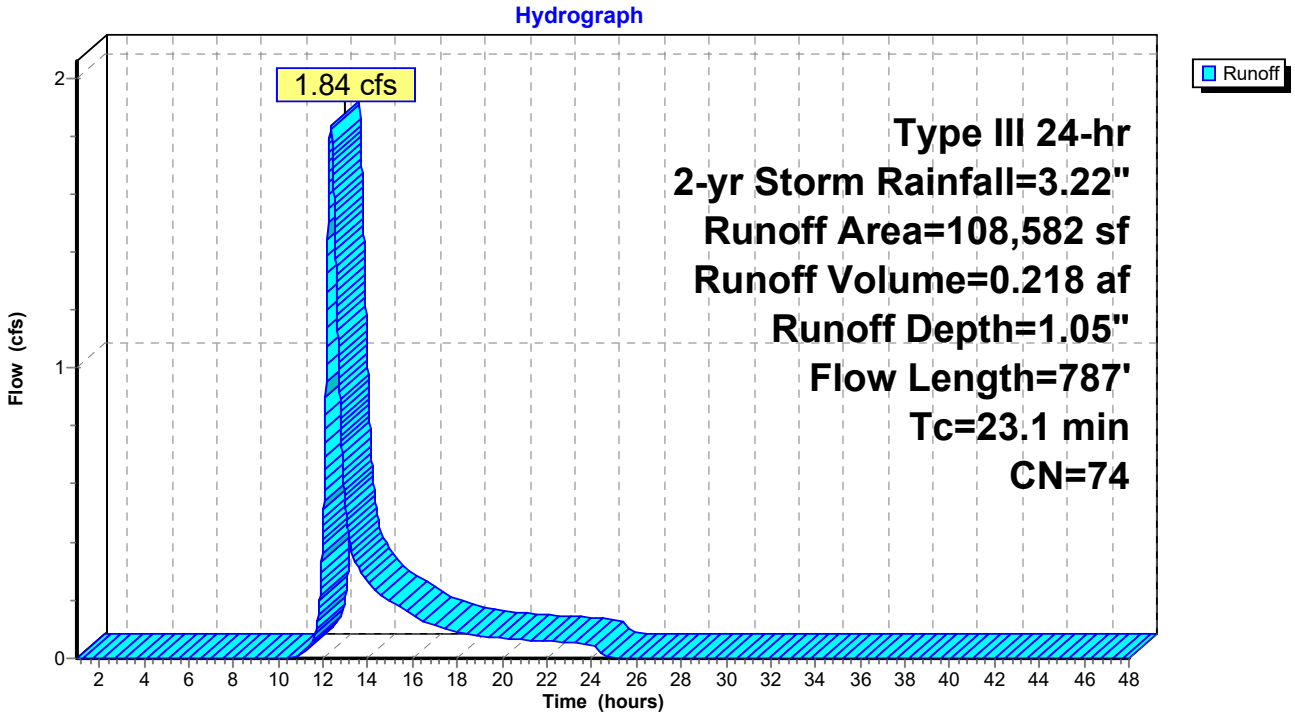
Runoff = 1.84 cfs @ 12.35 hrs, Volume= 0.218 af, Depth= 1.05"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
*	19,299	96	Gravel
	24,825	39	Pasture/grassland/range, Good, HSG A
	1,912	98	Paved parking, HSG A
*	48,595	76	Topping Stone (Gravel)
*	13,951	98	Foundations/Equipment
	108,582	74	Weighted Average
	92,719		85.39% Pervious Area
	15,863		14.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.7	157	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.6	385	0.0120	1.76		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
2.9	145	0.0030	0.82		**Shallow Concentrated Flow, D-E** Grassed Waterway Kv= 15.0 fps
23.1	787	Total			

Subcatchment SC-1A: SC-1A NORTH



Summary for Subcatchment SC-1B: SC-1B SOUTH

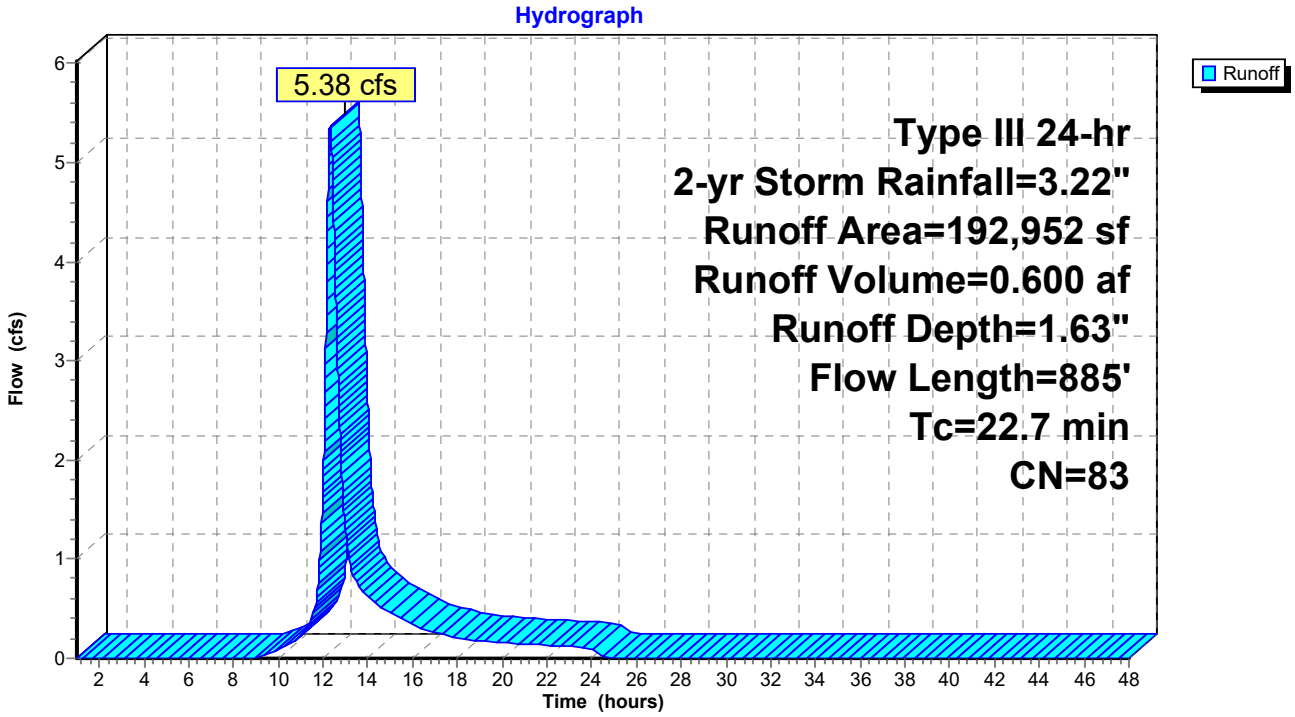
Runoff = 5.38 cfs @ 12.33 hrs, Volume= 0.600 af, Depth= 1.63"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
*	38,260	96	Gravel
	18,614	39	Pasture/grassland/range, Good, HSG A
	8,866	98	Roofs, HSG A
*	73,911	76	Topping Stone (Gravel)
	9,866	98	Paved parking, HSG A
*	43,435	98	Foundations/Equipment
	192,952	83	Weighted Average
	130,785		67.78% Pervious Area
	62,167		32.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
0.8	75	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
1.8	83	0.0120	0.77		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
4.3	440	0.0110	1.69		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
2.9	187	0.0050	1.06		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
22.7	885	Total			

Subcatchment SC-1B: SC-1B SOUTH



Summary for Subcatchment SC-1C: SC-1C NORTH&EAST

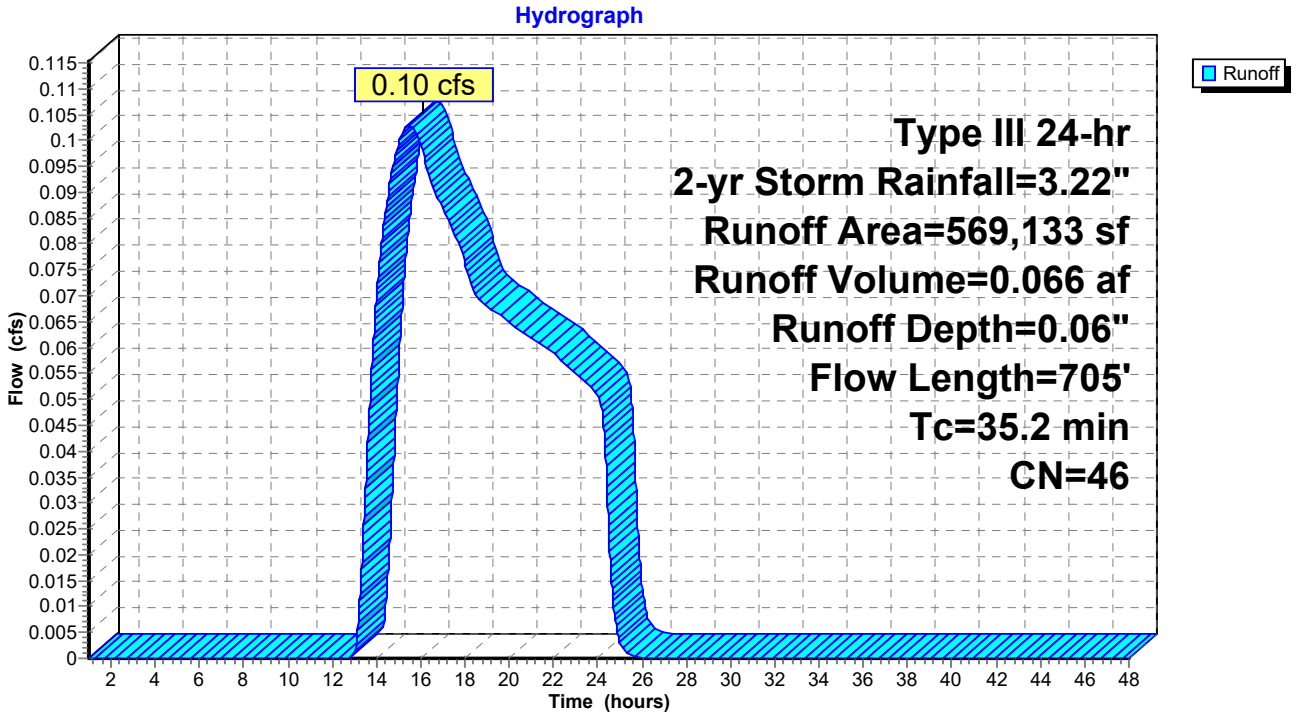
Runoff = 0.10 cfs @ 15.45 hrs, Volume= 0.066 af, Depth= 0.06"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
	264,412	39	Pasture/grassland/range, Good, HSG A
	207,341	30	Woods, Good, HSG A
	2,581	98	Paved parking, HSG A
*	83,152	96	Gravel
	11,647	98	Roofs, HSG A
	569,133	46	Weighted Average
	554,905		97.50% Pervious Area
	14,228		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0050	0.10		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
14.1	430	0.0010	0.51		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
4.1	175	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.2	705	Total			

Subcatchment SC-1C: SC-1C NORTH&EAST



Summary for Subcatchment SC-1D: SC-1D BERM

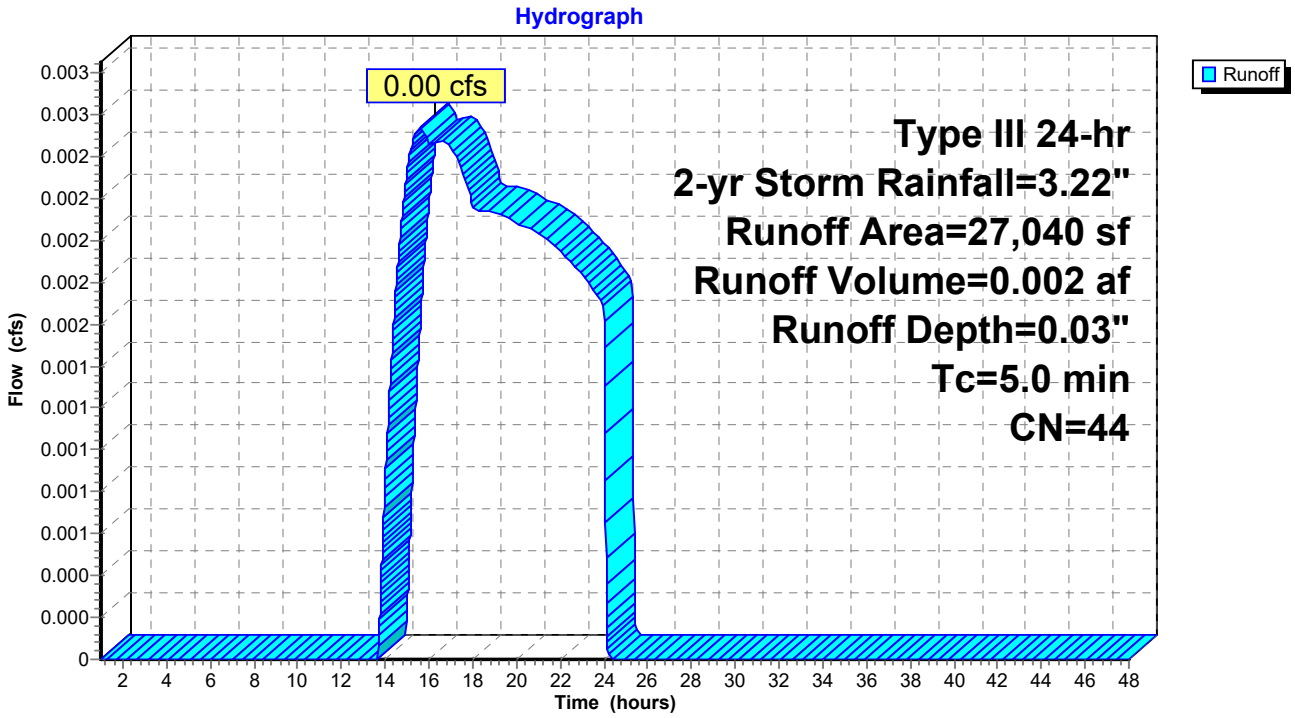
Runoff = 0.00 cfs @ 15.63 hrs, Volume= 0.002 af, Depth= 0.03"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
*	2,164	96	Gravel
	24,876	39	Pasture/grassland/range, Good, HSG A
	27,040	44	Weighted Average
	27,040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-1D: SC-1D BERM



Summary for Subcatchment SC-2: Silver Street

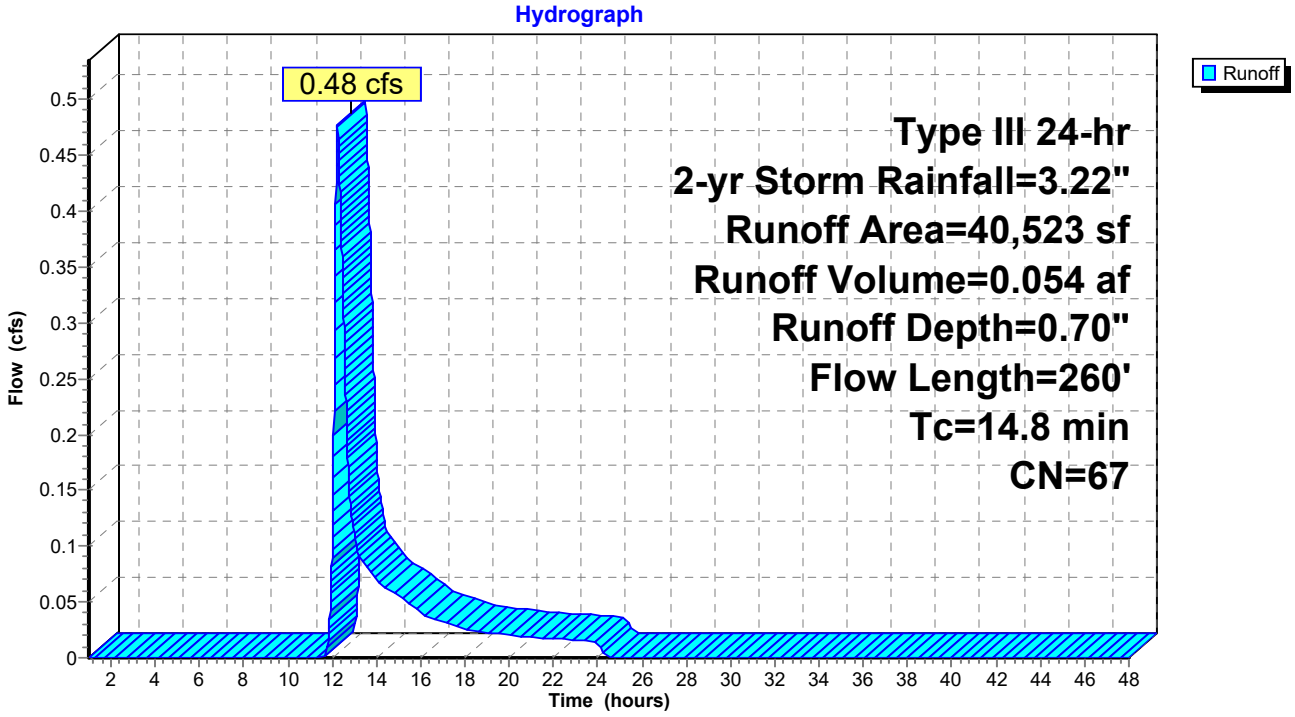
Runoff = 0.48 cfs @ 12.24 hrs, Volume= 0.054 af, Depth= 0.70"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

Area (sf)	CN	Description
15,815	98	Paved parking, HSG A
21,395	39	Pasture/grassland/range, Good, HSG A
3,313	98	Roofs, HSG A
40,523	67	Weighted Average
21,395		52.80% Pervious Area
19,128		47.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.9	160	0.0050	1.44		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.8	260	Total			

Subcatchment SC-2: Silver Street



Summary for Subcatchment SC-3: Southwest

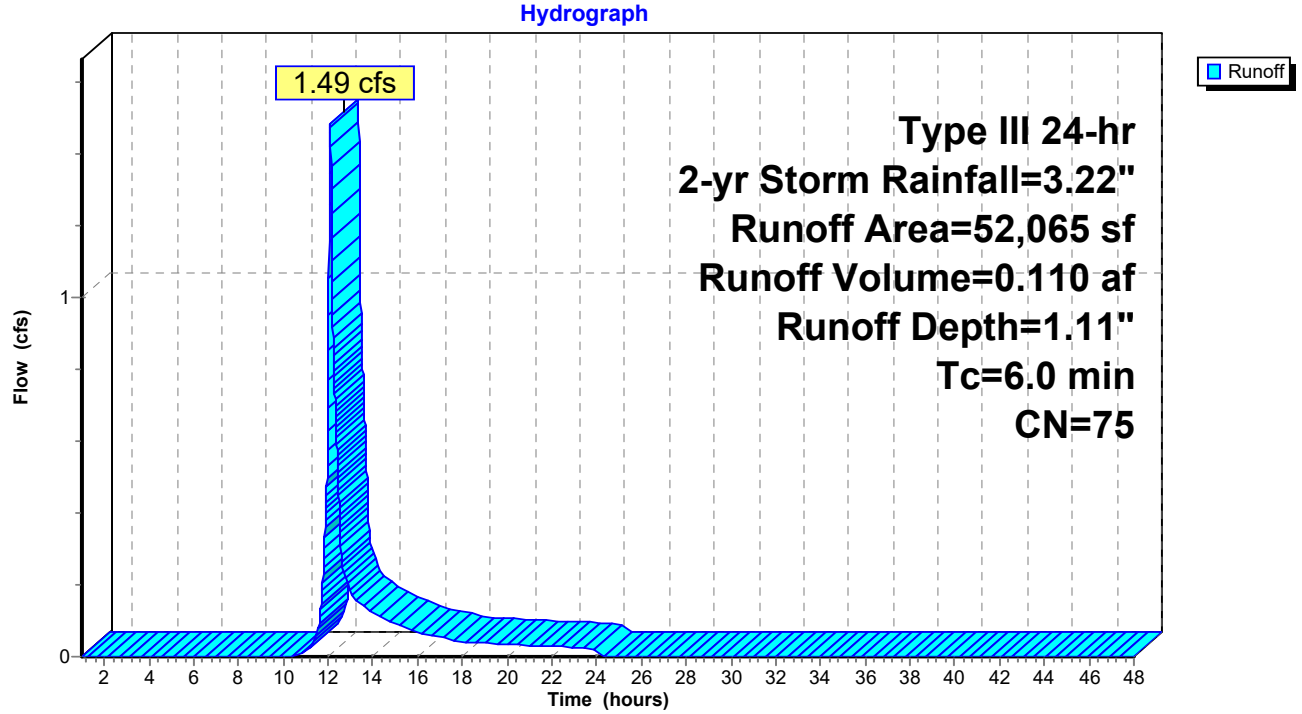
Runoff = 1.49 cfs @ 12.09 hrs, Volume= 0.110 af, Depth= 1.11"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
*	6,728	96	Gravel
	15,522	39	Pasture/grassland/range, Good, HSG A
	6,300	80	Pasture/grassland/range, Good, HSG D
	8,652	98	Paved parking, HSG A
	4,366	98	Roofs, HSG A
*	6,774	76	Topping Stone (Gravel)
*	3,723	98	Foundations/Equipment
	52,065	75	Weighted Average
	35,324		67.85% Pervious Area
	16,741		32.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3: Southwest



Summary for Pond 3P: Forebay

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 1.42" for 2-yr Storm event
Inflow = 7.21 cfs @ 12.33 hrs, Volume= 0.818 af
Outflow = 7.20 cfs @ 12.33 hrs, Volume= 0.794 af, Atten= 0%, Lag= 0.2 min
Primary = 7.20 cfs @ 12.33 hrs, Volume= 0.794 af
Routed to Pond 4P : Basin

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.31' @ 12.33 hrs Surf.Area= 1,611 sf Storage= 1,207 cf

Plug-Flow detention time= 23.7 min calculated for 0.794 af (97% of inflow)
Center-of-Mass det. time= 7.2 min (863.2 - 856.0)

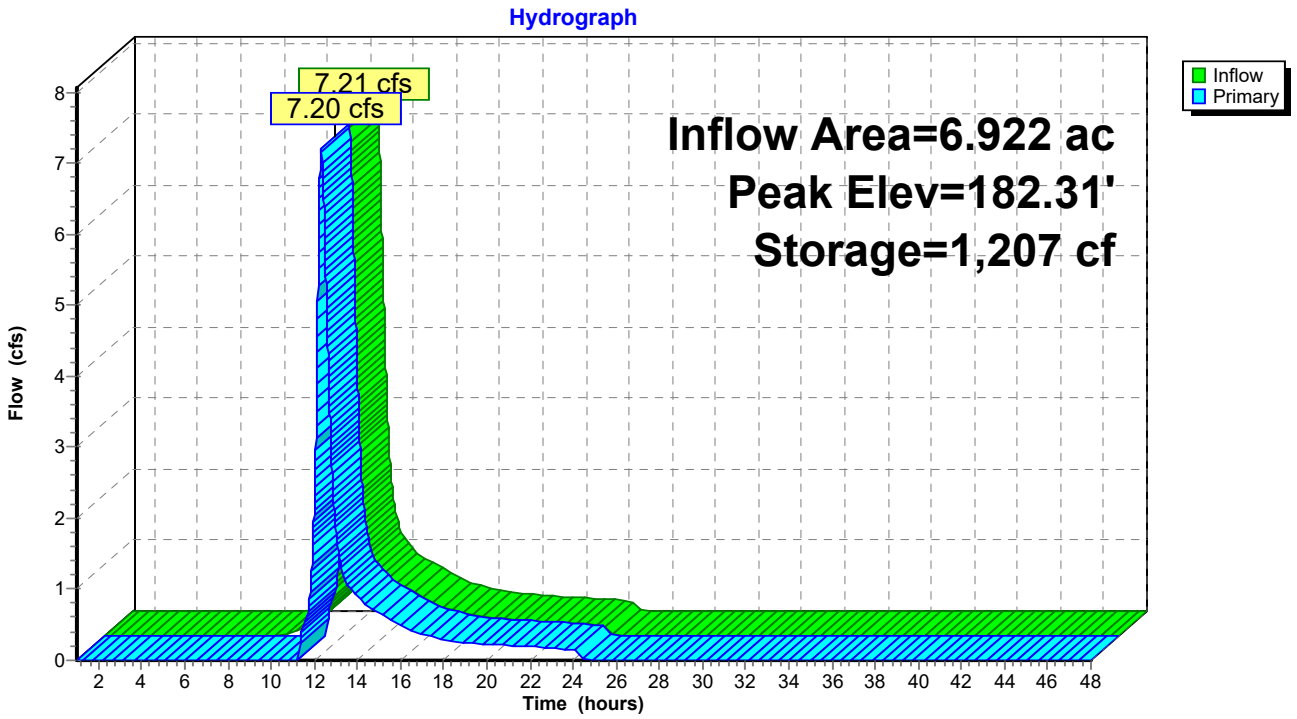
Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	2,650 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.00	323	0	0
182.00	1,219	771	771
182.50	1,856	769	1,540
183.00	2,584	1,110	2,650

Device	Routing	Invert	Outlet Devices
#1	Primary	182.20'	**85.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=7.18 cfs @ 12.33 hrs HW=182.31' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 7.18 cfs @ 0.78 fps)

Pond 3P: Forebay



Summary for Pond 4P: Basin

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 1.38" for 2-yr Storm event
Inflow = 7.20 cfs @ 12.33 hrs, Volume= 0.794 af
Outflow = 4.37 cfs @ 12.64 hrs, Volume= 0.717 af, Atten= 39%, Lag= 18.2 min
Primary = 4.37 cfs @ 12.64 hrs, Volume= 0.717 af
Routed to Link AP-1 : AP-1

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.23' @ 12.64 hrs Surf.Area= 5,167 sf Storage= 9,989 cf

Plug-Flow detention time= 101.8 min calculated for 0.717 af (90% of inflow)
Center-of-Mass det. time= 54.2 min (917.4 - 863.2)

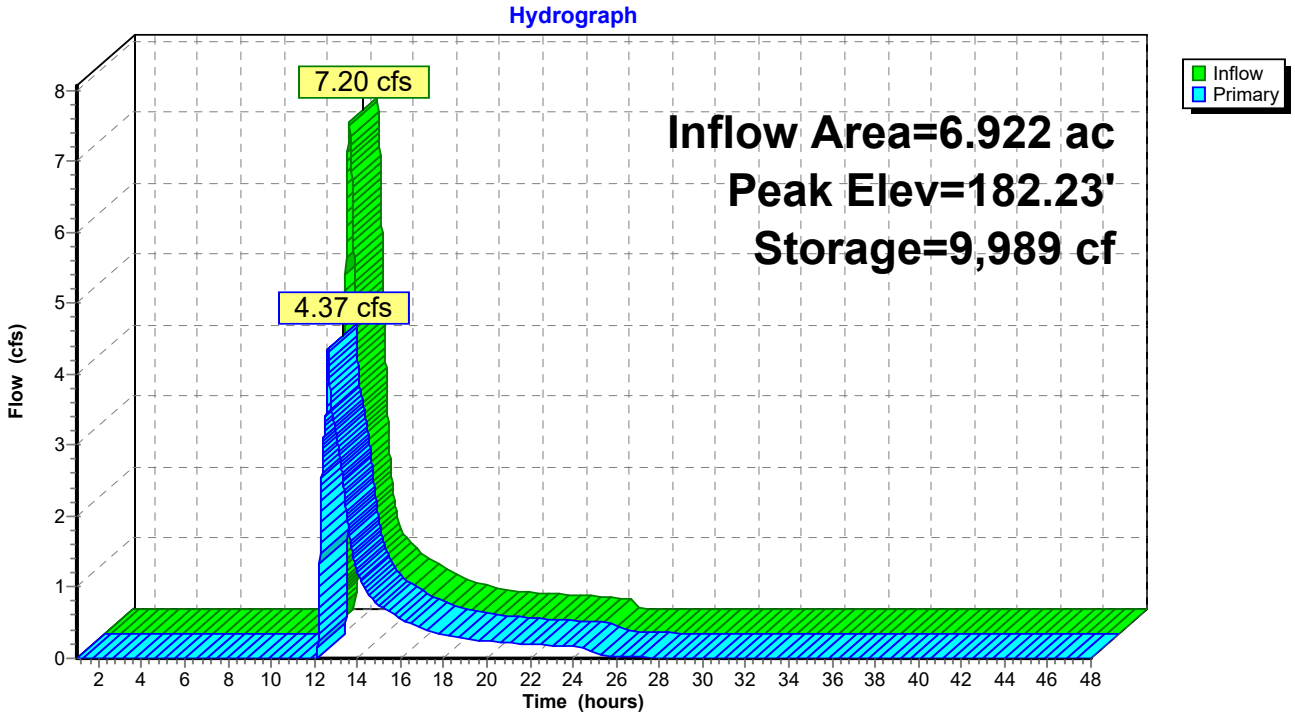
Volume	Invert	Avail.Storage	Storage Description
#1	179.00'	17,725 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
179.00	1,176	0	0
180.00	2,318	1,747	1,747
180.50	2,919	1,309	3,056
180.75	3,227	768	3,825
181.00	3,541	846	4,671
181.50	4,184	1,931	6,602
182.00	4,851	2,259	8,861
183.00	6,254	5,553	14,413
183.50	6,995	3,312	17,725

Device	Routing	Invert	Outlet Devices
#1	Primary	182.20'	**40.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	182.20'	**30.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Primary	180.60'	**12.0" Round Culvert** L= 20.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 180.60' / 180.40' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.20 cfs @ 12.64 hrs HW=182.23' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 0.38 cfs @ 0.37 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 0.28 cfs @ 0.37 fps)
- **3=Culvert** (Inlet Controls 3.54 cfs @ 4.51 fps)

Pond 4P: Basin

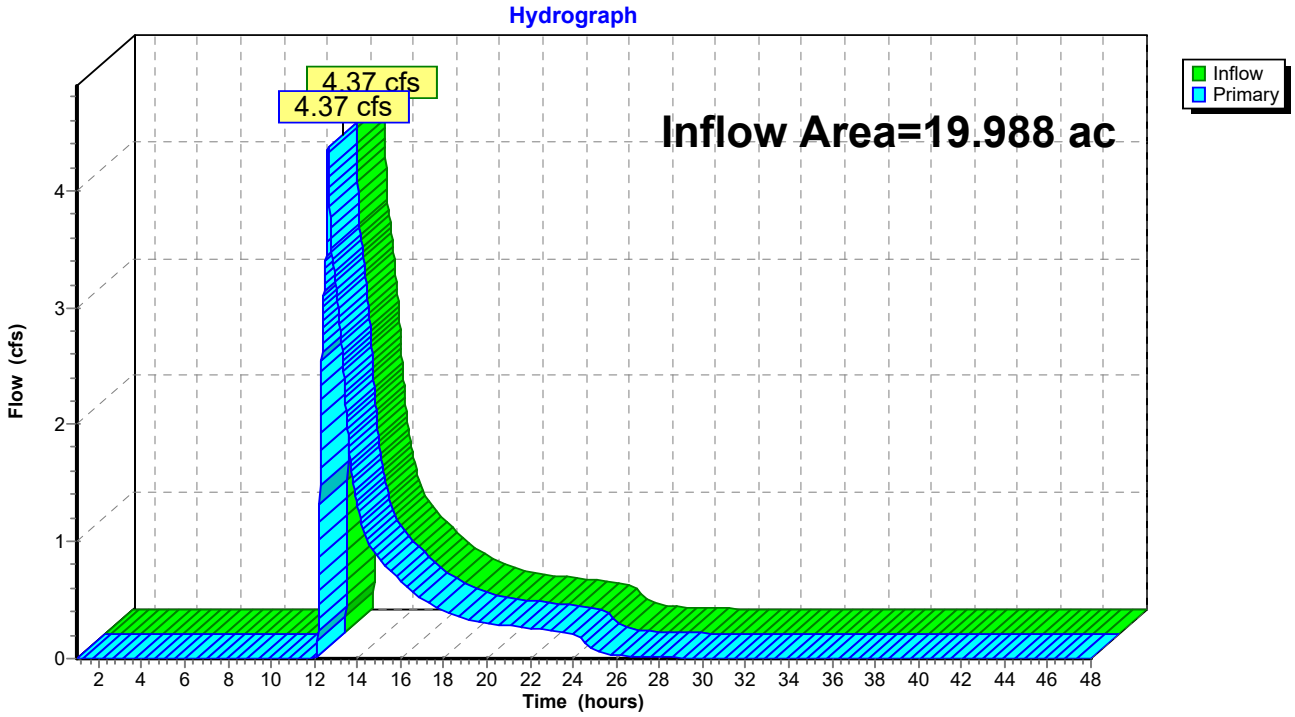


Summary for Link AP-1: AP-1

Inflow Area = 19.988 ac, 10.60% Impervious, Inflow Depth = 0.47" for 2-yr Storm event
Inflow = 4.37 cfs @ 12.64 hrs, Volume= 0.783 af
Primary = 4.37 cfs @ 12.64 hrs, Volume= 0.783 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

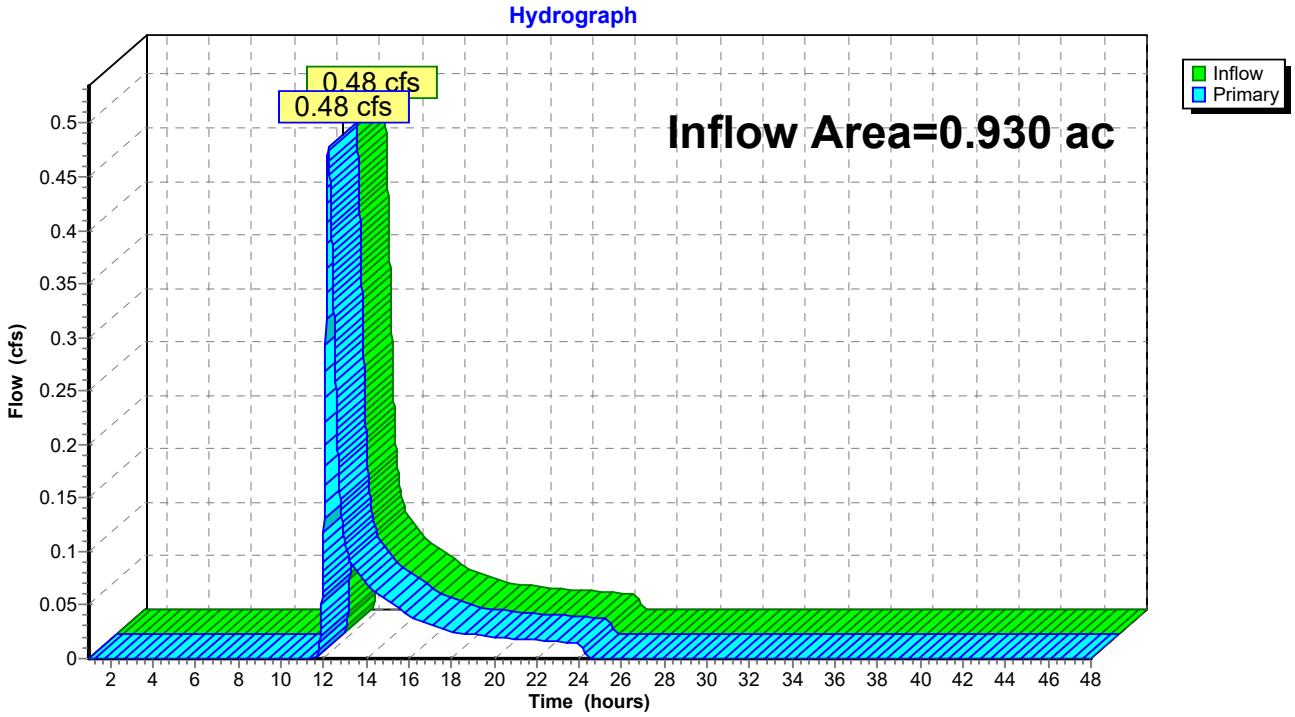


Summary for Link AP-2: AP-2

Inflow Area = 0.930 ac, 47.20% Impervious, Inflow Depth = 0.70" for 2-yr Storm event
Inflow = 0.48 cfs @ 12.24 hrs, Volume= 0.054 af
Primary = 0.48 cfs @ 12.24 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2

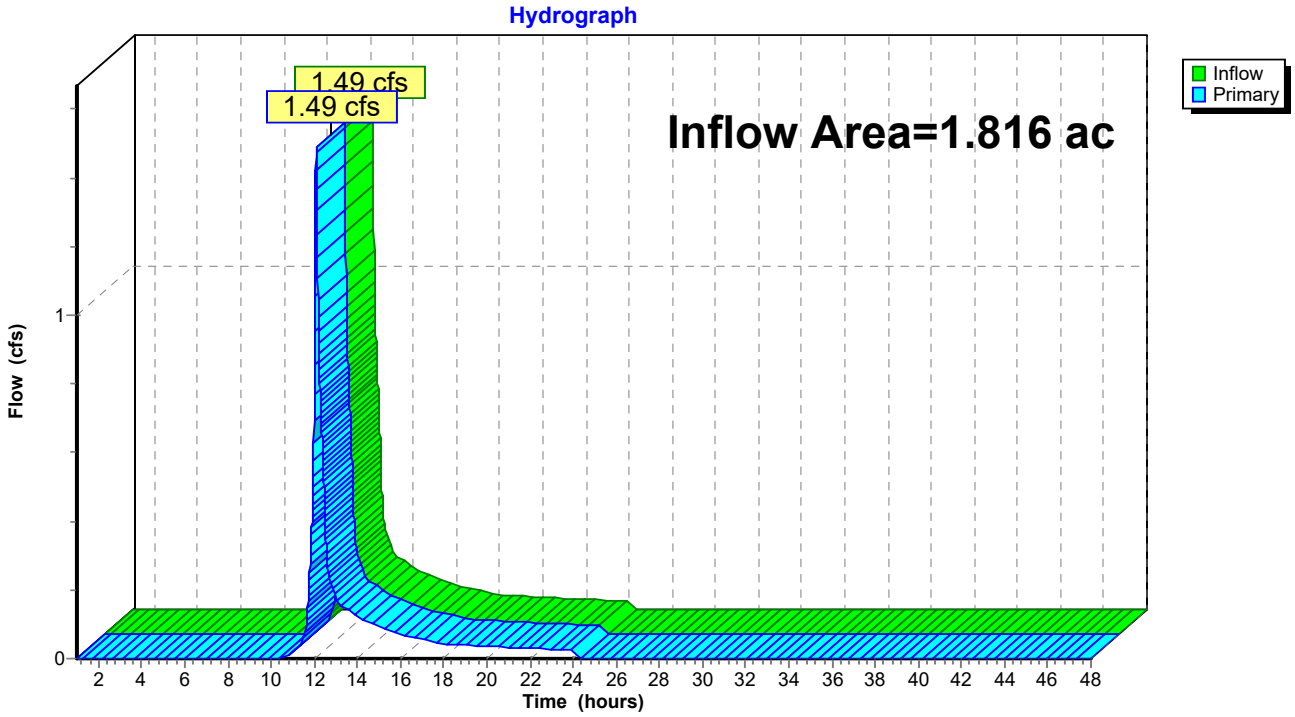


Summary for Link AP-3: AP-3

Inflow Area = 1.816 ac, 21.16% Impervious, Inflow Depth = 0.74" for 2-yr Storm event
Inflow = 1.49 cfs @ 12.09 hrs, Volume= 0.112 af
Primary = 1.49 cfs @ 12.09 hrs, Volume= 0.112 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-3: AP-3



Time span=1.00-48.00 hrs, dt=0.01 hrs, 4701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1A: SC-1A NORTH Runoff Area=108,582 sf 14.61% Impervious Runoff Depth=2.51"
Flow Length=787' Tc=23.1 min CN=74 Runoff=4.62 cfs 0.521 af

Subcatchment SC-1B: SC-1B SOUTH Runoff Area=192,952 sf 32.22% Impervious Runoff Depth=3.34"
Flow Length=885' Tc=22.7 min CN=83 Runoff=11.04 cfs 1.232 af

Subcatchment SC-1C: SC-1C Runoff Area=569,133 sf 2.50% Impervious Runoff Depth=0.55"
Flow Length=705' Tc=35.2 min CN=46 Runoff=2.55 cfs 0.599 af

Subcatchment SC-1D: SC-1D BERM Runoff Area=27,040 sf 0.00% Impervious Runoff Depth=0.45"
Tc=5.0 min CN=44 Runoff=0.13 cfs 0.023 af

Subcatchment SC-2: Silver Street Runoff Area=40,523 sf 47.20% Impervious Runoff Depth=1.93"
Flow Length=260' Tc=14.8 min CN=67 Runoff=1.54 cfs 0.150 af

Subcatchment SC-3: Southwest Runoff Area=52,065 sf 32.15% Impervious Runoff Depth=2.60"
Tc=6.0 min CN=75 Runoff=3.63 cfs 0.259 af

Pond 3P: Forebay Peak Elev=182.38' Storage=1,329 cf Inflow=15.64 cfs 1.753 af
Outflow=15.64 cfs 1.729 af

Pond 4P: Basin Peak Elev=182.37' Storage=10,770 cf Inflow=15.64 cfs 1.729 af
Outflow=15.61 cfs 1.652 af

Link AP-1: AP-1 Inflow=16.58 cfs 2.251 af
Primary=16.58 cfs 2.251 af

Link AP-2: AP-2 Inflow=1.54 cfs 0.150 af
Primary=1.54 cfs 0.150 af

Link AP-3: AP-3 Inflow=3.71 cfs 0.282 af
Primary=3.71 cfs 0.282 af

Summary for Subcatchment SC-1A: SC-1A NORTH

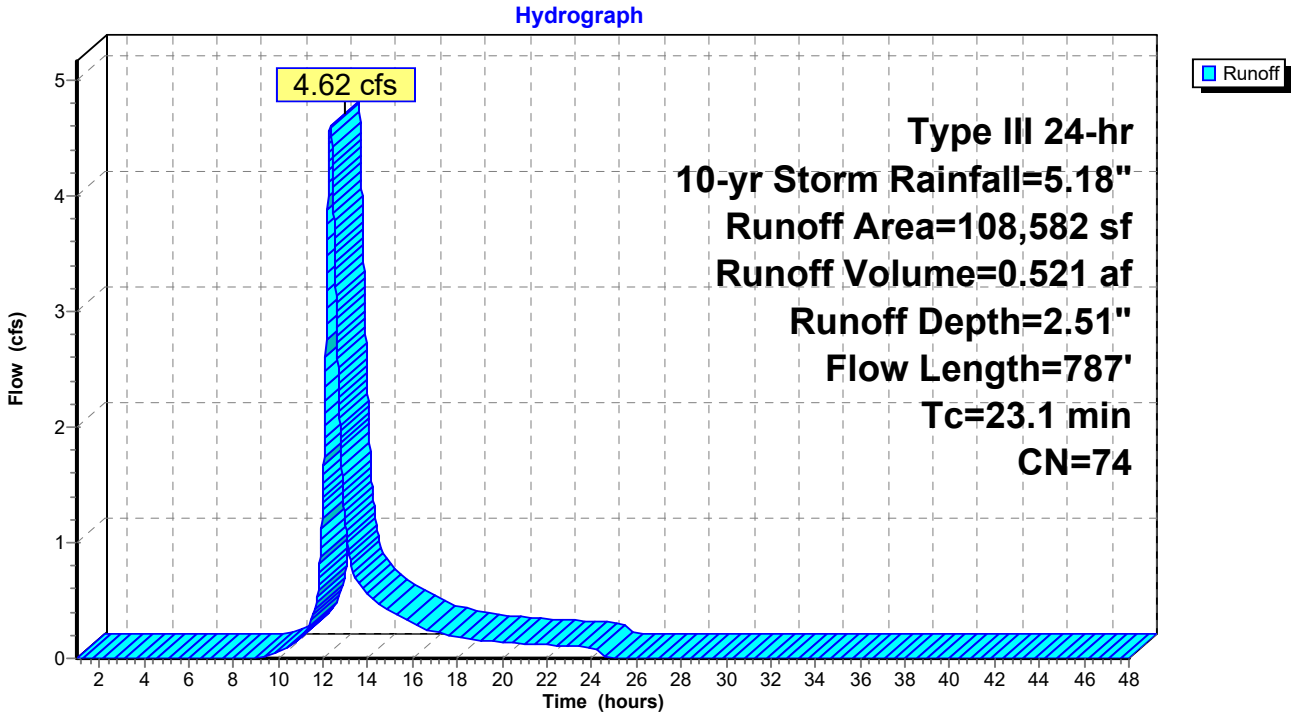
Runoff = 4.62 cfs @ 12.33 hrs, Volume= 0.521 af, Depth= 2.51"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
*	19,299	96	Gravel
	24,825	39	Pasture/grassland/range, Good, HSG A
	1,912	98	Paved parking, HSG A
*	48,595	76	Topping Stone (Gravel)
*	13,951	98	Foundations/Equipment
	108,582	74	Weighted Average
	92,719		85.39% Pervious Area
	15,863		14.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.7	157	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.6	385	0.0120	1.76		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
2.9	145	0.0030	0.82		**Shallow Concentrated Flow, D-E** Grassed Waterway Kv= 15.0 fps
23.1	787	Total			

Subcatchment SC-1A: SC-1A NORTH



Summary for Subcatchment SC-1B: SC-1B SOUTH

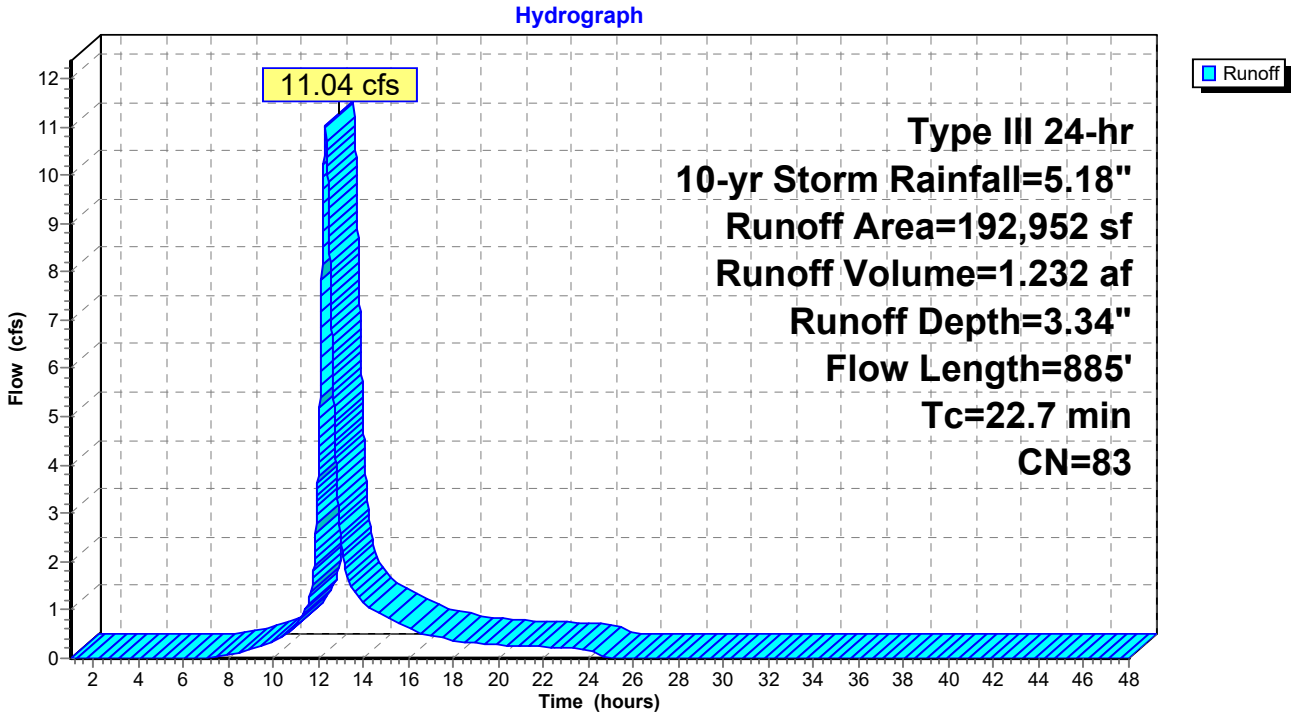
Runoff = 11.04 cfs @ 12.31 hrs, Volume= 1.232 af, Depth= 3.34"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
*	38,260	96	Gravel
	18,614	39	Pasture/grassland/range, Good, HSG A
	8,866	98	Roofs, HSG A
*	73,911	76	Topping Stone (Gravel)
	9,866	98	Paved parking, HSG A
*	43,435	98	Foundations/Equipment
	192,952	83	Weighted Average
	130,785		67.78% Pervious Area
	62,167		32.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
0.8	75	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
1.8	83	0.0120	0.77		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
4.3	440	0.0110	1.69		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
2.9	187	0.0050	1.06		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
22.7	885	Total			

Subcatchment SC-1B: SC-1B SOUTH



Summary for Subcatchment SC-1C: SC-1C NORTH&EAST

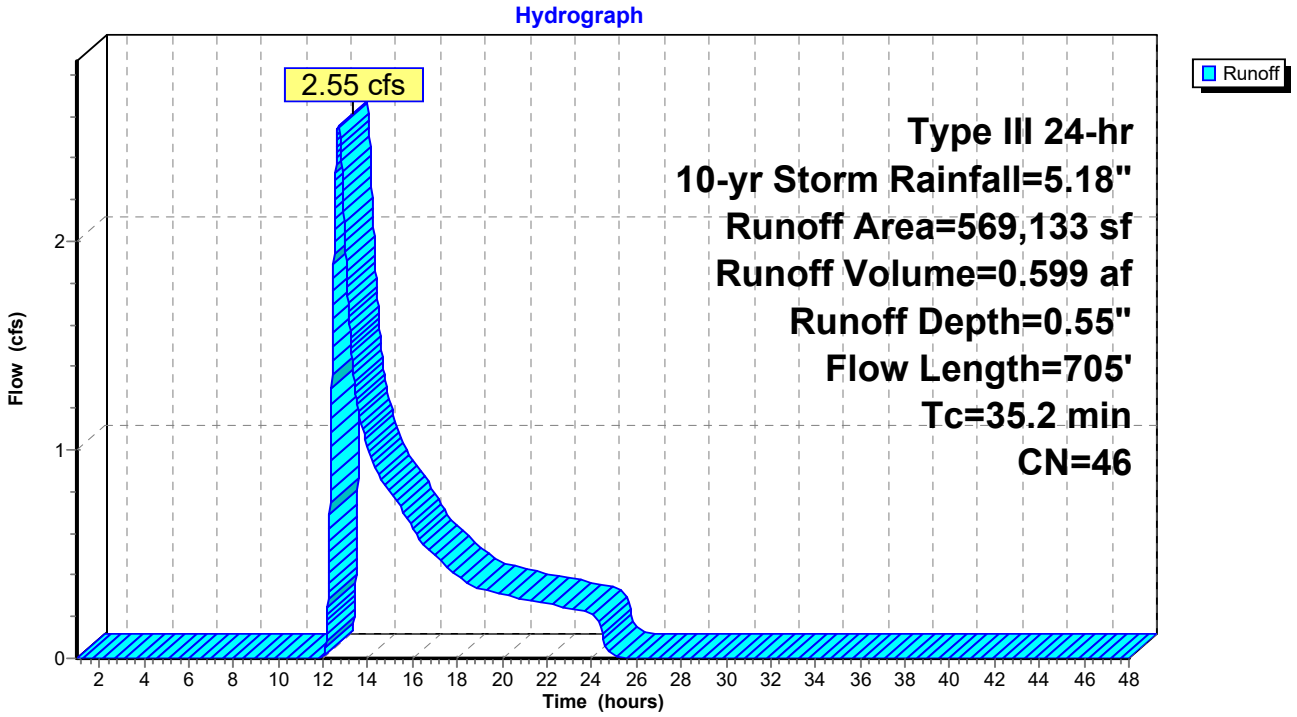
Runoff = 2.55 cfs @ 12.71 hrs, Volume= 0.599 af, Depth= 0.55"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
	264,412	39	Pasture/grassland/range, Good, HSG A
	207,341	30	Woods, Good, HSG A
	2,581	98	Paved parking, HSG A
*	83,152	96	Gravel
	11,647	98	Roofs, HSG A
	569,133	46	Weighted Average
	554,905		97.50% Pervious Area
	14,228		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0050	0.10		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
14.1	430	0.0010	0.51		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
4.1	175	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.2	705	Total			

Subcatchment SC-1C: SC-1C NORTH&EAST



Summary for Subcatchment SC-1D: SC-1D BERM

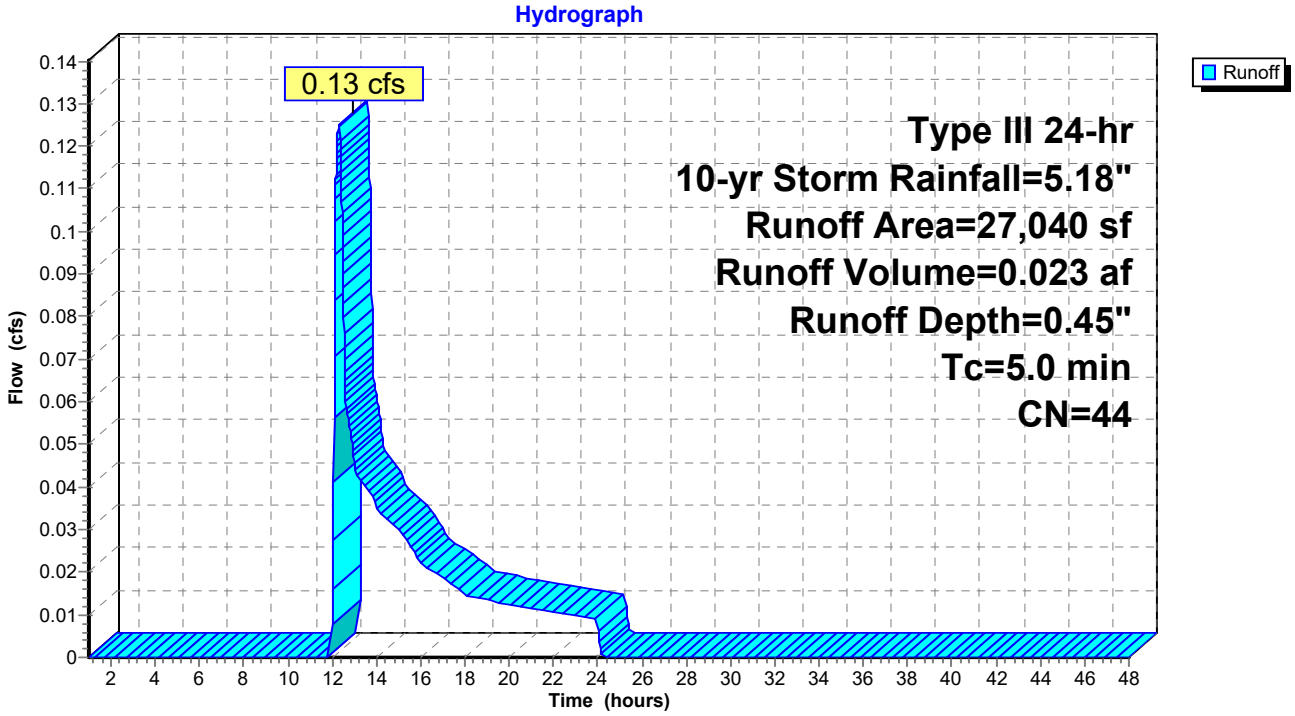
Runoff = 0.13 cfs @ 12.29 hrs, Volume= 0.023 af, Depth= 0.45"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
*	2,164	96	Gravel
	24,876	39	Pasture/grassland/range, Good, HSG A
	27,040	44	Weighted Average
	27,040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-1D: SC-1D BERM



Summary for Subcatchment SC-2: Silver Street

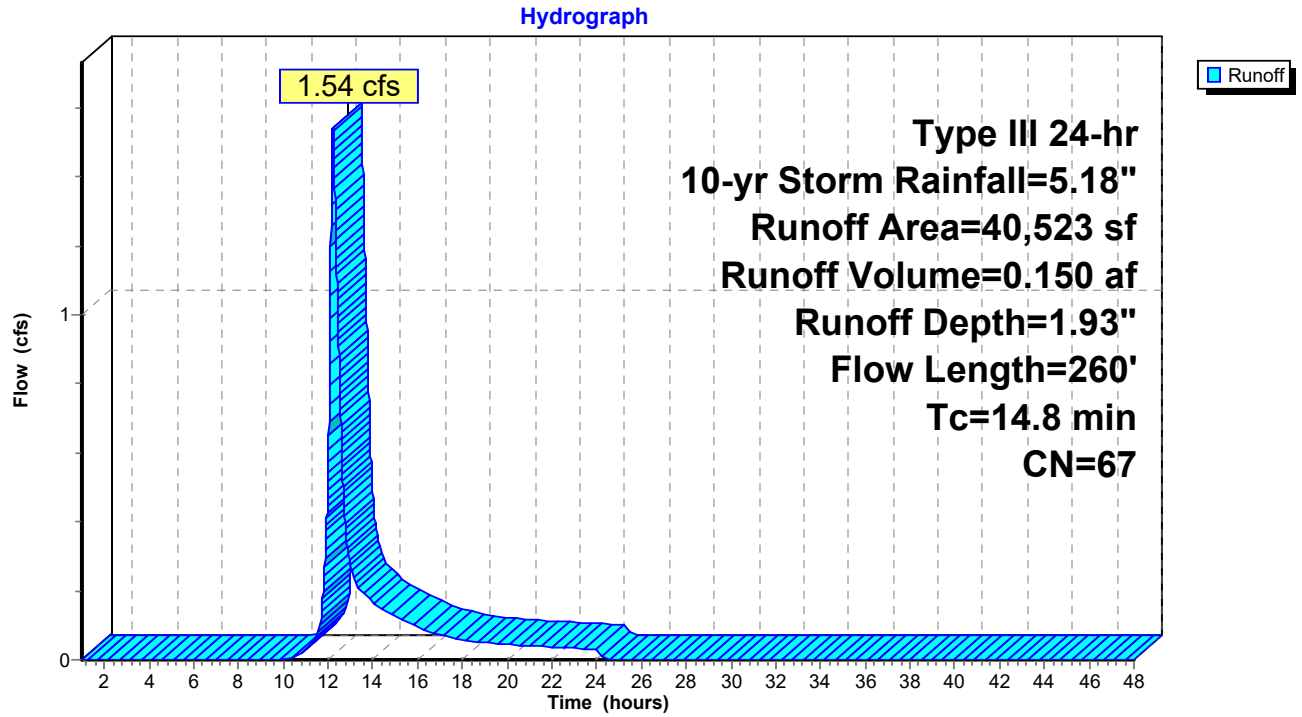
Runoff = 1.54 cfs @ 12.22 hrs, Volume= 0.150 af, Depth= 1.93"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

Area (sf)	CN	Description
15,815	98	Paved parking, HSG A
21,395	39	Pasture/grassland/range, Good, HSG A
3,313	98	Roofs, HSG A
40,523	67	Weighted Average
21,395		52.80% Pervious Area
19,128		47.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.9	160	0.0050	1.44		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.8	260	Total			

Subcatchment SC-2: Silver Street



Summary for Subcatchment SC-3: Southwest

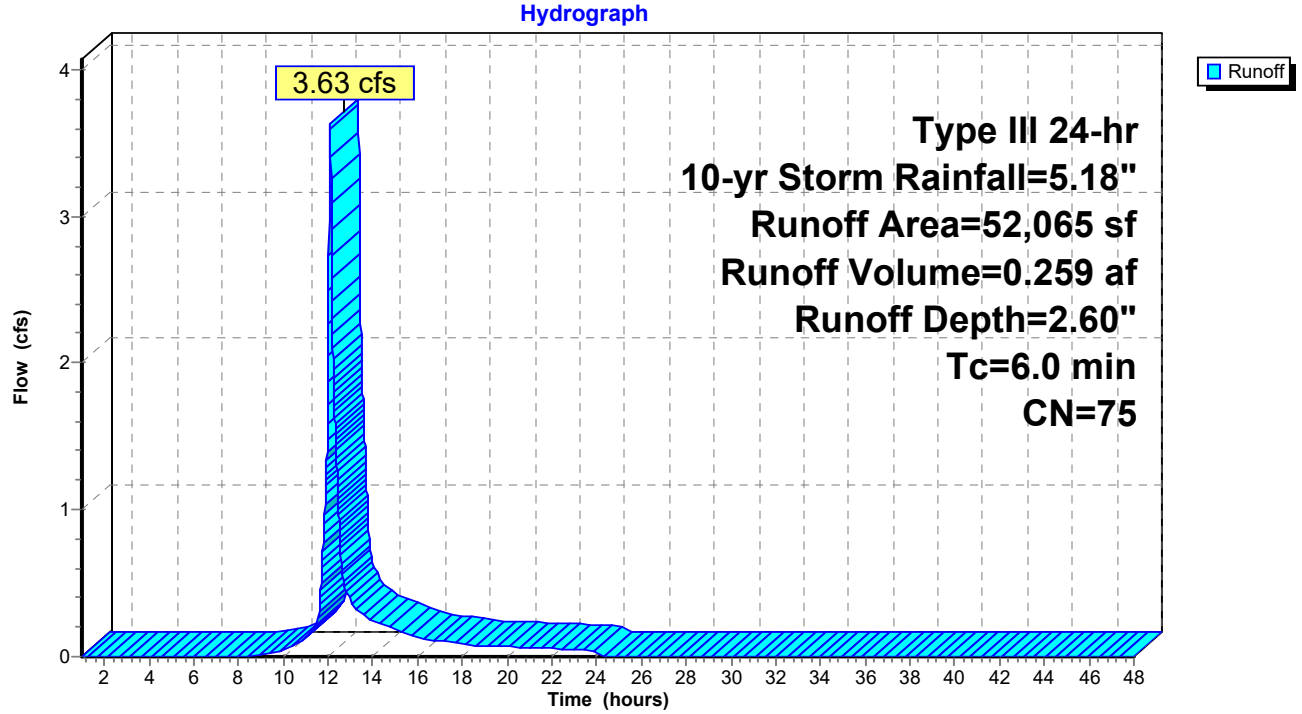
Runoff = 3.63 cfs @ 12.09 hrs, Volume= 0.259 af, Depth= 2.60"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
*	6,728	96	Gravel
	15,522	39	Pasture/grassland/range, Good, HSG A
	6,300	80	Pasture/grassland/range, Good, HSG D
	8,652	98	Paved parking, HSG A
	4,366	98	Roofs, HSG A
*	6,774	76	Topping Stone (Gravel)
*	3,723	98	Foundations/Equipment
	52,065	75	Weighted Average
	35,324		67.85% Pervious Area
	16,741		32.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3: Southwest



Summary for Pond 3P: Forebay

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 3.04" for 10-yr Storm event
Inflow = 15.64 cfs @ 12.31 hrs, Volume= 1.753 af
Outflow = 15.64 cfs @ 12.32 hrs, Volume= 1.729 af, Atten= 0%, Lag= 0.3 min
Primary = 15.64 cfs @ 12.32 hrs, Volume= 1.729 af
Routed to Pond 4P : Basin

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.38' @ 12.32 hrs Surf.Area= 1,705 sf Storage= 1,329 cf

Plug-Flow detention time= 13.0 min calculated for 1.729 af (99% of inflow)
Center-of-Mass det. time= 4.8 min (839.4 - 834.7)

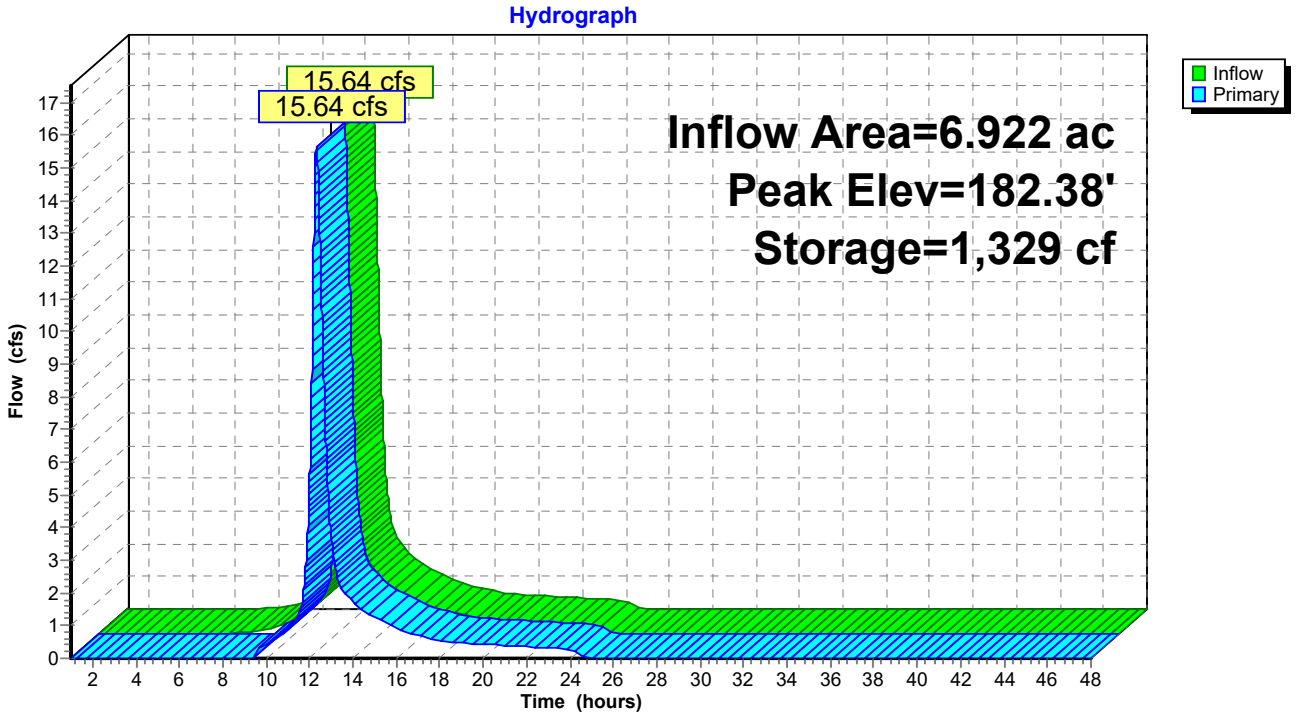
Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	2,650 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.00	323	0	0
182.00	1,219	771	771
182.50	1,856	769	1,540
183.00	2,584	1,110	2,650

Device	Routing	Invert	Outlet Devices
#1	Primary	182.20'	**85.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=15.64 cfs @ 12.32 hrs HW=182.38' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 15.64 cfs @ 1.01 fps)

Pond 3P: Forebay



Summary for Pond 4P: Basin

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 3.00" for 10-yr Storm event
Inflow = 15.64 cfs @ 12.32 hrs, Volume= 1.729 af
Outflow = 15.61 cfs @ 12.33 hrs, Volume= 1.652 af, Atten= 0%, Lag= 1.0 min
Primary = 15.61 cfs @ 12.33 hrs, Volume= 1.652 af
Routed to Link AP-1 : AP-1

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.37' @ 12.33 hrs Surf.Area= 5,375 sf Storage= 10,770 cf

Plug-Flow detention time= 59.9 min calculated for 1.652 af (96% of inflow)
Center-of-Mass det. time= 35.1 min (874.5 - 839.4)

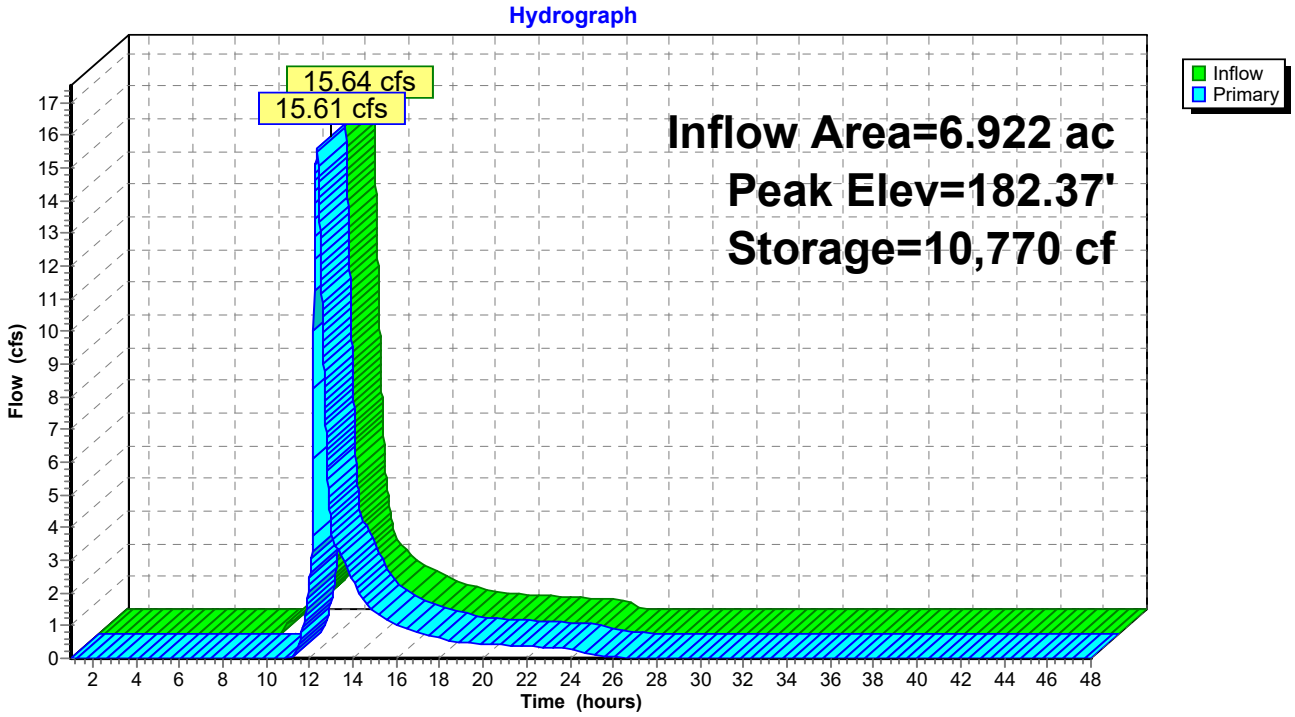
Volume	Invert	Avail.Storage	Storage Description
#1	179.00'	17,725 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
179.00	1,176	0	0
180.00	2,318	1,747	1,747
180.50	2,919	1,309	3,056
180.75	3,227	768	3,825
181.00	3,541	846	4,671
181.50	4,184	1,931	6,602
182.00	4,851	2,259	8,861
183.00	6,254	5,553	14,413
183.50	6,995	3,312	17,725

Device	Routing	Invert	Outlet Devices
#1	Primary	182.20'	**40.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	182.20'	**30.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Primary	180.60'	**12.0" Round Culvert** L= 20.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 180.60' / 180.40' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=15.59 cfs @ 12.33 hrs HW=182.37' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 6.76 cfs @ 0.97 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 5.07 cfs @ 0.97 fps)
- **3=Culvert** (Inlet Controls 3.77 cfs @ 4.79 fps)

Pond 4P: Basin

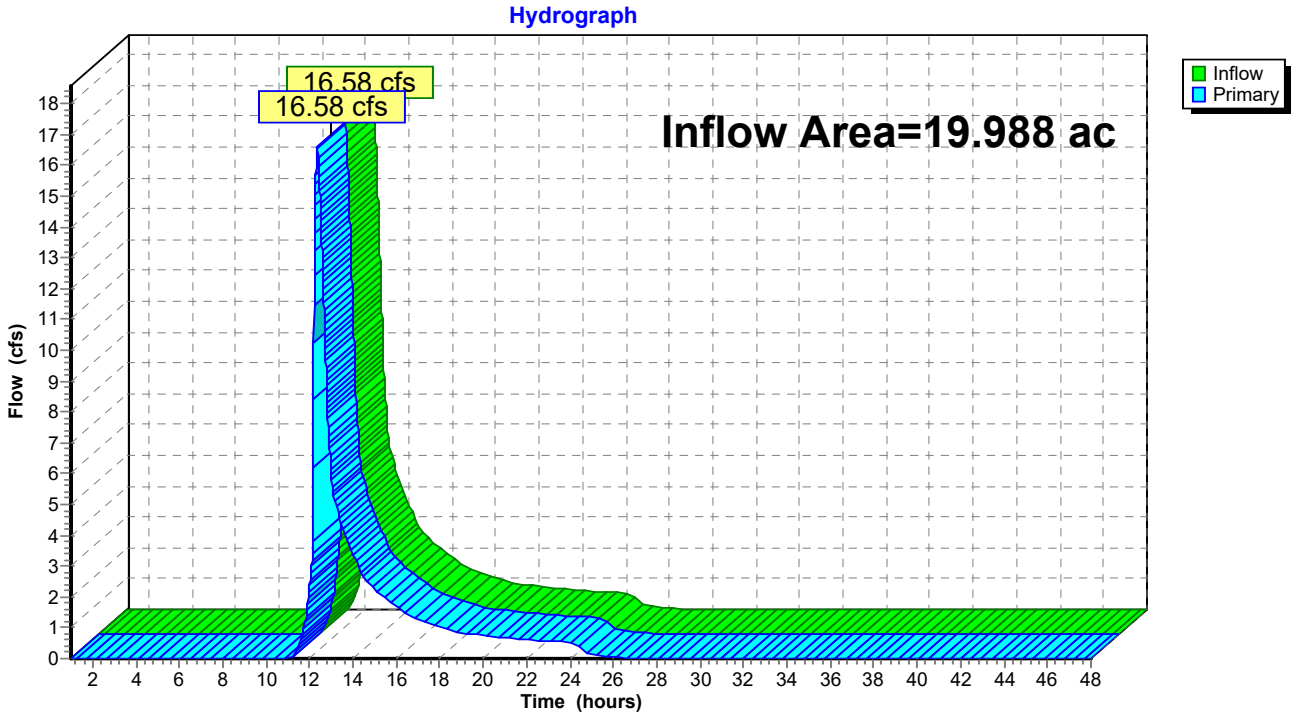


Summary for Link AP-1: AP-1

Inflow Area = 19.988 ac, 10.60% Impervious, Inflow Depth = 1.35" for 10-yr Storm event
Inflow = 16.58 cfs @ 12.35 hrs, Volume= 2.251 af
Primary = 16.58 cfs @ 12.35 hrs, Volume= 2.251 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

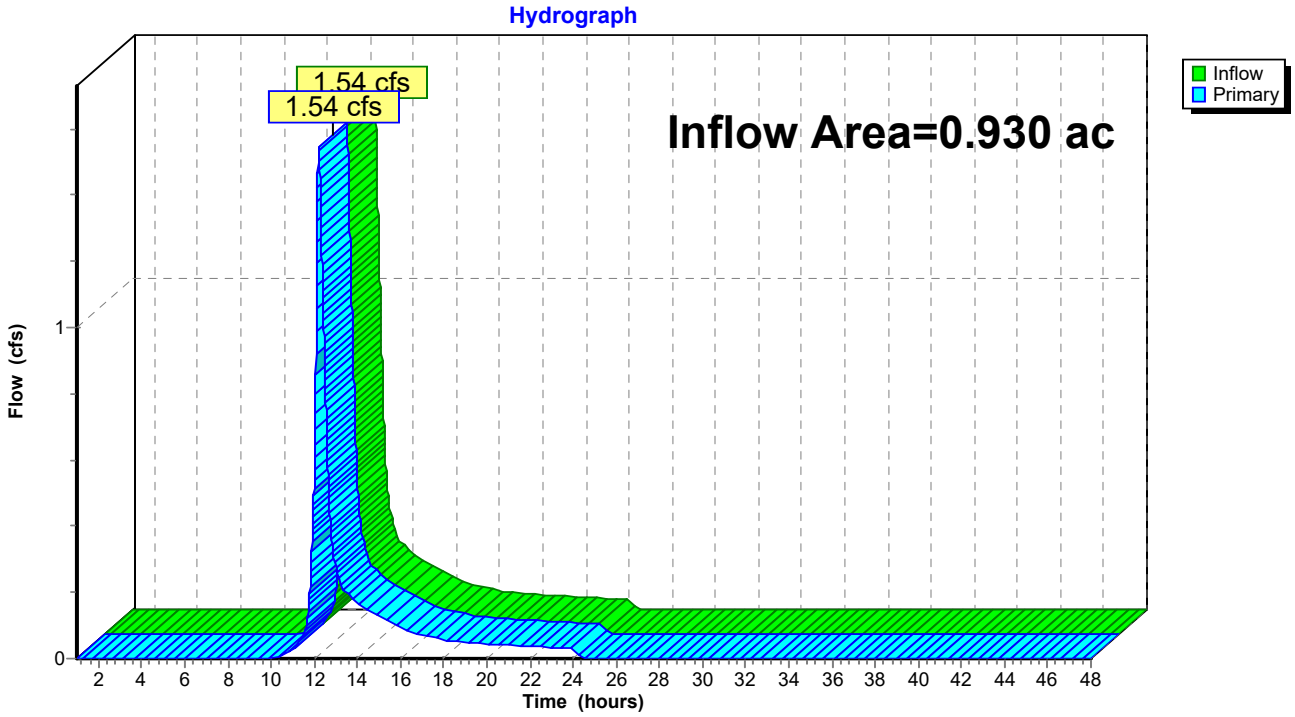


Summary for Link AP-2: AP-2

Inflow Area = 0.930 ac, 47.20% Impervious, Inflow Depth = 1.93" for 10-yr Storm event
Inflow = 1.54 cfs @ 12.22 hrs, Volume= 0.150 af
Primary = 1.54 cfs @ 12.22 hrs, Volume= 0.150 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2

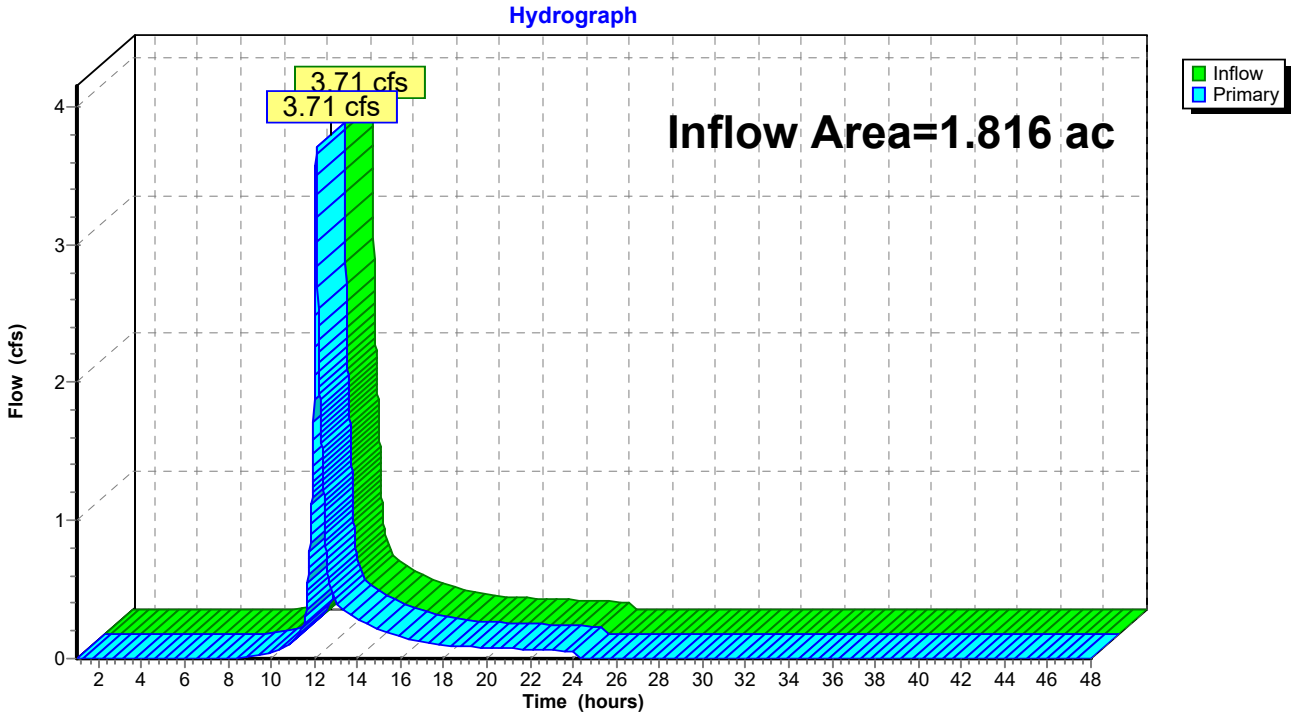


Summary for Link AP-3: AP-3

Inflow Area = 1.816 ac, 21.16% Impervious, Inflow Depth = 1.86" for 10-yr Storm event
Inflow = 3.71 cfs @ 12.09 hrs, Volume= 0.282 af
Primary = 3.71 cfs @ 12.09 hrs, Volume= 0.282 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-3: AP-3



Time span=1.00-48.00 hrs, dt=0.01 hrs, 4701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1A: SC-1A NORTH Runoff Area=108,582 sf 14.61% Impervious Runoff Depth=3.53"
Flow Length=787' Tc=23.1 min CN=74 Runoff=6.54 cfs 0.734 af

Subcatchment SC-1B: SC-1B SOUTH Runoff Area=192,952 sf 32.22% Impervious Runoff Depth=4.47"
Flow Length=885' Tc=22.7 min CN=83 Runoff=14.68 cfs 1.651 af

Subcatchment SC-1C: SC-1C Runoff Area=569,133 sf 2.50% Impervious Runoff Depth=1.04"
Flow Length=705' Tc=35.2 min CN=46 Runoff=6.27 cfs 1.137 af

Subcatchment SC-1D: SC-1D BERM Runoff Area=27,040 sf 0.00% Impervious Runoff Depth=0.90"
Tc=5.0 min CN=44 Runoff=0.43 cfs 0.047 af

Subcatchment SC-2: Silver Street Runoff Area=40,523 sf 47.20% Impervious Runoff Depth=2.84"
Flow Length=260' Tc=14.8 min CN=67 Runoff=2.33 cfs 0.220 af

Subcatchment SC-3: Southwest Runoff Area=52,065 sf 32.15% Impervious Runoff Depth=3.63"
Tc=6.0 min CN=75 Runoff=5.10 cfs 0.362 af

Pond 3P: Forebay Peak Elev=182.42' Storage=1,398 cf Inflow=21.22 cfs 2.385 af
Outflow=21.21 cfs 2.361 af

Pond 4P: Basin Peak Elev=182.42' Storage=11,036 cf Inflow=21.21 cfs 2.361 af
Outflow=21.19 cfs 2.284 af

Link AP-1: AP-1 Inflow=24.89 cfs 3.421 af
Primary=24.89 cfs 3.421 af

Link AP-2: AP-2 Inflow=2.33 cfs 0.220 af
Primary=2.33 cfs 0.220 af

Link AP-3: AP-3 Inflow=5.52 cfs 0.409 af
Primary=5.52 cfs 0.409 af

Summary for Subcatchment SC-1A: SC-1A NORTH

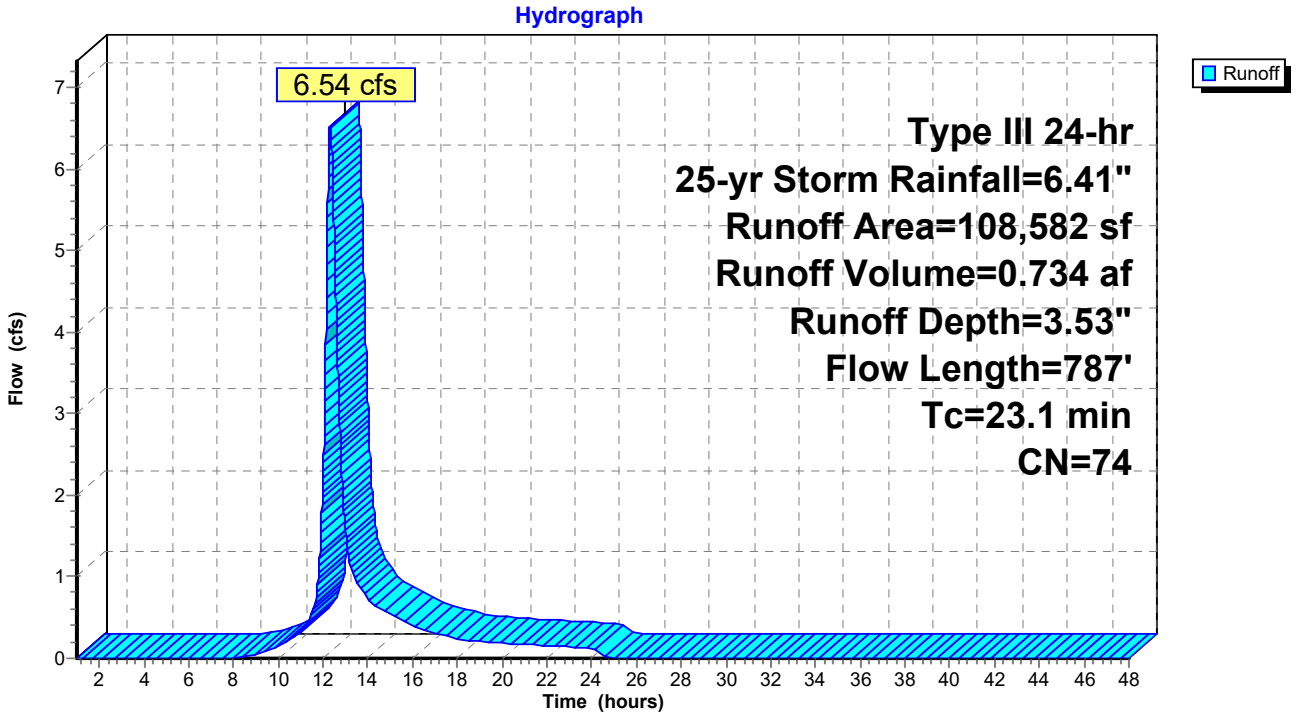
Runoff = 6.54 cfs @ 12.32 hrs, Volume= 0.734 af, Depth= 3.53"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
*	19,299	96	Gravel
	24,825	39	Pasture/grassland/range, Good, HSG A
	1,912	98	Paved parking, HSG A
*	48,595	76	Topping Stone (Gravel)
*	13,951	98	Foundations/Equipment
	108,582	74	Weighted Average
	92,719		85.39% Pervious Area
	15,863		14.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.7	157	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.6	385	0.0120	1.76		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
2.9	145	0.0030	0.82		**Shallow Concentrated Flow, D-E** Grassed Waterway Kv= 15.0 fps
23.1	787	Total			

Subcatchment SC-1A: SC-1A NORTH



Summary for Subcatchment SC-1B: SC-1B SOUTH

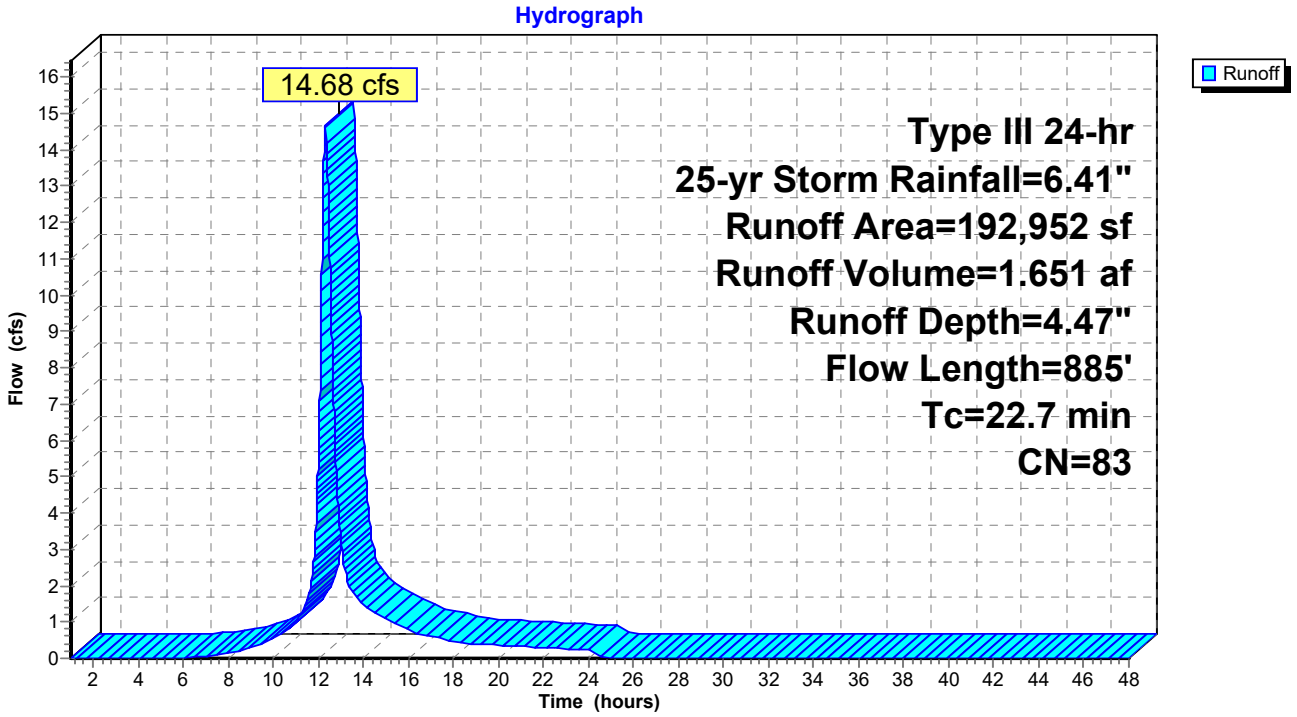
Runoff = 14.68 cfs @ 12.31 hrs, Volume= 1.651 af, Depth= 4.47"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
*	38,260	96	Gravel
	18,614	39	Pasture/grassland/range, Good, HSG A
	8,866	98	Roofs, HSG A
*	73,911	76	Topping Stone (Gravel)
	9,866	98	Paved parking, HSG A
*	43,435	98	Foundations/Equipment
	192,952	83	Weighted Average
	130,785		67.78% Pervious Area
	62,167		32.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
0.8	75	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
1.8	83	0.0120	0.77		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
4.3	440	0.0110	1.69		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
2.9	187	0.0050	1.06		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
22.7	885	Total			

Subcatchment SC-1B: SC-1B SOUTH



Summary for Subcatchment SC-1C: SC-1C NORTH&EAST

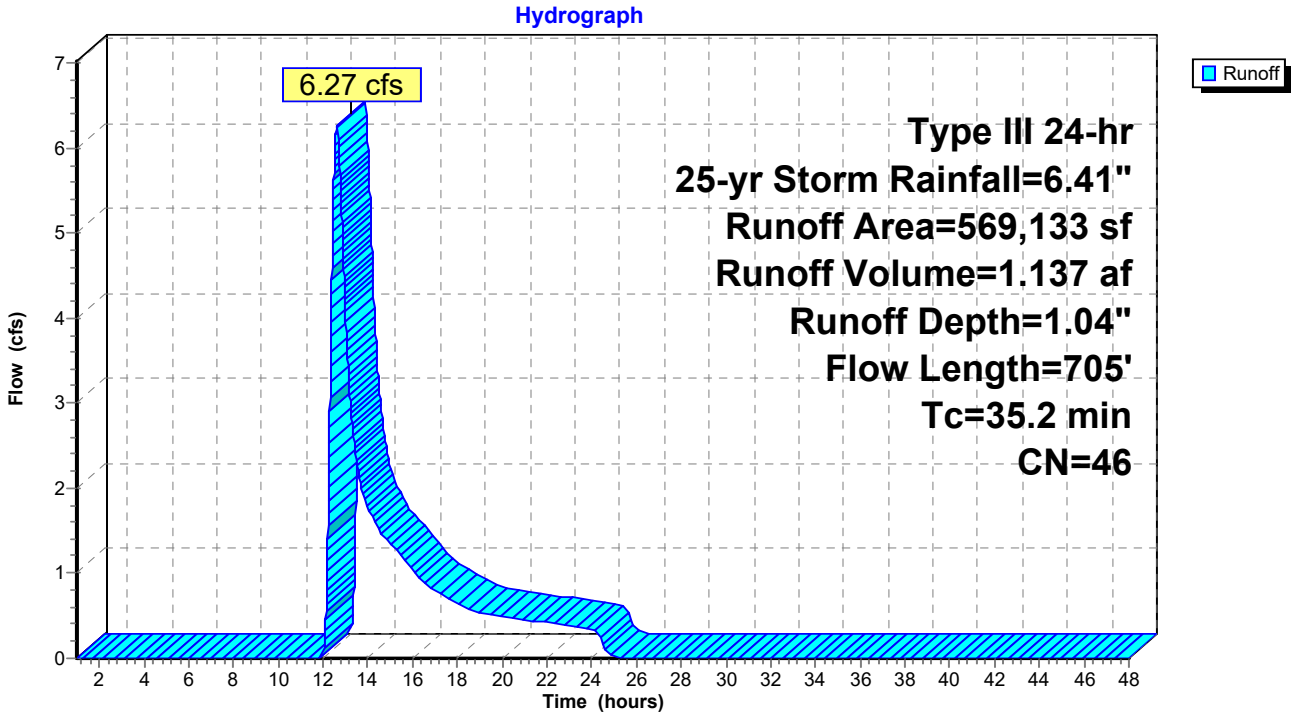
Runoff = 6.27 cfs @ 12.63 hrs, Volume= 1.137 af, Depth= 1.04"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
	264,412	39	Pasture/grassland/range, Good, HSG A
	207,341	30	Woods, Good, HSG A
	2,581	98	Paved parking, HSG A
*	83,152	96	Gravel
	11,647	98	Roofs, HSG A
	569,133	46	Weighted Average
	554,905		97.50% Pervious Area
	14,228		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0050	0.10		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
14.1	430	0.0010	0.51		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
4.1	175	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.2	705	Total			

Subcatchment SC-1C: SC-1C NORTH&EAST



Summary for Subcatchment SC-1D: SC-1D BERM

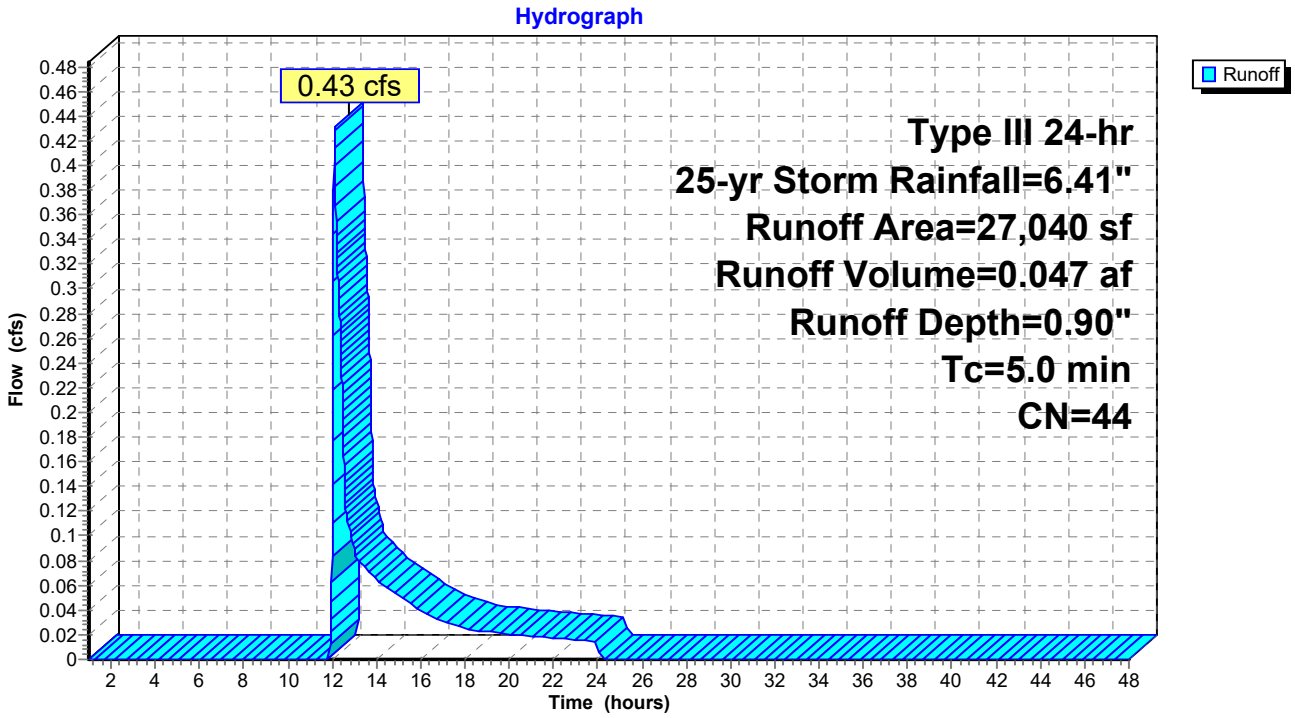
Runoff = 0.43 cfs @ 12.11 hrs, Volume= 0.047 af, Depth= 0.90"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
*	2,164	96	Gravel
	24,876	39	Pasture/grassland/range, Good, HSG A
	27,040	44	Weighted Average
	27,040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-1D: SC-1D BERM



Summary for Subcatchment SC-2: Silver Street

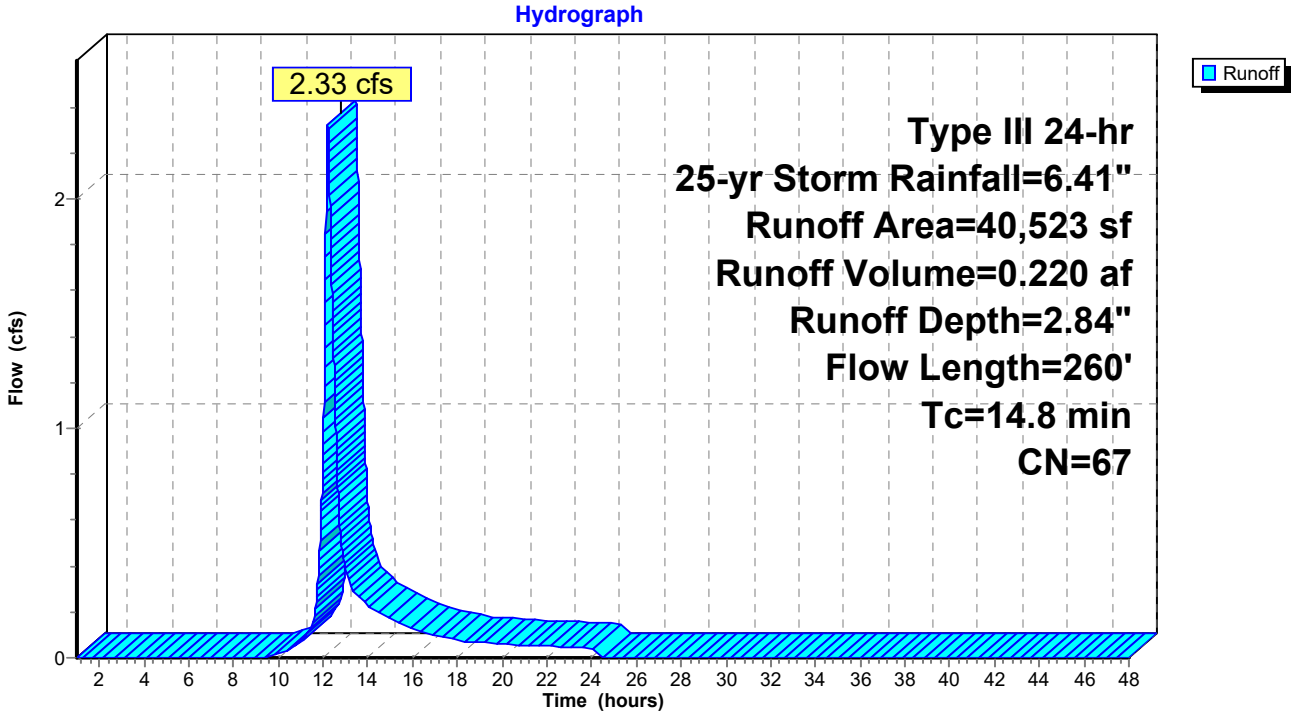
Runoff = 2.33 cfs @ 12.21 hrs, Volume= 0.220 af, Depth= 2.84"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

Area (sf)	CN	Description
15,815	98	Paved parking, HSG A
21,395	39	Pasture/grassland/range, Good, HSG A
3,313	98	Roofs, HSG A
40,523	67	Weighted Average
21,395		52.80% Pervious Area
19,128		47.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.9	160	0.0050	1.44		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.8	260	Total			

Subcatchment SC-2: Silver Street



Summary for Subcatchment SC-3: Southwest

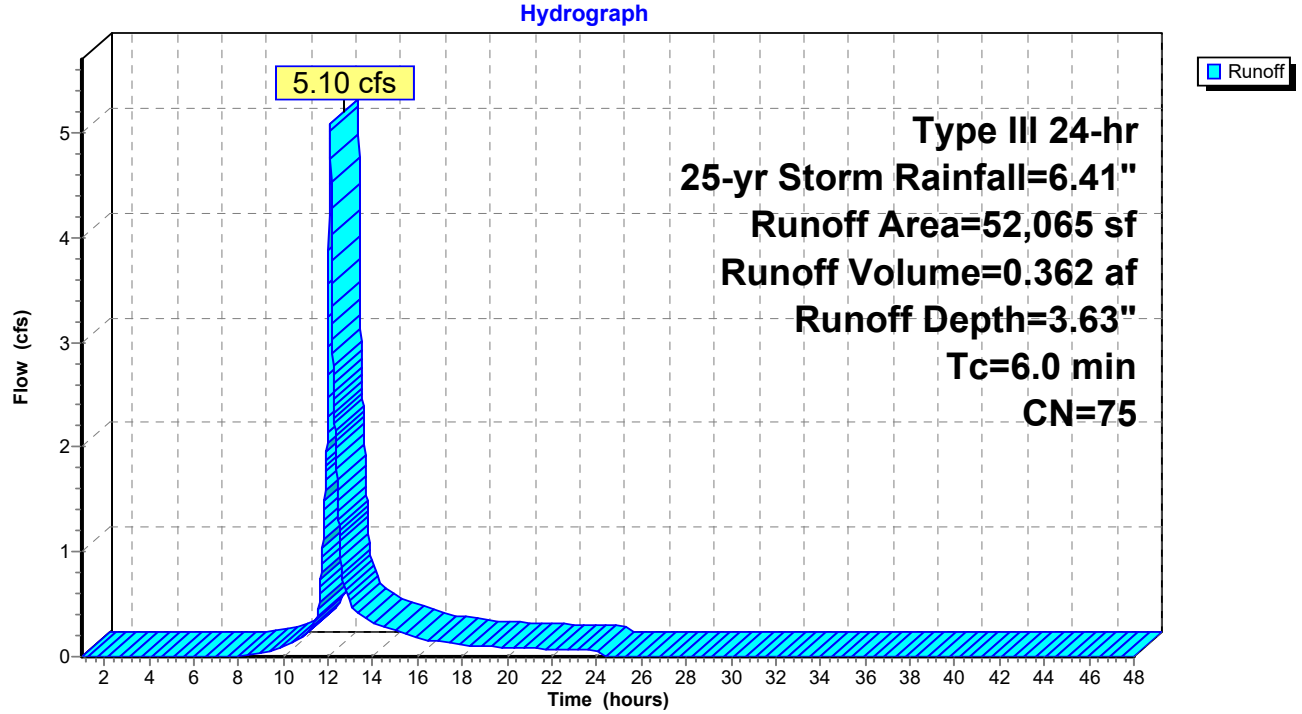
Runoff = 5.10 cfs @ 12.09 hrs, Volume= 0.362 af, Depth= 3.63"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
*	6,728	96	Gravel
	15,522	39	Pasture/grassland/range, Good, HSG A
	6,300	80	Pasture/grassland/range, Good, HSG D
	8,652	98	Paved parking, HSG A
	4,366	98	Roofs, HSG A
*	6,774	76	Topping Stone (Gravel)
*	3,723	98	Foundations/Equipment
	52,065	75	Weighted Average
	35,324		67.85% Pervious Area
	16,741		32.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3: Southwest



Summary for Pond 3P: Forebay

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 4.13" for 25-yr Storm event
Inflow = 21.22 cfs @ 12.31 hrs, Volume= 2.385 af
Outflow = 21.21 cfs @ 12.31 hrs, Volume= 2.361 af, Atten= 0%, Lag= 0.2 min
Primary = 21.21 cfs @ 12.31 hrs, Volume= 2.361 af
Routed to Pond 4P : Basin

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.42' @ 12.31 hrs Surf.Area= 1,756 sf Storage= 1,398 cf

Plug-Flow detention time= 10.2 min calculated for 2.361 af (99% of inflow)
Center-of-Mass det. time= 4.1 min (830.2 - 826.1)

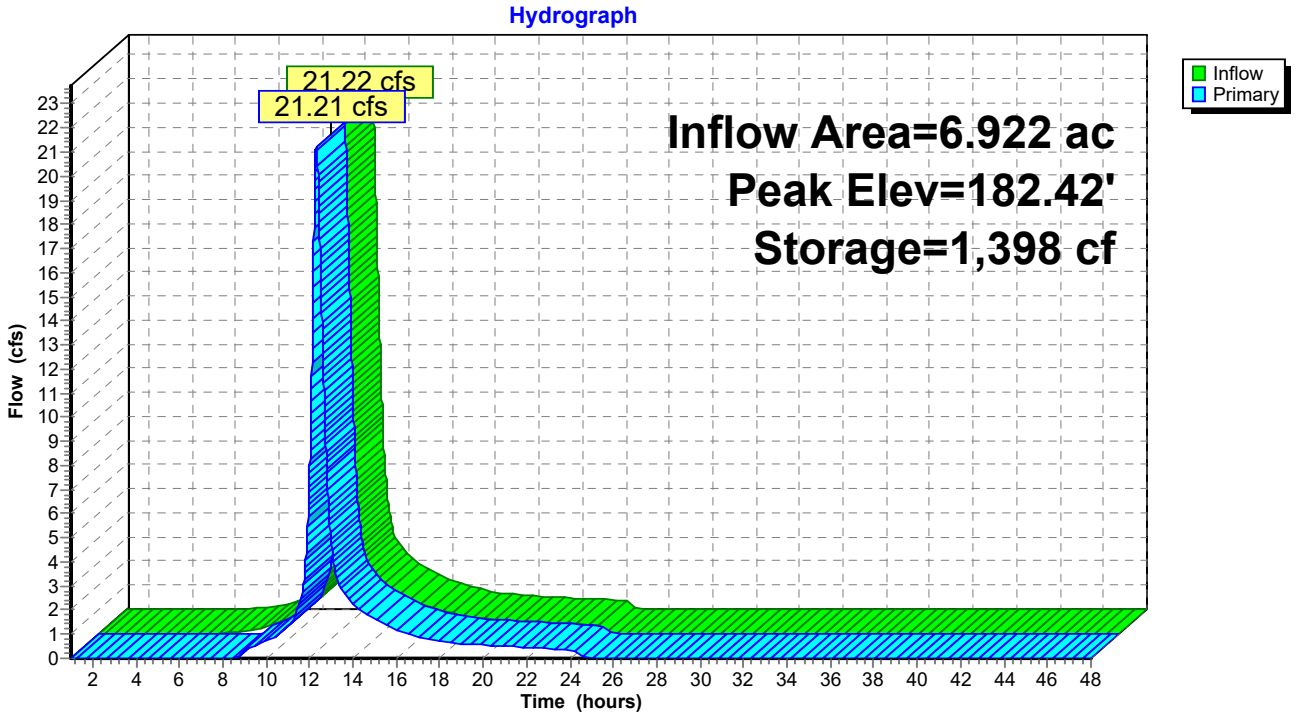
Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	2,650 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.00	323	0	0
182.00	1,219	771	771
182.50	1,856	769	1,540
183.00	2,584	1,110	2,650

Device	Routing	Invert	Outlet Devices
#1	Primary	182.20'	**85.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=21.21 cfs @ 12.31 hrs HW=182.42' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 21.21 cfs @ 1.13 fps)

Pond 3P: Forebay



Summary for Pond 4P: Basin

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 4.09" for 25-yr Storm event
Inflow = 21.21 cfs @ 12.31 hrs, Volume= 2.361 af
Outflow = 21.19 cfs @ 12.33 hrs, Volume= 2.284 af, Atten= 0%, Lag= 0.8 min
Primary = 21.19 cfs @ 12.33 hrs, Volume= 2.284 af
Routed to Link AP-1 : AP-1

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.42' @ 12.33 hrs Surf.Area= 5,444 sf Storage= 11,036 cf

Plug-Flow detention time= 49.5 min calculated for 2.284 af (97% of inflow)
Center-of-Mass det. time= 30.6 min (860.8 - 830.2)

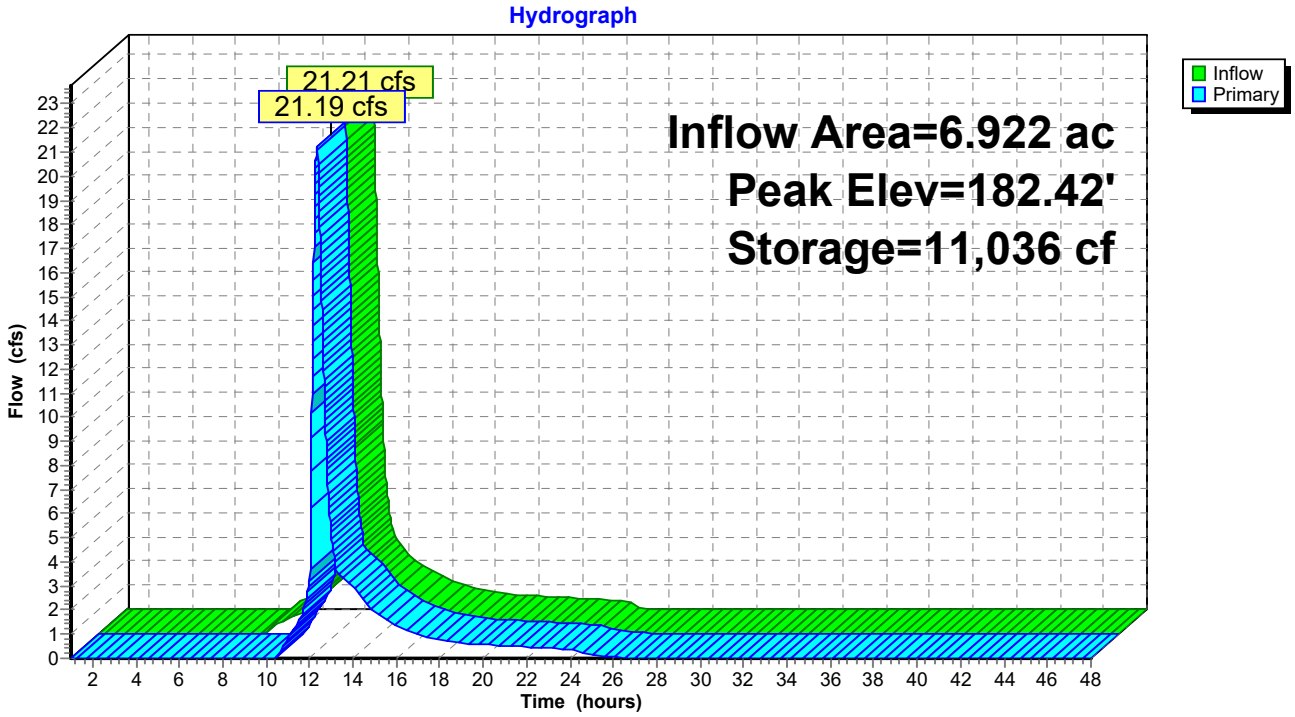
Volume	Invert	Avail.Storage	Storage Description
#1	179.00'	17,725 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
179.00	1,176	0	0
180.00	2,318	1,747	1,747
180.50	2,919	1,309	3,056
180.75	3,227	768	3,825
181.00	3,541	846	4,671
181.50	4,184	1,931	6,602
182.00	4,851	2,259	8,861
183.00	6,254	5,553	14,413
183.50	6,995	3,312	17,725

Device	Routing	Invert	Outlet Devices
#1	Primary	182.20'	**40.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	182.20'	**30.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Primary	180.60'	**12.0" Round Culvert** L= 20.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 180.60' / 180.40' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=21.16 cfs @ 12.33 hrs HW=182.42' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 9.90 cfs @ 1.11 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 7.43 cfs @ 1.11 fps)
- **3=Culvert** (Inlet Controls 3.84 cfs @ 4.89 fps)

Pond 4P: Basin

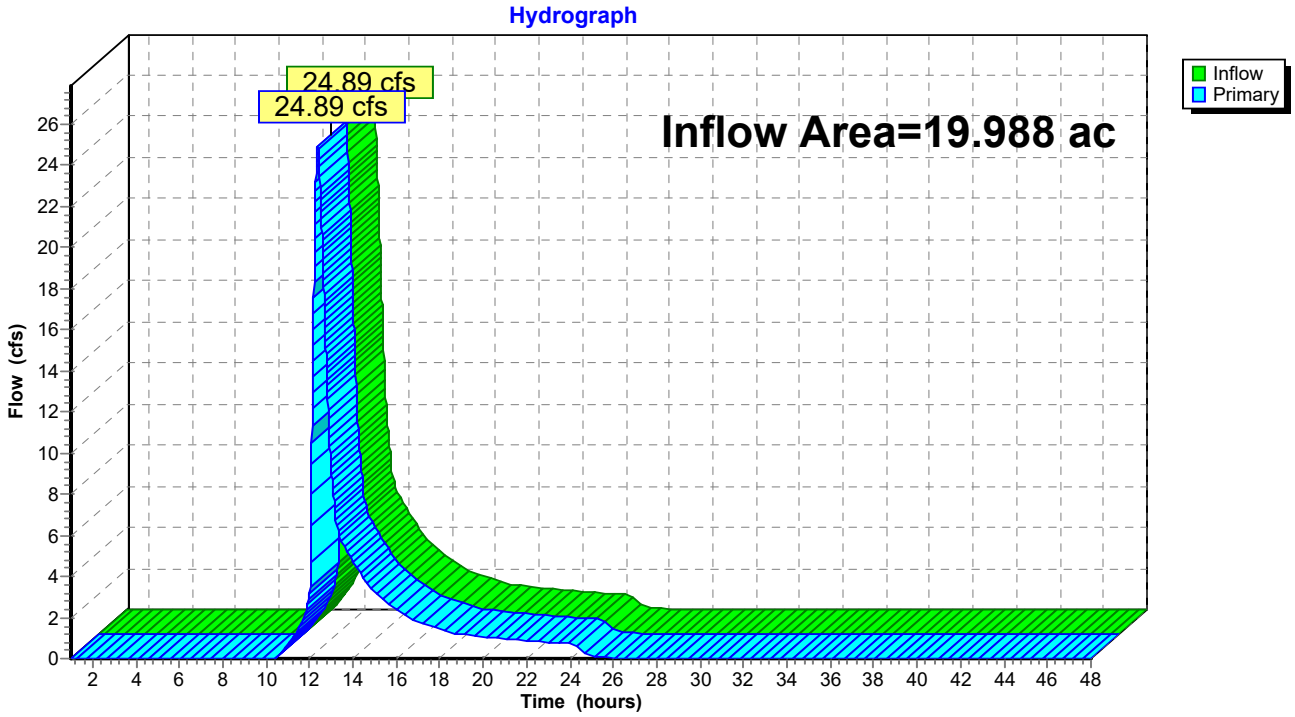


Summary for Link AP-1: AP-1

Inflow Area = 19.988 ac, 10.60% Impervious, Inflow Depth = 2.05" for 25-yr Storm event
Inflow = 24.89 cfs @ 12.37 hrs, Volume= 3.421 af
Primary = 24.89 cfs @ 12.37 hrs, Volume= 3.421 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

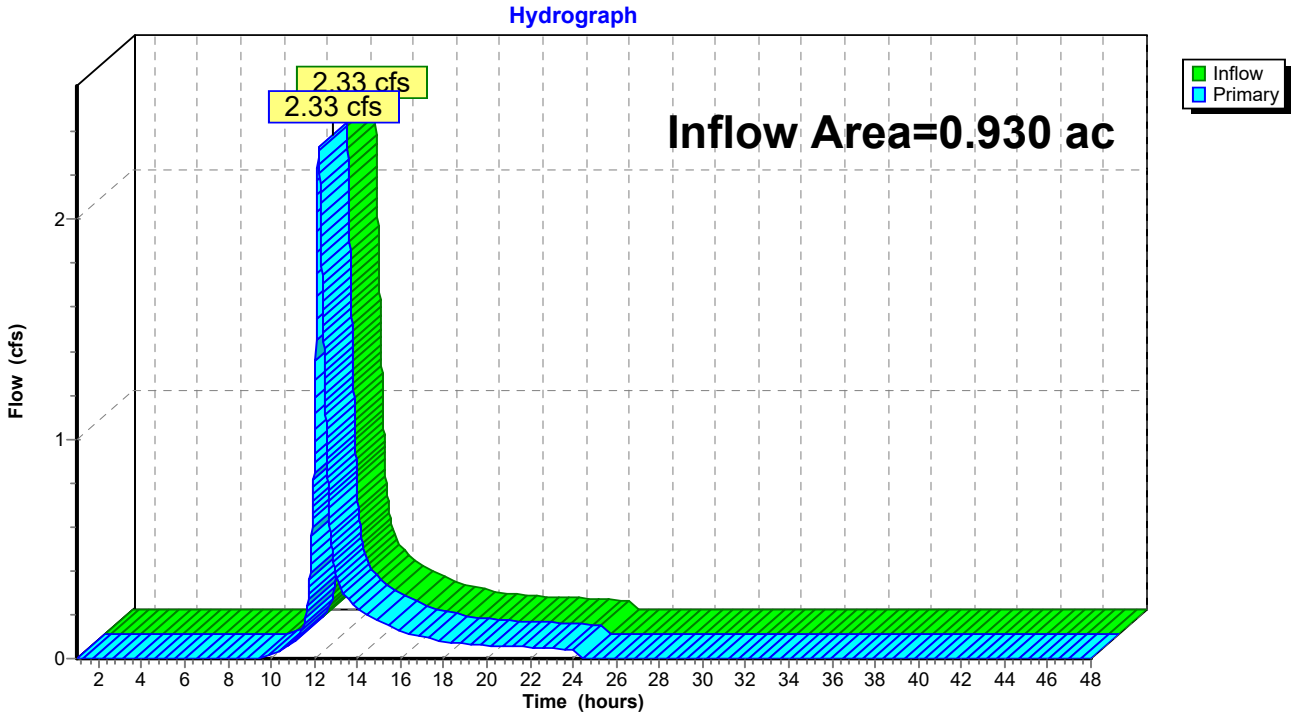


Summary for Link AP-2: AP-2

Inflow Area = 0.930 ac, 47.20% Impervious, Inflow Depth = 2.84" for 25-yr Storm event
Inflow = 2.33 cfs @ 12.21 hrs, Volume= 0.220 af
Primary = 2.33 cfs @ 12.21 hrs, Volume= 0.220 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2

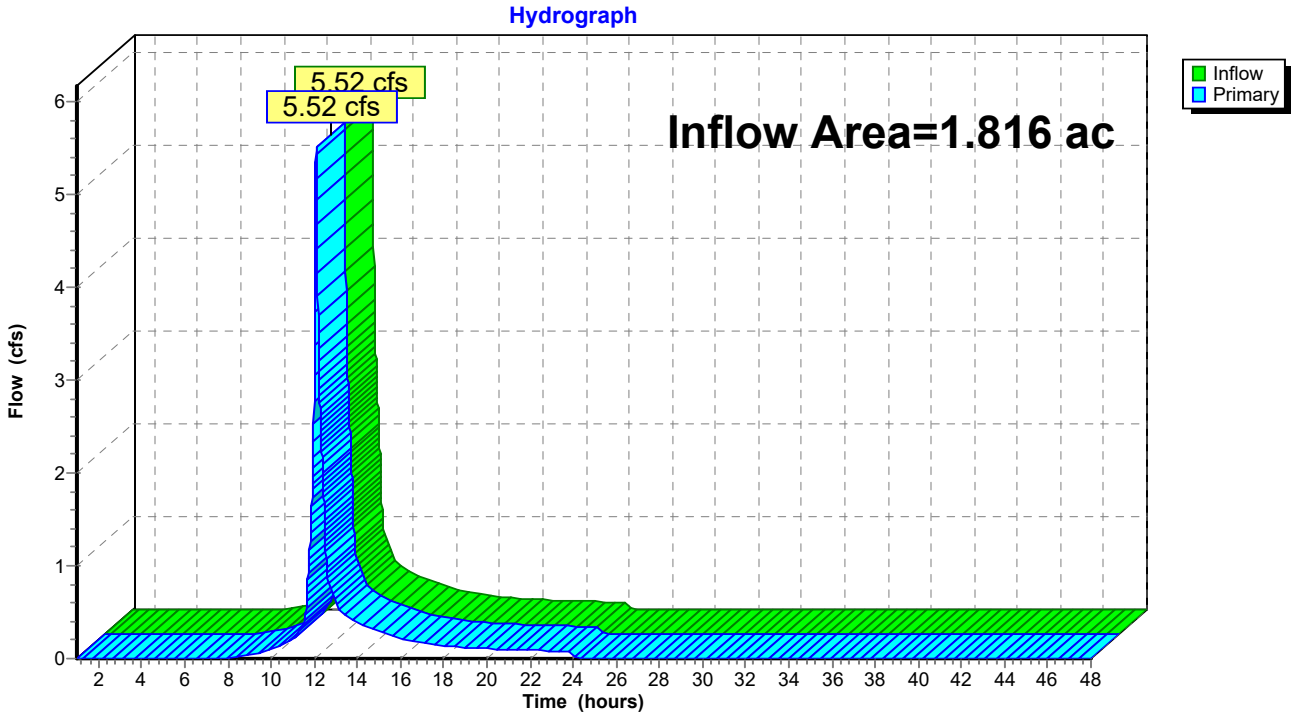


Summary for Link AP-3: AP-3

Inflow Area = 1.816 ac, 21.16% Impervious, Inflow Depth = 2.70" for 25-yr Storm event
Inflow = 5.52 cfs @ 12.09 hrs, Volume= 0.409 af
Primary = 5.52 cfs @ 12.09 hrs, Volume= 0.409 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-3: AP-3



Time span=1.00-48.00 hrs, dt=0.01 hrs, 4701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1A: SC-1A NORTH Runoff Area=108,582 sf 14.61% Impervious Runoff Depth=5.20"
Flow Length=787' Tc=23.1 min CN=74 Runoff=9.63 cfs 1.081 af

Subcatchment SC-1B: SC-1B SOUTH Runoff Area=192,952 sf 32.22% Impervious Runoff Depth=6.27"
Flow Length=885' Tc=22.7 min CN=83 Runoff=20.34 cfs 2.316 af

Subcatchment SC-1C: SC-1C Runoff Area=569,133 sf 2.50% Impervious Runoff Depth=2.01"
Flow Length=705' Tc=35.2 min CN=46 Runoff=14.18 cfs 2.186 af

Subcatchment SC-1D: SC-1D BERM Runoff Area=27,040 sf 0.00% Impervious Runoff Depth=1.80"
Tc=5.0 min CN=44 Runoff=1.14 cfs 0.093 af

Subcatchment SC-2: Silver Street Runoff Area=40,523 sf 47.20% Impervious Runoff Depth=4.38"
Flow Length=260' Tc=14.8 min CN=67 Runoff=3.63 cfs 0.340 af

Subcatchment SC-3: Southwest Runoff Area=52,065 sf 32.15% Impervious Runoff Depth=5.32"
Tc=6.0 min CN=75 Runoff=7.42 cfs 0.530 af

Pond 3P: Forebay Peak Elev=182.48' Storage=1,494 cf Inflow=29.96 cfs 3.397 af
Outflow=29.95 cfs 3.373 af

Pond 4P: Basin Peak Elev=182.49' Storage=11,388 cf Inflow=29.95 cfs 3.373 af
Outflow=29.92 cfs 3.296 af

Link AP-1: AP-1 Inflow=40.40 cfs 5.482 af
Primary=40.40 cfs 5.482 af

Link AP-2: AP-2 Inflow=3.63 cfs 0.340 af
Primary=3.63 cfs 0.340 af

Link AP-3: AP-3 Inflow=8.56 cfs 0.623 af
Primary=8.56 cfs 0.623 af

Summary for Subcatchment SC-1A: SC-1A NORTH

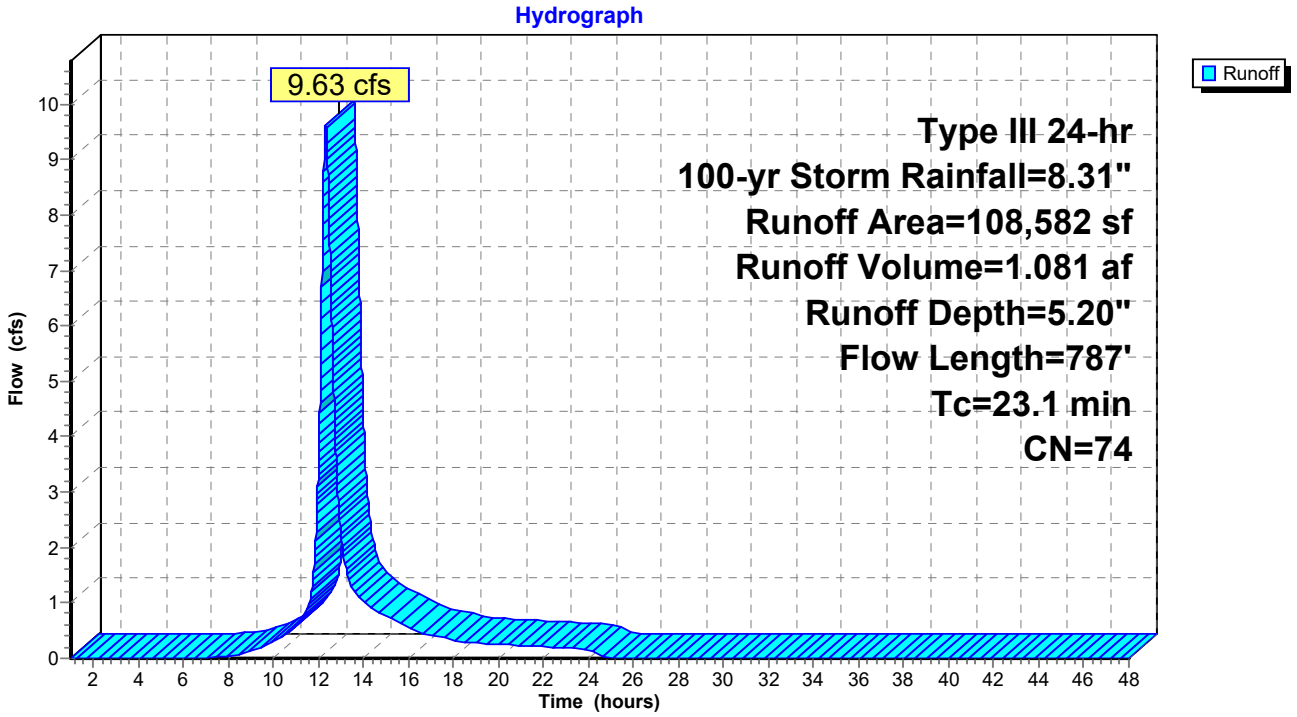
Runoff = 9.63 cfs @ 12.32 hrs, Volume= 1.081 af, Depth= 5.20"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
*	19,299	96	Gravel
	24,825	39	Pasture/grassland/range, Good, HSG A
	1,912	98	Paved parking, HSG A
*	48,595	76	Topping Stone (Gravel)
*	13,951	98	Foundations/Equipment
	108,582	74	Weighted Average
	92,719		85.39% Pervious Area
	15,863		14.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.7	157	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.6	385	0.0120	1.76		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
2.9	145	0.0030	0.82		**Shallow Concentrated Flow, D-E** Grassed Waterway Kv= 15.0 fps
23.1	787	Total			

Subcatchment SC-1A: SC-1A NORTH



Summary for Subcatchment SC-1B: SC-1B SOUTH

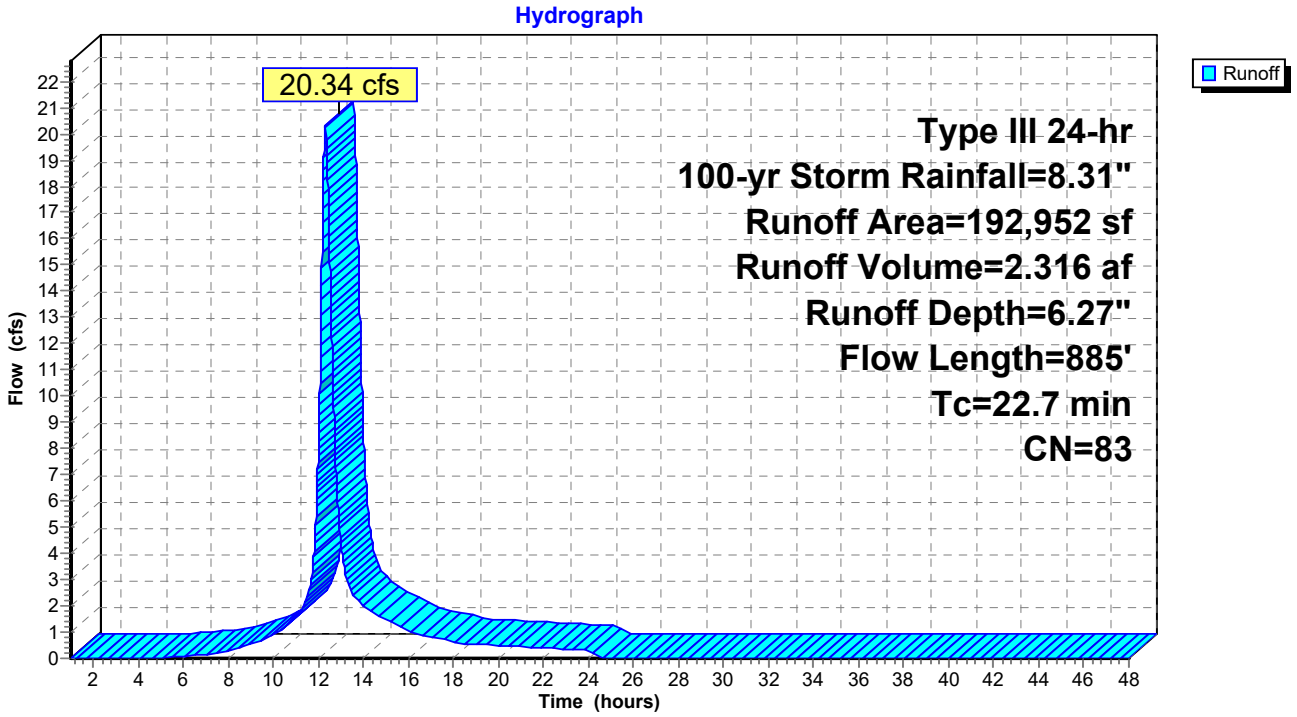
Runoff = 20.34 cfs @ 12.30 hrs, Volume= 2.316 af, Depth= 6.27"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
*	38,260	96	Gravel
	18,614	39	Pasture/grassland/range, Good, HSG A
	8,866	98	Roofs, HSG A
*	73,911	76	Topping Stone (Gravel)
	9,866	98	Paved parking, HSG A
*	43,435	98	Foundations/Equipment
	192,952	83	Weighted Average
	130,785		67.78% Pervious Area
	62,167		32.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
0.8	75	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
1.8	83	0.0120	0.77		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
4.3	440	0.0110	1.69		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
2.9	187	0.0050	1.06		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
22.7	885	Total			

Subcatchment SC-1B: SC-1B SOUTH



Summary for Subcatchment SC-1C: SC-1C NORTH&EAST

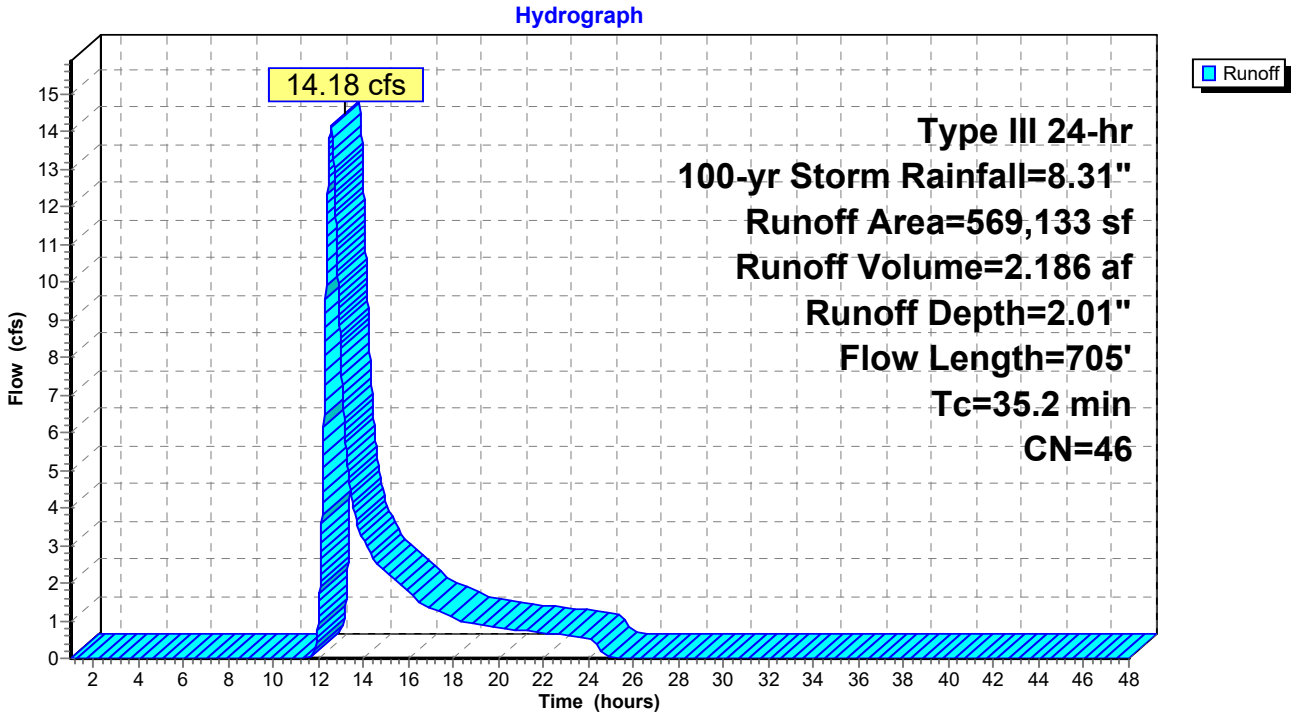
Runoff = 14.18 cfs @ 12.56 hrs, Volume= 2.186 af, Depth= 2.01"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
	264,412	39	Pasture/grassland/range, Good, HSG A
	207,341	30	Woods, Good, HSG A
	2,581	98	Paved parking, HSG A
*	83,152	96	Gravel
	11,647	98	Roofs, HSG A
	569,133	46	Weighted Average
	554,905		97.50% Pervious Area
	14,228		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0050	0.10		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
14.1	430	0.0010	0.51		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
4.1	175	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.2	705	Total			

Subcatchment SC-1C: SC-1C NORTH&EAST



Summary for Subcatchment SC-1D: SC-1D BERM

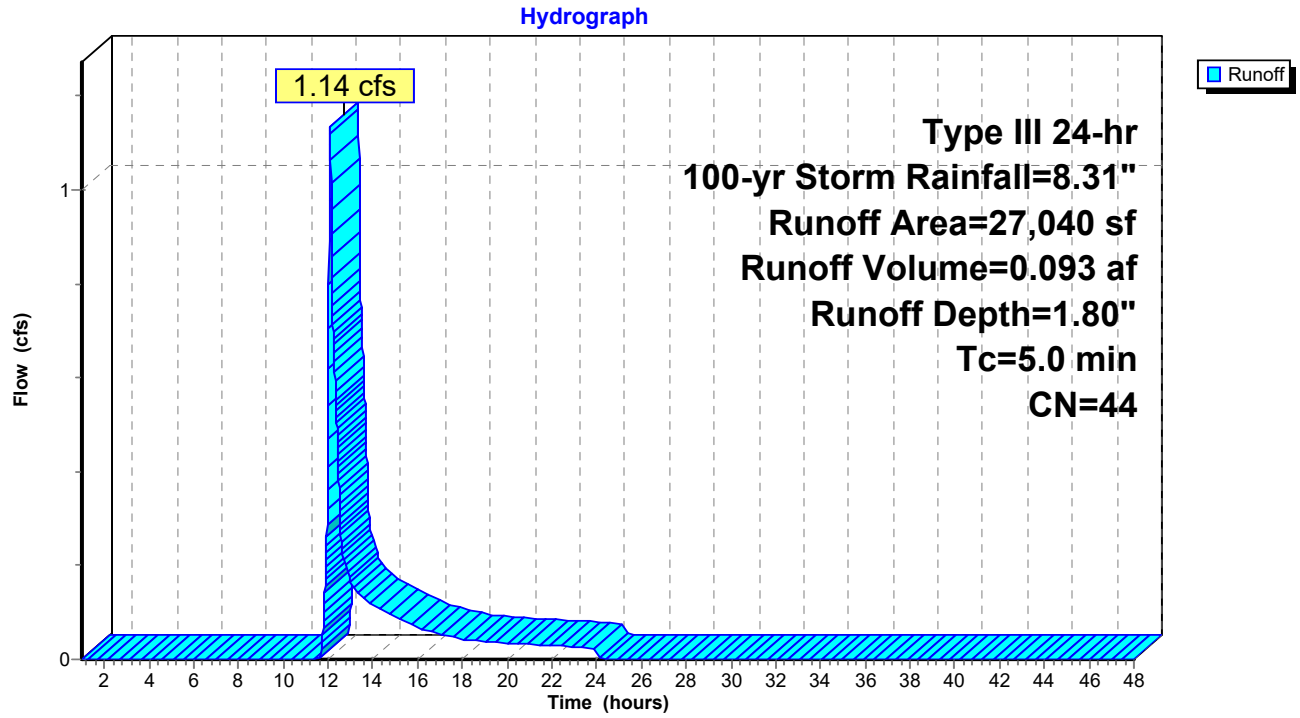
Runoff = 1.14 cfs @ 12.09 hrs, Volume= 0.093 af, Depth= 1.80"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
*	2,164	96	Gravel
	24,876	39	Pasture/grassland/range, Good, HSG A
	27,040	44	Weighted Average
	27,040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-1D: SC-1D BERM



Summary for Subcatchment SC-2: Silver Street

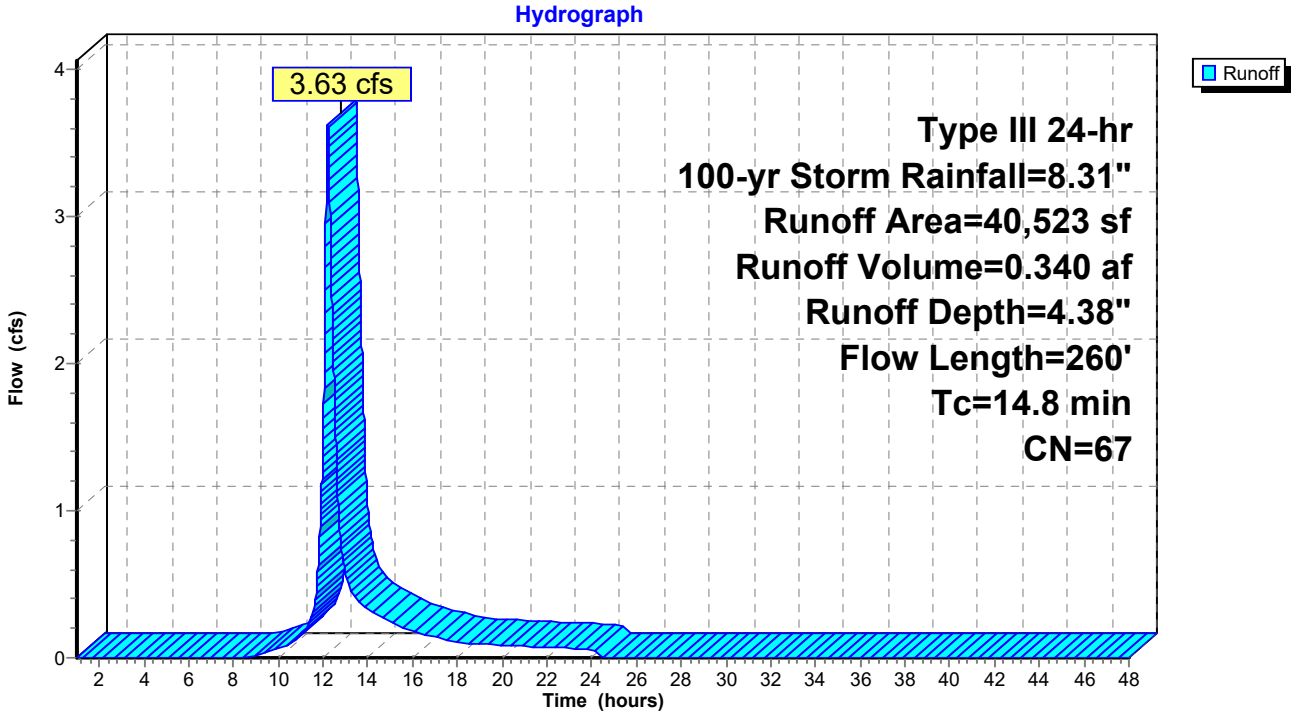
Runoff = 3.63 cfs @ 12.21 hrs, Volume= 0.340 af, Depth= 4.38"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

Area (sf)	CN	Description
15,815	98	Paved parking, HSG A
21,395	39	Pasture/grassland/range, Good, HSG A
3,313	98	Roofs, HSG A
40,523	67	Weighted Average
21,395		52.80% Pervious Area
19,128		47.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.9	160	0.0050	1.44		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.8	260	Total			

Subcatchment SC-2: Silver Street



Summary for Subcatchment SC-3: Southwest

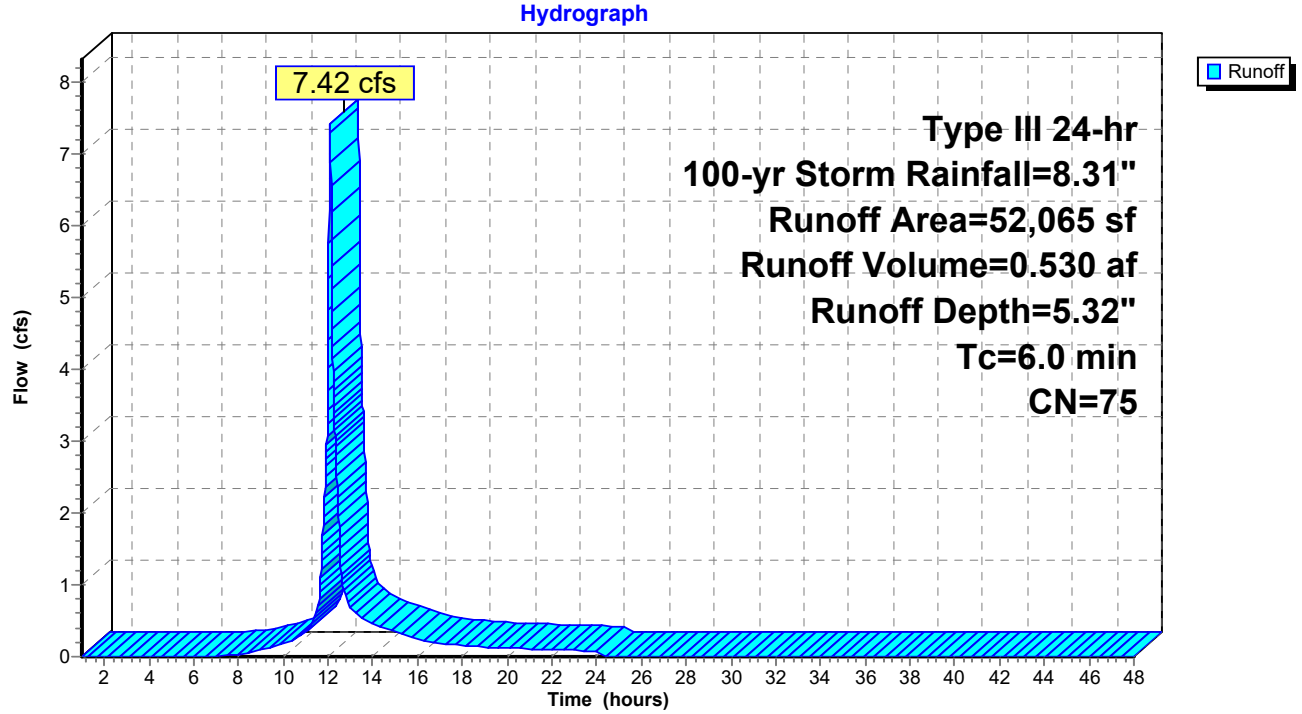
Runoff = 7.42 cfs @ 12.09 hrs, Volume= 0.530 af, Depth= 5.32"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
*	6,728	96	Gravel
	15,522	39	Pasture/grassland/range, Good, HSG A
	6,300	80	Pasture/grassland/range, Good, HSG D
	8,652	98	Paved parking, HSG A
	4,366	98	Roofs, HSG A
*	6,774	76	Topping Stone (Gravel)
*	3,723	98	Foundations/Equipment
	52,065	75	Weighted Average
	35,324		67.85% Pervious Area
	16,741		32.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3: Southwest



Summary for Pond 3P: Forebay

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 5.89" for 100-yr Storm event
Inflow = 29.96 cfs @ 12.30 hrs, Volume= 3.397 af
Outflow = 29.95 cfs @ 12.31 hrs, Volume= 3.373 af, Atten= 0%, Lag= 0.1 min
Primary = 29.95 cfs @ 12.31 hrs, Volume= 3.373 af
Routed to Pond 4P : Basin

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.48' @ 12.31 hrs Surf.Area= 1,824 sf Storage= 1,494 cf

Plug-Flow detention time= 7.8 min calculated for 3.372 af (99% of inflow)
Center-of-Mass det. time= 3.4 min (819.8 - 816.4)

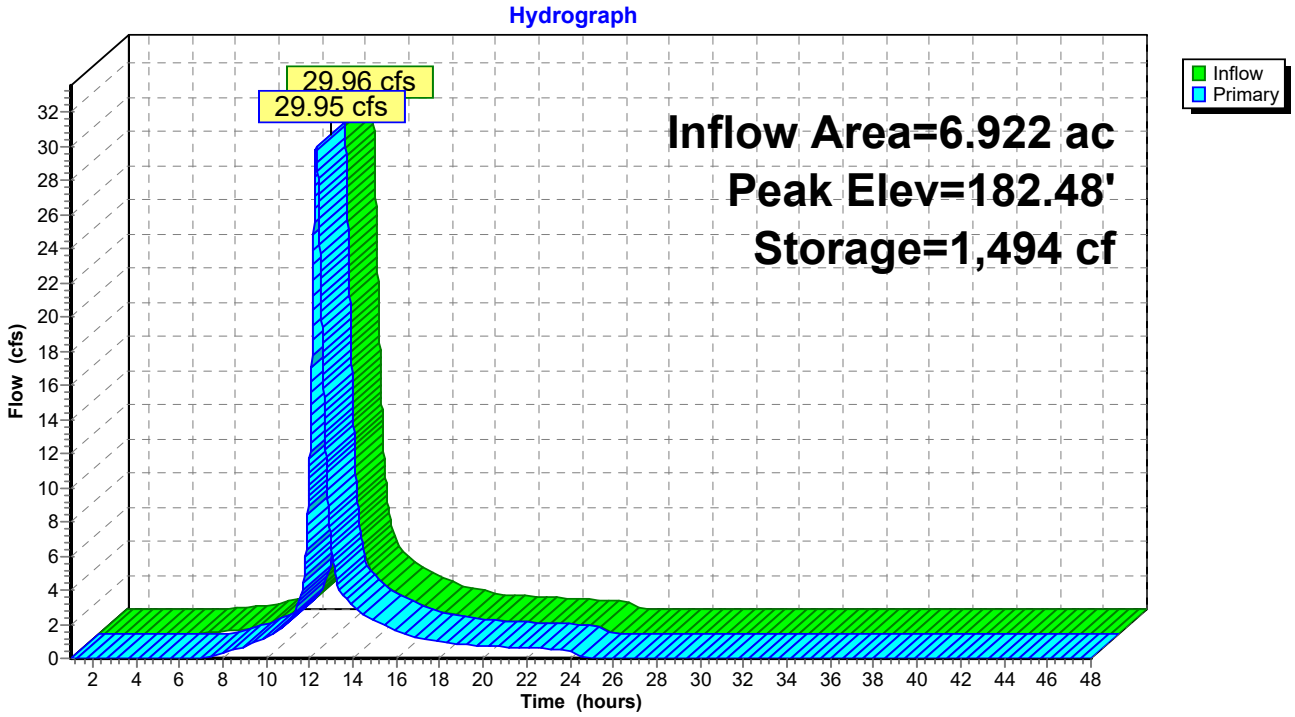
Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	2,650 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.00	323	0	0
182.00	1,219	771	771
182.50	1,856	769	1,540
183.00	2,584	1,110	2,650

Device	Routing	Invert	Outlet Devices
#1	Primary	182.20'	**85.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=29.93 cfs @ 12.31 hrs HW=182.48' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 29.93 cfs @ 1.28 fps)

Pond 3P: Forebay



Summary for Pond 4P: Basin

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 5.85" for 100-yr Storm event
Inflow = 29.95 cfs @ 12.31 hrs, Volume= 3.373 af
Outflow = 29.92 cfs @ 12.32 hrs, Volume= 3.296 af, Atten= 0%, Lag= 0.8 min
Primary = 29.92 cfs @ 12.32 hrs, Volume= 3.296 af
Routed to Link AP-1 : AP-1

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.49' @ 12.32 hrs Surf.Area= 5,534 sf Storage= 11,388 cf

Plug-Flow detention time= 40.0 min calculated for 3.295 af (98% of inflow)
Center-of-Mass det. time= 26.4 min (846.2 - 819.8)

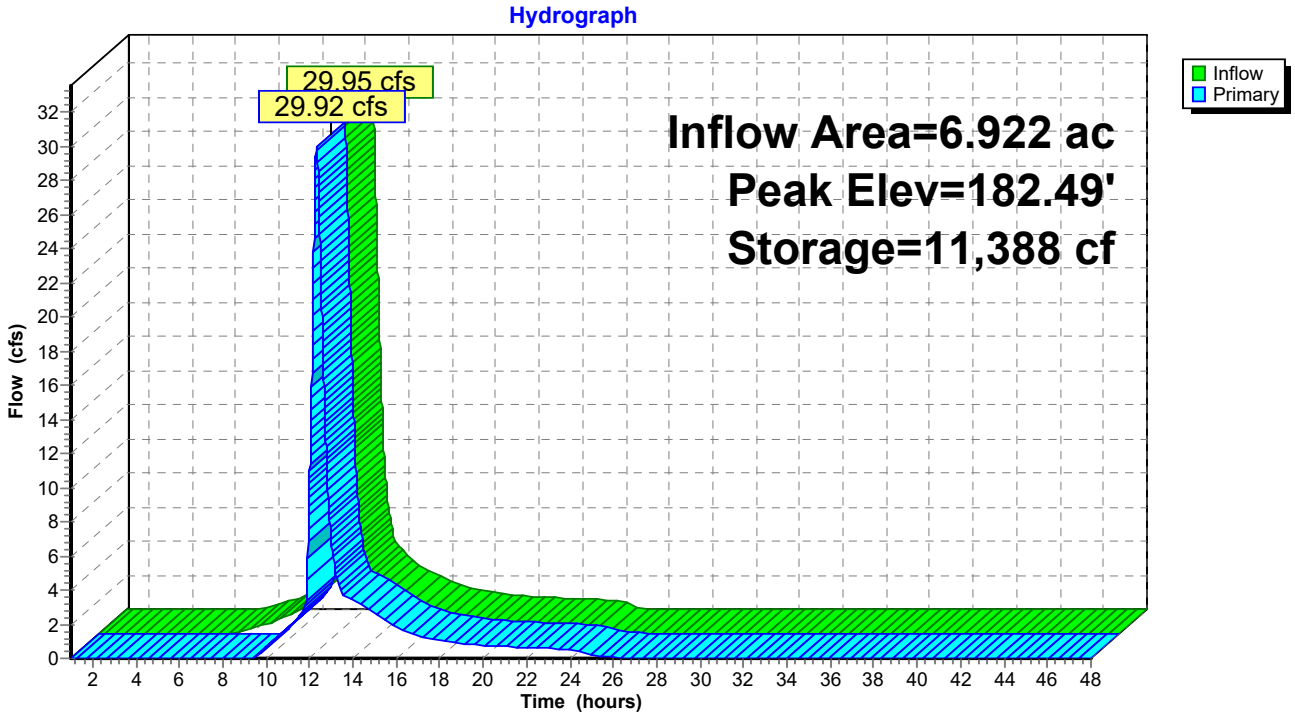
Volume	Invert	Avail.Storage	Storage Description
#1	179.00'	17,725 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
179.00	1,176	0	0
180.00	2,318	1,747	1,747
180.50	2,919	1,309	3,056
180.75	3,227	768	3,825
181.00	3,541	846	4,671
181.50	4,184	1,931	6,602
182.00	4,851	2,259	8,861
183.00	6,254	5,553	14,413
183.50	6,995	3,312	17,725

Device	Routing	Invert	Outlet Devices
#1	Primary	182.20'	**40.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	182.20'	**30.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Primary	180.60'	**12.0" Round Culvert** L= 20.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 180.60' / 180.40' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=29.83 cfs @ 12.32 hrs HW=182.49' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 14.80 cfs @ 1.29 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 11.10 cfs @ 1.29 fps)
- **3=Culvert** (Inlet Controls 3.93 cfs @ 5.00 fps)

Pond 4P: Basin

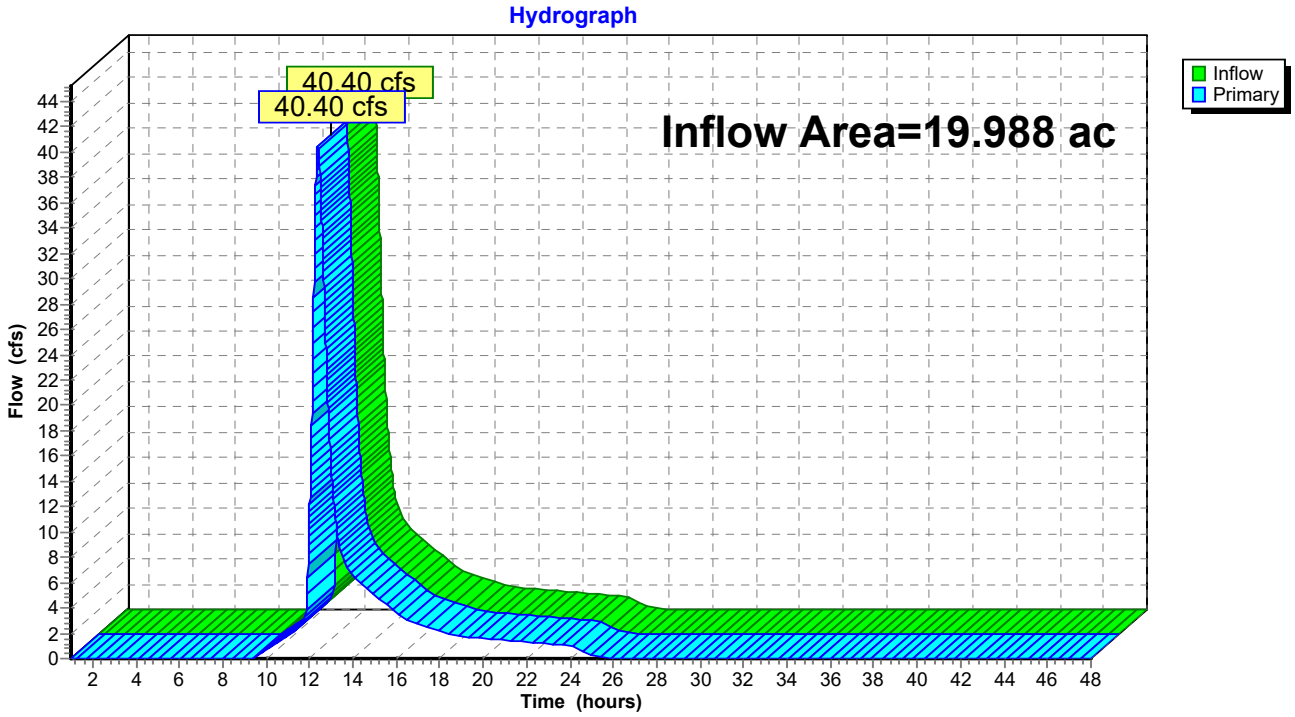


Summary for Link AP-1: AP-1

Inflow Area = 19.988 ac, 10.60% Impervious, Inflow Depth = 3.29" for 100-yr Storm event
Inflow = 40.40 cfs @ 12.37 hrs, Volume= 5.482 af
Primary = 40.40 cfs @ 12.37 hrs, Volume= 5.482 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

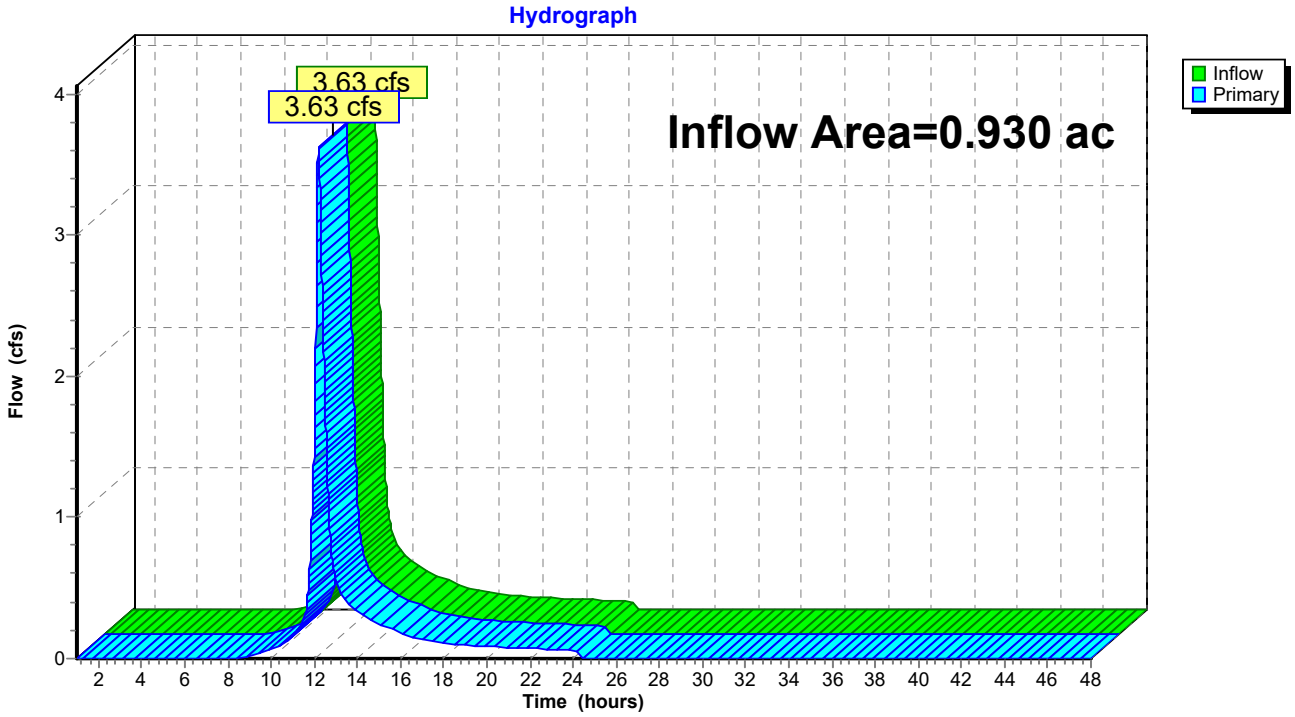


Summary for Link AP-2: AP-2

Inflow Area = 0.930 ac, 47.20% Impervious, Inflow Depth = 4.38" for 100-yr Storm event
Inflow = 3.63 cfs @ 12.21 hrs, Volume= 0.340 af
Primary = 3.63 cfs @ 12.21 hrs, Volume= 0.340 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2

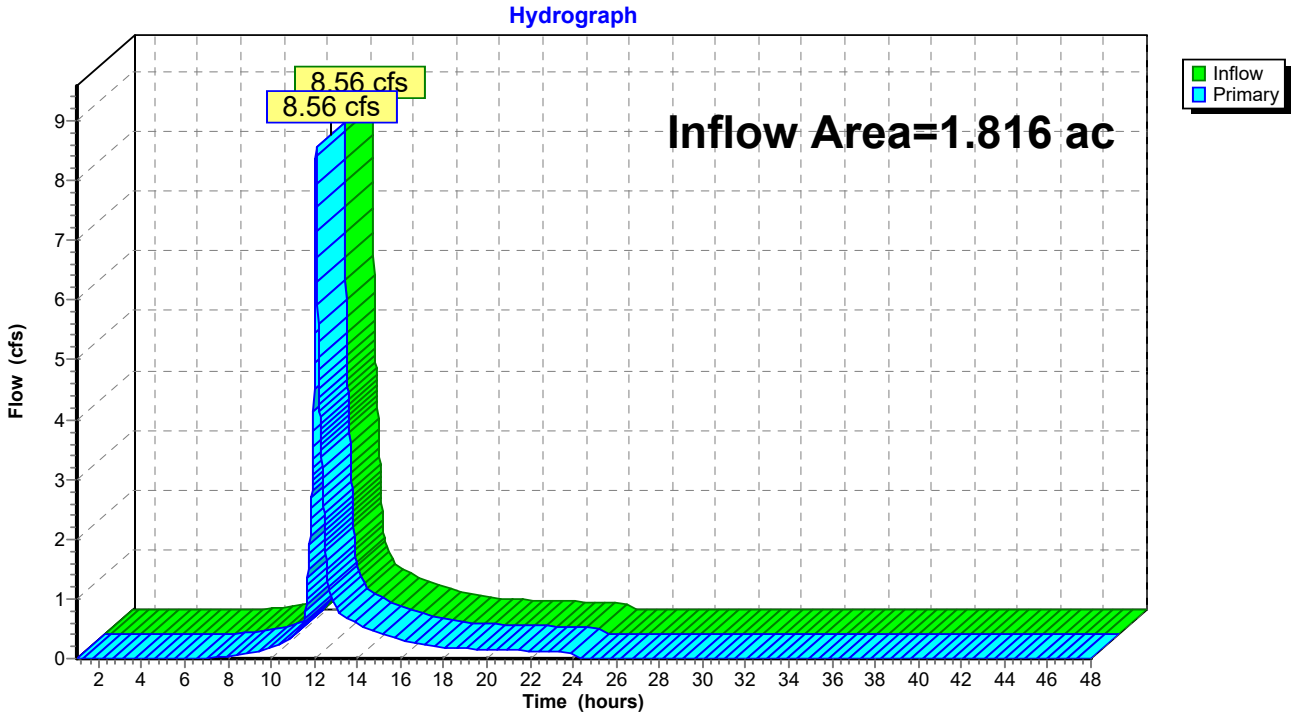


Summary for Link AP-3: AP-3

Inflow Area = 1.816 ac, 21.16% Impervious, Inflow Depth = 4.12" for 100-yr Storm event
Inflow = 8.56 cfs @ 12.09 hrs, Volume= 0.623 af
Primary = 8.56 cfs @ 12.09 hrs, Volume= 0.623 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-3: AP-3



ATTACHMENT E

TREATMENT VOLUME CALCULATIONS

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DETENTION POND TREATMENT VOLUME

	Gravel/Pavement Area (SF)	Treatment Volume (CF)
North Area (SC1A-North)		
GRAVEL (R0AD)	19,299	804
PAVED PARKING/ROAD	1,912	80
South Area (SC1A-South)		
GRAVEL (R0AD)	38,260	1,594
PAVED PARKING/ROAD	9,866	411
ROOFS, HSG A	8,866	369
	Total Treatment Volume (CF)	**3,258**

Note: Treatment Depth (in) = 0.5

FOREBAY TREATMENT VOLUME

	Gravel/Pavement Area (SF)	Treatment Volume (CF)
North Area (SC1A-North)		
GRAVEL (R0AD)	19,299	
PAVED PARKING/ROAD	1,912	
South Area (SC1A-South)		
GRAVEL (R0AD)	38,260	
PAVED PARKING/ROAD	9,866	
ROOFS, HSG A	8,866	
Total Area (SF)	78,203	
Total Area (Acre)	1.80	**652**

Note: Treatment Depth (in/arcre)= 0.1

FORE BAY STORAGE SUMMARY

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
181.00	323	0
181.05	368	17
181.10	413	37
181.15	457	59
181.20	502	83
181.25	547	109
181.30	592	137
181.35	637	168
181.40	681	201
181.45	726	236
181.50	771	274
181.55	816	313
181.60	861	355
181.65	905	399
181.70	950	446
181.75	995	494
181.80	1,040	545
181.85	1,085	598
181.90	1,129	654
181.95	1,174	711
182.00	1,219	771

DETENTION BASIN STORAGE SUMMARY

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
179.00	1,176	0
179.10	1,290	123
179.20	1,404	258
179.30	1,519	404
179.40	1,633	562
179.50	1,747	731
179.60	1,861	911
179.70	1,975	1,103
179.80	2,090	1,306
179.90	2,204	1,521
180.00	2,318	1,747
180.10	2,438	1,985
180.20	2,558	2,235
180.30	2,679	2,496
180.40	2,799	2,770
180.50	2,919	3,056
180.60	3,042	3,354

ATTACHMENT F

LONG TERM POLLUTION PREVENTION PLAN

SME
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ENGINEERS

Long Term Pollution Prevention Plan

Standard #4 of the MassDEP Stormwater Management Handbook requires that a Long Term Pollution Prevention Plan (LTPPP) be prepared and incorporated into the long term operation and maintenance plan of the projects stormwater management system. The purpose of the LTPPP is to identify potential sources of pollution that may affect the quality of stormwater discharges and to describe suggested practices to reduce pollutants in stormwater discharges.

This document should be used in conjunction with the operation and maintenance plan for the facility.

Good housekeeping practices - The Property Owner is to keep the site in a neat and orderly condition so that pollutants are not conveyed to the storm drainage system and adjacent wetlands. Materials swept, blown or washed into the sites detention pond decreases the system's effectiveness and could eventually be conveyed into the adjacent wetland resource area. Some examples of good housekeeping practices are litter control and protected material storage areas. The Property Owner should assign responsibilities to personnel to keep the site in a neat and orderly condition at regular intervals.

Provisions for storing materials and waste products inside or under cover – A dedicated dumpster area should be provided if and when necessary. The trash and waste program should include regular pickup to avoid an overflowing dumpster condition. The water tight dumpster lid should be maintained closed when not actively loading or unloading. A trash disposal company, hired by the Property Owner(s), is to properly dispose the trash at a state approved disposal facility.

Requirements for routine inspections and maintenance of stormwater BMP's - Consistent with Standard 9 of the Massachusetts Stormwater Management Regulations, an Operation and Maintenance Plan has been prepared. The plan details routine inspection and maintenance along with associated record keeping forms.

Spill prevention and response plans – A spill containment and countermeasure plan (SPPC) will be prepared for the site. Beyond the measures for oil containing equipment, exterior spill hazards are to be minimized. Exterior spill hazards have the potential to enter the stormwater drainage system and are to be addressed as follows:

1) Spill hazards of pesticides, paints, and solvents shall be remediated using the

Manufacturers' recommended spill cleanup protocol

2) Vehicle fluid and fuel spills shall be remediated according to local and state regulations governing fuel spills. Spills are to be immediately cleaned up with absorbent materials and properly disposed.

3) The Property Owners shall have the following equipment and materials on hand to address a spill clean-up: brooms, dust-pans, mops, rags, gloves, trash bags, trash containers, and absorptive materials such as sand, sawdust, or kitty litter.

4) Spills of toxic or hazardous materials shall be reported to the Massachusetts Department of Environmental Protection at 1-888-304-1133.

Provisions for maintenance of lawns, garden, and other landscaped areas - It should be a general goal of the Property Owner to achieve a high quality of well-groomed and stable landscape that evolves throughout the changing seasons and overall condition of the property. All landscaped areas are to be maintained with dense vegetative growth or a layer of mulch so as to minimize sediment transport associated with erosion. Litter and waste are to be removed weekly from the landscaped areas and adjoining parking lots and disposed of in an appropriate receptacle.

Requirements for storage and use of fertilizer, herbicides, and pesticides - Fertilizers, herbicides, and pesticides will not to be stored on site. Chemical controls should be used as a last resort to organic and biological control methods.

Snow disposal and deicing chemicals – The parking lot and access road is designed to provide ample snow storage along the perimeter. If necessary, snow removal to an offsite location will occur to remain reasonable access and parking. No snow is to be moved to within 100 feet of a wetland resource area.

The use of de-icing agent such as salt or potassium chloride may be required to maintain a safe driving and walking surface. The de-icing agent for the walkways and building entrances may be kept on site within the building. De-icing agents are not to be stored outside.

ATTACHMENT G

ILLICIT DISCHARGE STATEMENT

SME
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ILLICIT DISCHARGE COMPLIANCE STATEMENT

I verify that no illicit discharges exist from the Agawam Energy Center. Through the implementation of a Long Term Pollution Prevention Plan and Operation and Maintenance Plan, measures are set forth to prevent illicit discharges from entering the stormwater management drainage system.

Signature	**Print Name**	**Date**
Title	**Company**	
Signature	**Print Name**	**Date**
Title	**Company**	

Note: This certification must be signed before stormwater is conveyed to the proposed stormwater drainage system in accordance with Standard 10 of the Massachusetts Stormwater Management Standards.

ATTACHMENT H

POST-CONSTRUCTION STORMWATER INSPECTION & MAINTENANCE PLAN

SME
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ENGINEERS

POST-CONSTRUCTION STORMWATER INSPECTION AND MAINTENANCE PLAN
AGAWAM ENERGY CENTER
769 SILVER STREET
AGAWAM, MASSACHUSETTS

Prepared for

AGAWAM ENERGY CENTER, LLC
C/O Longroad Development Company, LLC
125 High Street
Boston, MA 02210

February 2026
Revised March 10, 2026

4 Blanchard Road
P.O. Box 85A
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SME
SEVEE & MAHER
ENGINEERS

TABLE OF CONTENTS

Section No.	Title	Page No.
1.0	**SITE DESCRIPTION**	**1-1**
2.0	**FACILITY CONTACTS**	**2-1**
3.0	**POST-CONSTRUCTION STORMWATER INSPECTION AND MAINTENANCE PLAN OVERVIEW AND OBJECTIVES**	**3-1**
3.1	Site Management Practices	3-1
3.2	Inspections	3-2
3.3	Routine Maintenance and Corrective Actions	3-2
3.4	Housekeeping	3-3
3.5	Maintenance Records	3-4

LIST OF FIGURES

Figure No.	Title	Page No.
1	SITE LOCATION MAP	1-2

LIST OF TABLES

Table No.	Title	Page No.
1	POST-CONSTRUCTION STORMWATER INSPECTION AND MAINTENANCE PLAN	3-5

POST-CONSTRUCTION STORMWATER INSPECTION AND MAINTENANCE PLAN
AGAWAM ENERGY CENTER
769 SILVER STREET
AGAWAM, MASSACHUSETTS

1.0 SITE DESCRIPTION

Agawam Energy Center, LLC (Applicant) proposes to develop an approximately 250 megawatt (MW), 1,000 megawatt hour (MWh), battery energy storage system (BESS) on the 17.2 acre Site located at 769 Silver Street (Map G6, Block 2, Lot 6) in Agawam, Massachusetts (the Project). The Project will utilize lithium-ion (Li-ion) chemistry and will interconnect at Eversource's South Agawam 115 kV switchyard located to the southeast, approximately 600 feet from the Project.

The BESS Project is intended to charge during hours where electricity demand is low and discharge energy to the electrical grid during seasonal peak periods and monthly peak hours. By strategically charging and discharging, the Project will serve to displace fossil fuel generation in the Northeast and reduce carbon intensity of generation in Massachusetts.

The site was identified for proximity to a utility substation available for connection, its large open area and the historic commercial/industrial use of the site and neighboring properties. The location of the project is shown in Figure 1, Site Location Map. More details on the project site are shown in the engineering drawing set attached to this application.

The project area is a previously developed commercial site with large amounts of impervious and disturbed areas; bound by developed commercial property to the north and south, a combination of undeveloped forested land and developed industrial property to the east and Silver Street to the west. The BESS site will be accessed by a paved driveway and parking area near the entrance, transitioning to a gravel access road within the fenced in BESS yard. The access roads are designed to accommodate emergency vehicles.

The array will be enclosed by a combination of a 8-foot-high chain link fence and sound walls. The fence will include sliding vehicle gates at four access points. Approximately 6.8 acres of land in the BESS yard, within the fence line and approximately one acre within the substation fence. All areas not utilized for BESS yard, site access and parking or the substation will be revegetated.

Construction of the BESS facility will include installation of BESS modules on foundations, installation of underground cables, new gravel access road, substation equipment, and new utility poles with an interconnection point at the adjacent Eversource Substation.

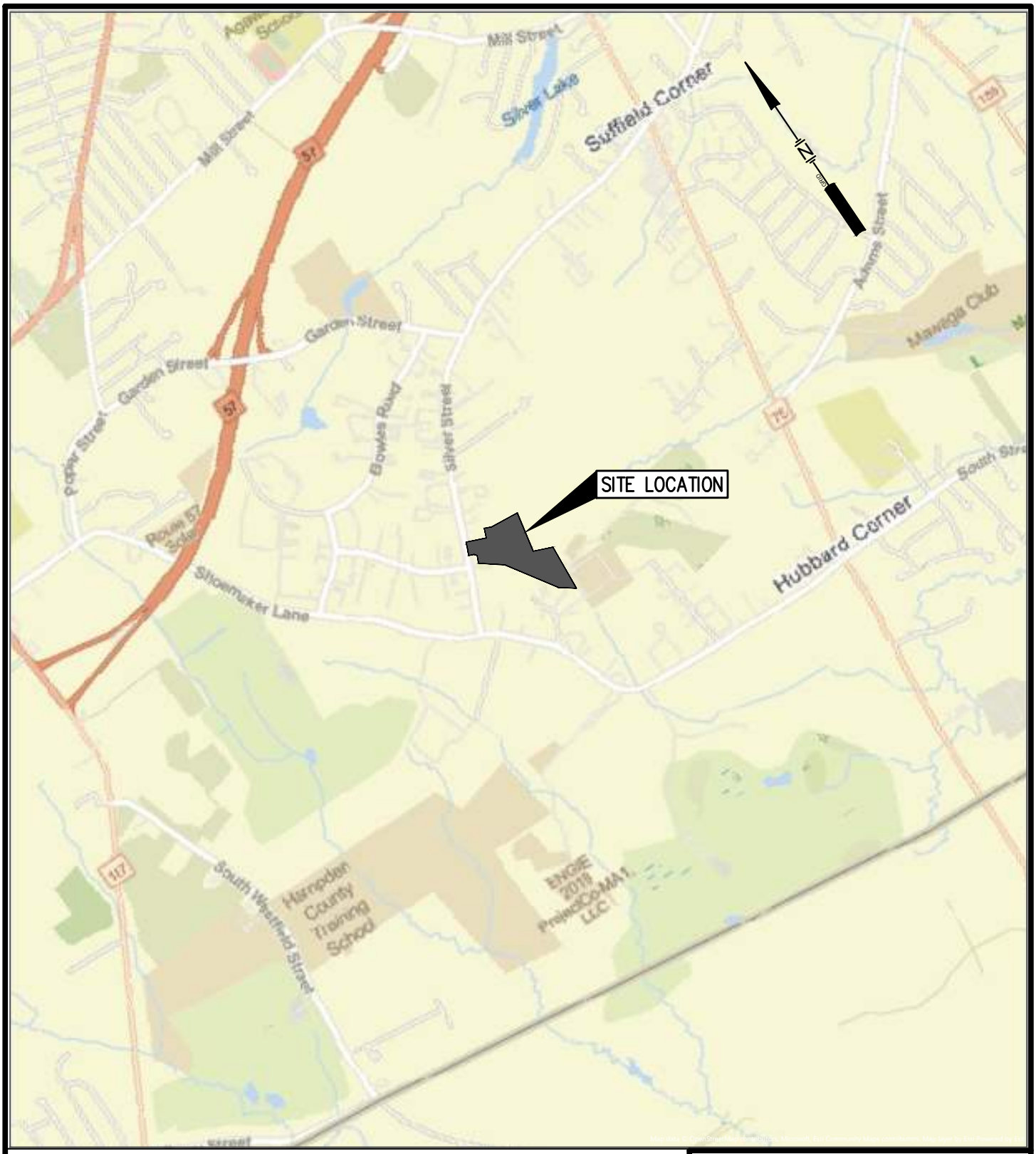


FIGURE 1
SITE LOCATION MAP
LONGROAD ENERGY
AGAWAM ENERGY CENTER
AGAWAM, MASSACHUSETTS

SME
SEVEE & MAHER
ENGINEERS

DWG: SITE LOCATION PLAN | LMN: NONE | CTB: SME-STD.CTB | JOB#: 250579.01 | REV: 03-10-2026

The project will include the installation of the BESS units, concrete equipment foundations, excavation of the utility trench, road improvements, construction of the substation and the gravel access road and improvements at the site entrance. The developed area of the BESS yard will include approximately 128,000 SF of gravel access road and 60,800 square feet of electrical equipment and concrete foundations, resulting in 4.3 acres of impervious area.

Erosion control measures are shown on the Layout and Grading with details included on the Erosion Control Notes and Details Drawing (AW1-C-300), included in the permit application.

The stormwater management system as referenced within this document refers to the entire project area. This Post-Construction Stormwater Management Plan is applicable to the areas of the site encompassed by the areas developed.

2.0 FACILITY CONTACTS

Facility:	Agawam Energy Center 769 Silver Street Agawam, Massachusetts
Owner Representative:	C/O Agawam Energy Center, LLC 125 High Street Boston, MA 02210 Contact: Chad Allen Telephone: 207-210-1175 Email: Sydney.allen@longroadenergy.com
Consultant/Designer:	Sevee & Maher Engineers, Inc. 4 Blanchard Road Cumberland, ME 04021 Thomas Henaghen, PE Email: Thomas.henaghen@sme-engineers.com BSC Group 180 Glastonbury Boulevard, Suite 305 Glastonbury, CT 06033 Melissa Kaplan, PWS Telephone: 860-652-8227 Email: mkaplan@bscgroup.com

3.0 POST-CONSTRUCTION STORMWATER INSPECTION AND MAINTENANCE PLAN OVERVIEW AND OBJECTIVES

The Post-Construction Stormwater Inspection and Maintenance Plan (PSWIMP) is an important component of the overall stormwater management system for the site. PSWIMP addresses various maintenance activities that should occur after construction and site stabilization. Proper implementation of the PSWIMP can minimize pollutant generation and transport and maintain the stormwater treatment system to ensure proper operation. This PSWIMP includes three primary components:

1. Site Management Practices;
2. Inspections; and
3. Routine Maintenance and Corrective Actions.

3.1 Site Management Practices

Site management practices are aimed at reducing pollutants by minimizing use of certain materials, using alternative materials, or removing pollutants prior to discharge to the stormwater management system. These practices shall include:

1. Use slow-release sulfur or plastic coated ureaform fertilizers (e.g., Nutralene);
2. Do not fertilize vegetated swales once vegetation is established;
3. Minimize use of pesticides by using a sound integrated pest management (IPM) approach to monitor and control the actual pests present;
4. Collect and remove autumn leaves to minimize transport to the stormwater treatment system;
5. Minimize use of de-icing materials and sand and keep a log of materials used;
6. Routine sweeping of paved parking areas and driveways;
7. Fertilizers, pesticides, and other hazardous materials should be stored in enclosed areas to avoid exposure to precipitation; and
8. Material handling should be conducted to minimize risk of spillage and release to the stormwater treatment system.

3.2 Inspections

A series of routine inspections shall be completed to allow for the early identification of potential problems and to guide routine maintenance activities. Inspections shall be carried out in accordance with the Long-Term Inspection and Maintenance Plan (Table 1). Dates and observations shall be recorded for each inspection on the attached Inspection Log.

3.3 Routine Maintenance and Corrective Actions

Routine maintenance activities are designed to ensure proper function of the stormwater management system and minimize pollutant transport from the site. Routine maintenance activities must be completed according to the schedule (Table 1) provided in this plan. This schedule is the minimum amount of maintenance required; maintenance that is more frequent may be needed when indicated by the inspections. Corrective actions (supplemental maintenance activities or repairs) should be completed within seven days of the inspection identifying the problem. Each maintenance activity will be recorded on the attached 'Maintenance and Repair Log.'

During construction, the Sitework Contractor (not yet selected) shall be responsible for cleaning and maintaining stormwater components on the schedule outlined in Table 1 and in accordance with the notes and details on the Erosion Control Notes and Details Drawing (AW1-C-300), included in the permit package.

Following completion of construction, Agawam Energy Center, LLC will be responsible for cleaning and maintaining stormwater components on the schedule outlined in Table 1.

The following describes specific stormwater facilities maintenance requirements and minimum schedule of inspection and maintenance.

- Open swales and ditches need to be inspected in spring and fall, or after a major rainfall event, to assure that debris or sediments do not reduce the effectiveness of the system. Debris needs to be removed at that time. Signs of erosion or blockage shall be immediately repaired to assure a vigorous growth of vegetation for the stability of the structure and proper functioning. Swales that show newly formed channels or gullies will be immediately repaired by reseeding/sodding of bare spots, removal of trash, leaves and/or accumulated sediments, and the control of woody or other undesirable vegetation.
- Vegetated swales and ditches should be mowed at least once during the growing season. Larger brush or trees must not be allowed to become established in the swales or ditches. Any area where the vegetation fails will be subject to erosion and should be repaired and revegetated. Mowing activities should comply with the conditions and time of year

requirements of the issued permits. Per the issued NHESP permit, a visual walking inspection shall be conducted prior to mowing between April 1 and October 31st to check for presence of rare turtles.

- If sediment in culverts or outlet pipes exceeds 20 percent of the diameter of the pipe, it should be removed. This may be accomplished by hydraulic flushing or other mechanical means and Storm pipes should be inspected on an annual basis.
- Paved surfaces shall be swept or vacuumed at least annually in the spring to remove winter sand and periodically during the year on an as-needed basis to minimize the transportation of sediment during rainfall events.
- The surface of the basin may clog with fine sediments over time. Maintenance of good grass cover will minimize this. Grass should be mowed not more than two times per season. Any bare areas should be seeded or sodded, as necessary. Inspect the basin's drainage area semi-annually for eroding soil and other sediment sources. Repair eroding areas using appropriate erosion control BMPs immediately. Control sediment sources, such as stockpiles of winter sand, by removing them from the basin's drainage area or surrounding them with sediment control BMPs. Prohibit vehicle access to all filtration areas. Heavy equipment used to maintain or rehabilitate the basins should work from the basin's perimeter.
- Riprap areas at the overflow from the sediment forebay, overflows from the detention basin and at the overflow of the level spreaders shall inspected in the spring and fall and after major rain events. Key focuses of the inspection should be on rip rap displacement, scour or erosion at the edges and beneath stone and sediment accumulation/blockage. Any displaced stone shall be re-placed and additional stone added as necessary. Erosion and scouring shall be repaired with loam and seed and erosion control fabric. Any accumulated sediment that presents a blockage shall be removed.

3.4 Housekeeping

- Spill prevention. Provide controls to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.
- Groundwater protection. Do not handle or store, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater in areas of the site draining to an infiltration area. An “infiltration area” is any area of the site that by design or as a result of soils, topography, and other relevant factors accumulates runoff that infiltrates into the soil. Provide dikes, berms, sumps, and other forms of secondary containments that

prevent discharge to groundwater to isolate portions of the site for the purposes of storage and handling of these materials.

- Fugitive sediment and dust. Provide measures to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control. If off-site tacking occurs, roadway must be swept immediately and no less than once a week prior to significant stormwater event.
- Debris and other materials. Prevent litter, construction debris, and chemicals exposed to stormwater from becoming a pollutant source.
- Trench or foundation de-watering. Trench dewatering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. Remove the collected water from the ponded area and dispose of in accordance with notes on Drawings C-300 and the project specifications.
- Non–stormwater discharges. Identify and prevent contamination by non-stormwater discharges.
- Additional requirements. Additional requirements may be applied on a site-specific basis.

3.5 Maintenance Records

Use the following inspection log to record the inspection and any required repair or maintenance of the stormwater management system.

1. *Identification and repair of erosion problems*. All areas of the project site have been inspected for areas of erosion and appropriate steps have been taken to permanently stabilize these areas, including placement of any removed sediment in an area of low erosion potential, either on-site or off-site, and seed with erosion control seed mix.;
2. *Inspection and repair of stormwater management system*. All aspects of the stormwater management system have been inspected for damage, wear, and malfunction and appropriate steps have been taken to repair or replace the system, or portions of the system;
3. *Maintenance*. The Post-Construction Stormwater Inspection and Maintenance Plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by Sevee & Maher, and the maintenance log is being maintained;
4. *Documentation.* Photographs documenting the conditions at the time of each inspection are taken and kept with the Inspection Log;

TABLE 1

POST-CONSTRUCTION STORNWATER INSPECTION AND MAINTENANCE PLAN
AGAWAM ENERGY CENTER
769 SILVER STRET
AGAWAM, MASSACHUSETTS

	Spring	Fall	After a Major Storm	Every 2-5 Years
Vegetated Areas				
Inspect all slopes and embankments.	X		X	
Replant bare areas or areas with sparse growth.	X		X	
Armor areas with rill erosion with an appropriate lining or divert the erosive flows to on-site areas able to withstand concentrated flows.	X		X	
Maintain 85% vegetative cover uniformly distributed on all areas permanently stabilized with vegetation.		X		
Stormwater Swales and Basins				
Inspect all slopes and embankments	X	X	X	
Inspect riprap outlets	X	X	X	
Repair erosion around outlets and embankments	X	X	X	
Remove debris and sediment	X	X	X	
RipRap Areas (forebay overflow, basin overflow #1 and #2, Level Spread #1 and #2)				
Inspect for Stone Stability and Placement	X	X	X	
Inspect for Erosion or Beneath Stone	X	X	X	
Inspect for Sediment Accumulations	X	X	X	
Repair/Replace Displaced Stone (add additional stone as needed)	X	X	X	
Repair erosion around edges of stone	X	X	X	
Remove accumulated sediment	X	X	X	

Notes:

1. During the first year following completion of construction the inspection frequency for all elements shall be a minimum of quarterly and after major rain events.
2. Corrective actions (supplemental maintenance activities or repairs) should be completed within seven days of the inspection identifying the problem.

STORMWATER INSPECTION LOG
AGAWAM ENERGY CENTER
769 SILVER STRET
AGAWAM, MASSACHUSETTS

Date	Device/Area Inspected	Inspected By	Observations, Deficiencies & Recommended Corrective Actions

ATTACHMENT I

TSS REMOVAL CALCULATIONS

SME
SEVEE & MAHER
ENGINEERS

Location: Agawam Energy Center

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Extended Dry Detention Basin	**0.50**	**1.00**	**0.50**	**0.50**
	0.00	**0.50**	**0.00**	**0.50**
	0.00	**0.50**	**0.00**	**0.50**
	0.00	**0.50**	**0.00**	**0.50**
	0.00	**0.50**	**0.00**	**0.50**

Total TSS Removal = **50%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Agawam Energy Center
Prepared By: TMH
Date: 3/10/2026

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

ATTACHMENT J

HYDRAULIC CONDUCTIVITY AND DRAWDOWN CALCULATION

SME
SEVEE & MAHER
ENGINEERS

HYDRAULIC CONDUCTIVITY AND DRAWDOWN CALCULATION

GOAL: Drain water quality depth within 72 hours.

KNOWN FACTORS:

Basin Bottom Area (A_b) = 1,176 SF

WQ Depth ~ 1.6 FT

WQ Volume (V) ~ 3,260 CF, Volume below invert out = 3,354 CF

HYDRAULIC CONDUCTIVITY DETERMINATION:

Native soils are loose sand with some silt

Typical Hydraulic Conductivity Values Range for sand can range from .5 to 5.0 in/hr.

Using a value of 1.42 in/hr taken from Engineering Manual EM 1110-2-1901 – Seepage Analysis and Control for Dams (shown below) to represent a sand with some silt.

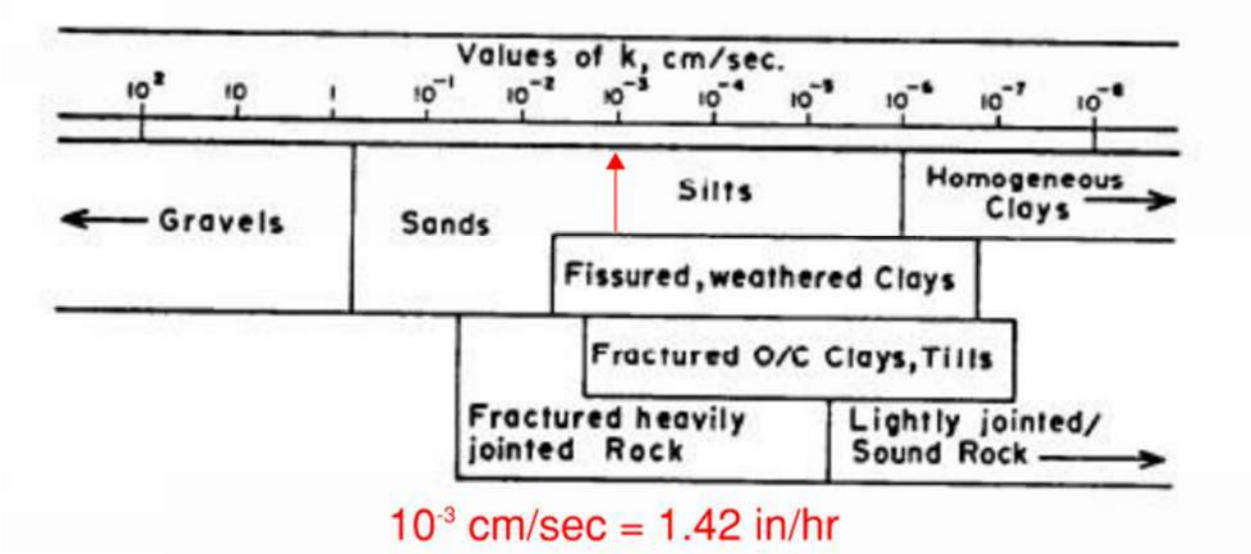


Figure 2-5. Approximate range in coefficient of permeability of soils and rocks (from Milligan[224])

FACTOR OF SAFETY (FS)

Due to lack of site-specific testing and use of typical values we will add a FS of 2 to determine our design value for K.

$K_{design}=K_{typical}/FS$

K_{design} = 1.42/2 = 0.71in/hr OR 1.42 ft/day

CALCULATE INFILTRATION RATE

$Q_{inf} = K_{design} \times A_b$

Q_{inf} = 1.42 ft/day x 1,176SF

Q_{inf} =1669.92 ft^3/Day

CALCULATE DRAWDOWN TIME

T= V/Qinf

T= 3354 CF/1669.92 ft^3/Day = 2.01 DayS OR ~ 48 hours

Confirmed Drawdown Time of 48 hours < 72 hours

SUMMARY OF TEST PIT AND BORING INFORMATION

Location	Elev	Depth to GW (ft)	GW (elev)	Material Description
B-1	182	15	167	Loose, Silty Sand
B-2	182.5	10	172.5	Loose Sand, Some Silt
B-3	187	10	177	
B-4	188	10	178	
B-5	187	10	177	
B-6	186	10	176	
B-7	183	10	173	Loose Sand, Trace Silt
B-8	185	10	175	
B-9	185	10	175	
TP-1	185	9	176	
TP-2	182	9	173	
TP-3	182	10	172	Fine Gravel over silty Sand
TP-4	183	9	174	
TP-5	187	9	178	
TP-6	187	10+	177	
TP-7	186	9	177	
TP-8	185	9	176	
TP-9	185	9	176	
TP-10	186	10+	176	

Notes:

1) Highlighted Locations are closes to the stormwater pond.
2) Elevation represents approximate elevation at ground surface at boring location.
3) Material description is summary of material anticipated at approximate bottom of basin elev.
4) GW elevation indicates approximate elevation of groundwater observation at the time of exploration.

ATTACHMENT K

RIP RAP SIZING CALCULATION FOR PIPE OUTLETS

SME
SEVEE & MAHER
ENGINEERS

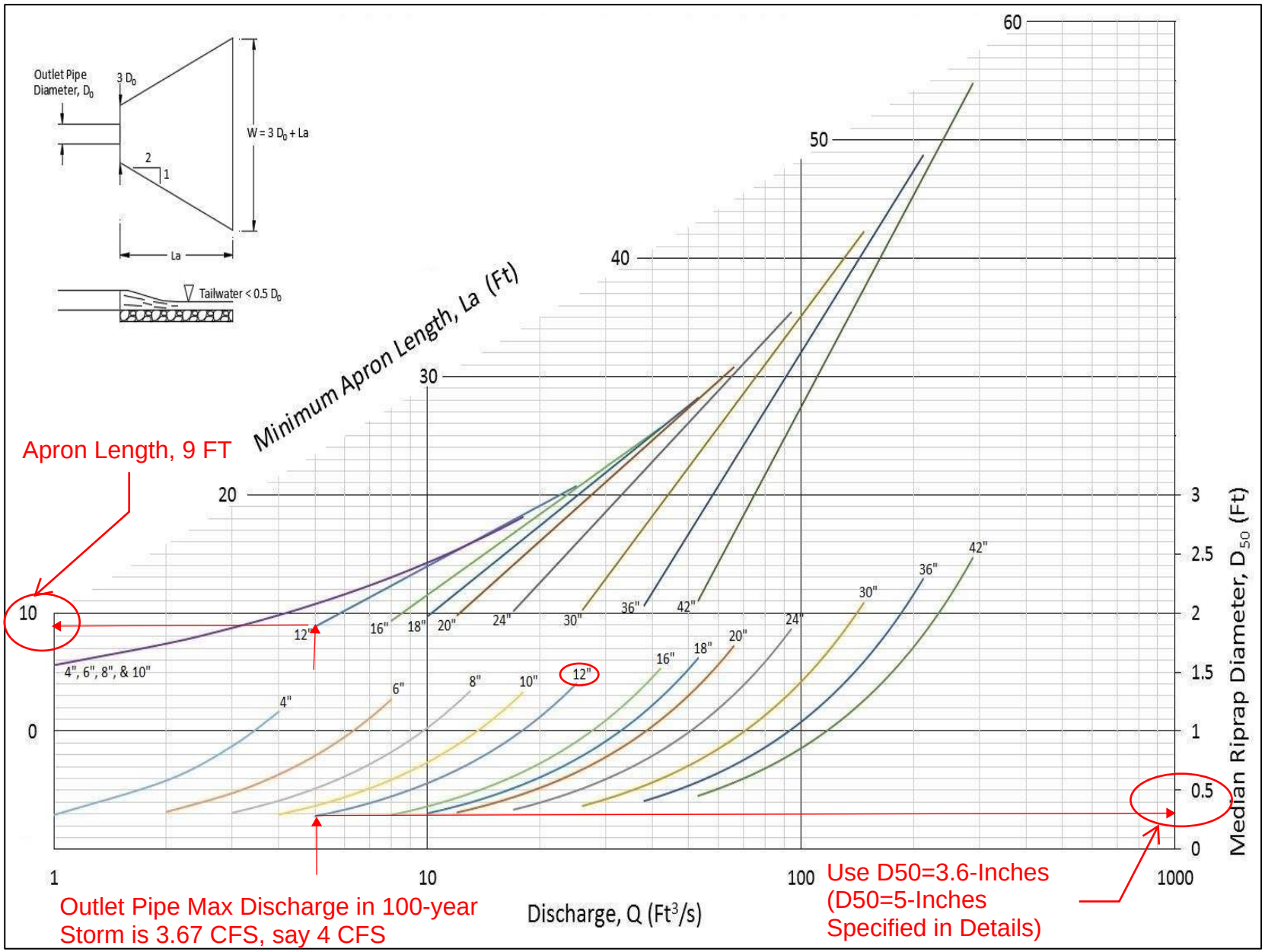


Figure 1a: Minimum Tailwater Condition

ATTACHMENT L

GEOTECHNICAL REPORT

SME
SEVEE & MAHER
ENGINEERS

REPORT

25-1685 S

December 16, 2025

Explorations and Geotechnical Engineering Services

Proposed BESS and Substation
769 Silver Street
Agawam, Massachusetts

Prepared For:
Longroad Energy, LLC
Attention: Kevin Hutchinson
125 High-Street High-Street Tower Suite 1705
Boston, MA 02110

Prepared By:
S. W. Cole Engineering, Inc.
227 Wampanoag Trail
Riverside, RI 02915
T: 401-438-7711

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Scope and Purpose 1
1.2 Site and Proposed Construction 1
2.0 EXPLORATION AND TESTING 2
2.1 Explorations 2
2.2 Field Testing 2
2.3 Field Resistivity 3
2.4 Laboratory Testing 3
3.0 SUBSURFACE CONDITIONS 4
3.1 Soil and Bedrock 4
3.2 Groundwater 4
4.0 EVALUATION AND RECOMMENDATIONS 4
4.1 General Findings 4
4.2 Site and Subgrade Preparation 5
4.3 Excavation and Dewatering 5
4.4 Foundations 6
4.5 Corrosion Protection and Cement Type 7
4.6 Frost Susceptibility and Protection 7
4.7 Fill, Backfill and Compaction 7
4.8 Weather Considerations 9
4.9 Roadways 9
4.10 Design Review and Construction Testing 9
5.0 CLOSURE 10

Appendix A Limitations
Appendix B Figures
Appendix C Exploration Logs & Key
Appendix D Laboratory Test Results
Appendix E Resistivity Data Sheets

25-1685 S

December 16, 2025

Longroad Energy, LLC
Attention: Kevin Hutchnison
125 High-Street Tower Suite 1705
Boston, MA 02110

Subject: Explorations and Geotechnical Engineering Services
Proposed BESS and Substation
769 Silver Street
Agawam, Massachusetts

Dear Kevin:

In accordance with our Proposal, dated September 2, 2025, we have performed subsurface explorations for the subject project. This report summarizes our findings and geotechnical recommendations and its contents are subject to the limitations set forth in Appendix A.

1.0 INTRODUCTION

1.1 Scope and Purpose

The purpose of our services was to obtain subsurface information at the site in order to develop geotechnical recommendations relative to foundations, earthwork and pavement associated with the proposed construction. Our scope of services included a test boring explorations, test pit explorations, soils laboratory testing, a geotechnical analysis of the subsurface findings and preparation of this report.

1.2 Site and Proposed Construction

The site is located at 769 Silver Street in Agawam, Massachusetts. The site is located within a commercial district. We understand the site occupies approximately 17 acres and is primarily used as a lumber yard business developed with several buildings and gravel laydown yards. The eastern border of the site includes densely wooded areas. An

overhead transmission line crosses the southern portion of the site in an east-west alignment. Based on existing aerial imagery site grades descend from Silver Street at an elevation of approximately 190 feet to the site in the northwest at an elevation of approximately 180 feet in southeast.

Details regarding the locations of the BESS, Substation, Equipment's Pads and Foundations loads are unknown at this time, however anticipate the site will be accessed from Silver Street and Moylan Lane. We understand associated electrical equipment will be supported by concrete pads. Details regarding proposed grading are unknown, however we anticipate that finish grade will be near existing grades requiring minor cuts and fills.

Proposed and existing site features are shown on the "Exploration Location Plan" attached in Appendix B.

2.0 EXPLORATION AND TESTING

2.1 Explorations

Nine test borings (B-1 through B-9) made at the site on October 13 and 14, 2025 by Seaboard Drilling, LLC. under subcontract to S. W. Cole Engineering, Inc. (S.W.COLE). Ten test pits (TP-1 through TP-10) were made at the site on October 13, 2025 by Seaboard Drilling. under subcontract to S.W.COLE. The exploration locations were selected by S.W.COLE. Exploration locations were established in the field by S.W.COLE personnel using a mapping-grade GPS.

The approximate exploration locations are shown on the "Exploration Location Plan" attached in Appendix B. Logs of the explorations and a key to the notes and symbols used on the logs are attached in Appendix C.

2.2 Field Testing

The test borings were drilled using hollow stem auger boring techniques. The soils were sampled at 2 to 5 foot intervals using a split spoon sampler and Standard Penetration Testing (SPT) methods. SPT blow counts results are shown on the logs.

2.3 Field Resistivity

A field soil electrical resistivity test spread (LRA-ER-1) was performed at the site on October 17, 2025 by S.W.COLE. The test spread included two mutually perpendicular test lines identified as A and B. The approximate location of the test spreads are shown on the "Exploration Location Plan," attached in Appendix B.

Field soil electrical resistivity testing was performed using a fixed-center Wenner Array, with an AGI SuperSting R1 resistivity meter. We conducted the electrical resistivity testing at two mutually perpendicular test spreads at the site substation. The maximum A-spacing tested was 60 feet. Instrument settings included automatic current and voltage settings and the use of interference compensation settings (for power at 60 Hz), which helps to reduce interferences to testing from nearby electrical fields. The apparent resistivity testing results are tabulated and graphed on the Resistivity Computation Data Sheets included as Appendix E.

As shown on the Resistivity Computation Data Sheets, the apparent resistivity ranged from approximately 742 ohm-meters (Ωm) at spread LRA-ER-1A (1 foot A-spacing) to 2120 Ωm (60 foot A-spacing). Variations in apparent resistivity between test locations and spread locations are interpreted as being due to variations in surficial and bedrock geology, moisture content and depth to water, and proximal unknown interferences.

The resistivity data should be reviewed by a grounding design engineer, in combination with the boring logs, to confirm that they are acceptable for the design of the grounding grid. It should be noted that these apparent resistivity measurements may be higher during drier seasonal conditions.

2.4 Laboratory Testing

Soil samples obtained from the explorations were returned to our laboratory for further classification and testing. Soil gradation, moisture content testing and soil proctor analysis were performed. Moisture content test results are noted on the logs.

Five soil samples were submitted to Testing Engineers International (TEI) for determination of pH, water soluble chloride, water soluble sulfate, water soluble sulfide, reduction-oxidation potential, electrical resistivity and alkalinity testing.

3.0 SUBSURFACE CONDITIONS

3.1 Soil and Bedrock

Below a surficial layer of topsoil, the subsurface profile generally consisted of subsoil; underlain uncontrolled and deposits of sands with varying amounts of silt. The principal strata encountered in the test borings are summarized below. Refer to the attached boring logs for detailed subsurface information.

Subsoil: A layer of brown, sandy Silt, with rootlets and organics was encountered from approximately 3 inches to 3 feet below the ground surface (bgs). Based on SPT blow counts, the subsoil layer was typically medium dense.

Uncontrolled Fill: A layer uncontrolled fill of encountered within boring B-1 and test pit TP-3. The reddish brown fill was encountered to depth between 5.5 and 11 feet below ground surface. Based on SPT blow counts the uncontrolled fill layer was typically medium dense.

Sand: Underlying the subsoil is a deposit of sand. The sand consisted of grayish tan fine sand with silt increasing with depth. Based on SPT N-Values, the sand was typically loose.

3.2 Groundwater

The soils encountered at the test borings and test pits were moist to wet from the ground surface. Saturated soils were encountered at depths varying from 9 to 15 feet. Long term groundwater information is not available. It should be anticipated that groundwater levels will fluctuate, particularly in response to periods of snowmelt and precipitation, as well as changes in site use.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

Based on the subsurface findings, the proposed construction appears feasible from a geotechnical standpoint. The principal geotechnical considerations include:

- Mat foundations or footing and pier foundations bearing on properly prepared subgrades appear suitable for the BESS Yard and Substation. The foundations

should bear on at least 6-inches of compacted Crushed overlying undisturbed native non-organic soils.

- All topsoil, subsoils and uncontrolled fill must be completely removed from beneath the BESS Yard and Substation and replaced with properly compacted granular borrow.

- Subgrades across the site will consist of subsoils, uncontrolled fill and sands. Earthwork and grading activities should occur during drier, non-freezing weather of Spring, Summer and Fall. Excavation of bearing surfaces should be completed with a smooth-edged bucket to lessen subgrade disturbance.

4.2 Site and Subgrade Preparation

We recommend that site preparation begin with the construction of an erosion control system to protect adjacent drainage ways and areas outside the construction limits. Surficial organics, roots and topsoil should be completely removed from areas of proposed fill and construction. As much vegetation as possible should remain outside the construction areas to lessen the potential for erosion and site disturbance.

All uncontrolled fills and subsoils must be completely removed from beneath the proposed BESS Yard and Substation. The extent of removal should extend 1 foot laterally outward from outside edge of the mat foundation for every 1-foot of excavation depth (1H:1V bearing splay). The overexcavated area should be backfilled with compacted Structural Fill.

We recommend that foundation be excavated using a smooth-edged bucket and that footings be underlain by at least 6 inches of Crushed Stone.

4.3 Excavation and Dewatering

Excavation work will generally encounter uncontrolled fills and sand. Care must be exercised during construction to limit disturbance of the bearing soils. Earthwork and grading activities should occur during drier, non-freezing weather of Spring, Summer and Fall. Low ground pressure tracked equipment may be needed and temporary haul roads overlying geotextile fabric may be necessary. Final cuts to subgrade should be performed with a smooth-edged bucket to help reduce strength loss from soil disturbance.

Vibrations from construction should be controlled below threshold limits of 0.5 in/sec for structures, water supply wells and infrastructure within 500 feet of the project site. More restrictive vibration limits may be warranted in specific cases with sensitive equipment, historic structures or artifacts on-site or within close proximity.

Based on the depth of observed water level in the test pit, we do not anticipate encountering water in shallow frost-depth foundations. Deeper foundations may require dewatering. Controlling the water levels to at least one foot below planned excavation depths will help stabilize subgrades during construction. Excavations must be properly shored or sloped in accordance with OSHA Regulations to prevent sloughing and caving of the sidewalls during construction. Care must be taken to preclude undermining adjacent structures, utilities and roadways. The design and planning of excavations, excavation support systems, and dewatering is the responsibility of the contractor.

4.4 Foundations

We recommend the proposed BESS Yard and Substation Foundations be supported on spread footing and pier foundations or mat foundations founded on at least 6-inches of crushed stone. For foundations bearing on properly prepared subgrades, we recommend the following geotechnical parameters for design consideration:

Geotechnical Parameters for Mat Foundation	
Design Frost Depth (MSBC)	4.0 feet
Net Allowable Soil Bearing Pressure	2.0 ksf
Base Friction Factor	0.35
Total Unit Weight of Backfill	125 pcf
At-Rest Lateral Earth Pressure Coefficient	0.5
Internal Friction Angle of Backfill	30°
Estimated Total Settlement	1-inch
Differential Settlement	½-inch

Mat foundations placed shallower than 4 feet from finish grade should either be frost protected incorporating insulation or incorporate the use of non-frost susceptible No. 57 crushed stone from the underside of the mat to the frost depth.

4.5 Corrosion Protection and Cement Type

A sample was submitted for laboratory of pH, water soluble chloride, water soluble sulfate, sulfide, reduction-oxidation potential, and electrical resistivity testing. The results of the testing are included in Appendix E.

Considering the corrosivity test results, we interpret the site soils score to be about 7 points on the "10-Point System" provided in the ANSI/AWWA C105/A21.5 standard. This indicates the soil samples are considered nonaggressive to slightly corrosive to ductile iron and cast iron.

According to the Portland Cement Association (PCA) manual *Design and Control of Concrete Mixtures*, Type II cement is used when concrete is to be in an environment with "negligible" to "moderate" sulfate exposure (sulfate values between 0 and 1500 ppm). Laboratory sulfate content was less than 10 ppm and therefore, Type II or Type I/II cement is applicable.

4.6 Frost Susceptibility and Protection

The design-freezing index for the Agawam, Massachusetts area is approximately 1268 Fahrenheit degree-days according to the National Oceanic and Atmospheric Administration (NOAA) databases, corresponding to a design frost depth of 4.0 feet.

Based on visual observations and the results of the laboratory testing, the soils in the frost zone varying in silt content, but the higher silt content areas have a high frost susceptibility. The sample at bor9ing B-1 from 2 to 4 feet below the ground surface has 34.8 percent fines (percent passing the No. 200 sieve) with moisture contents ranging from about 9 percent.

Mat foundations placed shallower than 4 feet from finish grade should either be frost protected incorporating insulation or incorporate the use of non-frost susceptible No. 57 crushed stone from the underside of the mat to the frost depth.

4.7 Fill, Backfill and Compaction

We recommend the following fill and backfill materials: recycled products must also be tested in accordance with applicable environmental regulations and approved by a qualified environmental consultant.

Granular Borrow: Fill to raise site grades should be sand or silty sand meeting the following gradation:

Granular Borrow	
Sieve Size	**Percent Finer by Weight**
6 inch	100
Portion Passing 3 inch Sieve	
3 inch	--
No. 40	0 to 70
No. 200	0 to 20

In our opinion, MassDOT-SSHB, Division III, M1.03.0 Gravel Borrow, Type A meets the requirements of Granular Borrow.

Structural Fill: Backfill for foundations should be clean, non-frost susceptible sand and gravel meeting the gradation requirements for Structural Fill as given below:

Structural Fill	
Sieve Size	**Percent Finer by Weight**
4 inch	100
3 inch	90 to 100
¼ inch	25 to 90
#40	0 to 30
#200	0 to 6

In our opinion, MassDOT-SSHB, Division III, M1.03.0, Gravel Borrow Type B with less than 6 percent passing the #200 sieve meets requirements of Structural Fill.

Crushed Stone: Crushed Stone, used beneath foundations and to frost-protect shallow mat foundations should be clean, washed crushed stone meeting the requirements of MassDOT-SSHB, Division III, M2.01.4, ¾-inch Crushed Stone.

Reuse of Site Soils: The non-organic on-site soils are unsuitable for reuse in BESS Yard and Substation areas.

Placement and Compaction: Fill should be placed in horizontal lifts and compacted such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. Loose lift thicknesses for grading, fill and backfill activities should

not exceed 12 inches. We recommend that fill and backfill in building and paved areas be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Crushed Stone should be compacted with 3 to 5 passes of a vibratory plate compactor having a static weight of at least 500 pounds.

4.8 Weather Considerations

Construction activity should be limited during wet and freezing weather and the site soils may require drying or thawing before construction activities may continue. The contractor should anticipate the need for water to temper fills in order to facilitate compaction during dry weather. If construction takes place during cold weather, subgrades, foundations and floor slabs must be protected during freezing conditions. Concrete and fill must not be placed on frozen soil; and once placed, the concrete and soil beneath the structure must be protected from freezing.

4.9 Roadways

We anticipate gravel roadways will be subjected primarily to service vehicle truck traffic and in the event of emergency by a fire truck. Considering the site soils, and proposed usage, we offer the following pavement section for consideration.

GRAVEL ROADWAY SECTIONS		
Material Type	**Minimum Thickness (Pick Up Truck Access)**	**Minimum Thickness (Emergency Truck Access)**
Base Course Gravel	3 inches	3 inches
Subbase Course Gravel	9 inches	15 inches

The base and subbase materials should be compacted to at least 95 percent of their maximum dry density as determined by ASTM D-1557.

4.10 Design Review and Construction Testing

S.W.COLE should be retained to review the construction documents prior to bidding to determine that our earthwork, foundation and pavement recommendations have been properly interpreted and implemented.

A construction materials testing and quality assurance program should be implemented during construction to observe compliance with the design concepts, plans, and specifications. S.W.COLE is available to observe earthwork activities, the preparation of

foundation bearing surfaces, as well as to provide testing and IBC Special Inspection services for soils, concrete, and steel construction materials.

5.0 CLOSURE

It has been a pleasure to be of assistance to you with this phase of your project. We look forward to working with you during the construction phase of the project.

Sincerely,

S. W. Cole Engineering, Inc.

Jethro Celamy, E.I.T
Project Geotechnical Engineer



Chad B Michaud, P.E.
Executive Vice President

JC:cbm

APPENDIX A

Limitations

This report has been prepared for the exclusive use of Long Road Energy for specific application to the proposed BESS and Substation on 769 Silver Street in Agawam, MA. S. W. Cole Engineering, Inc. (S.W.COLE) has endeavored to conduct our services in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

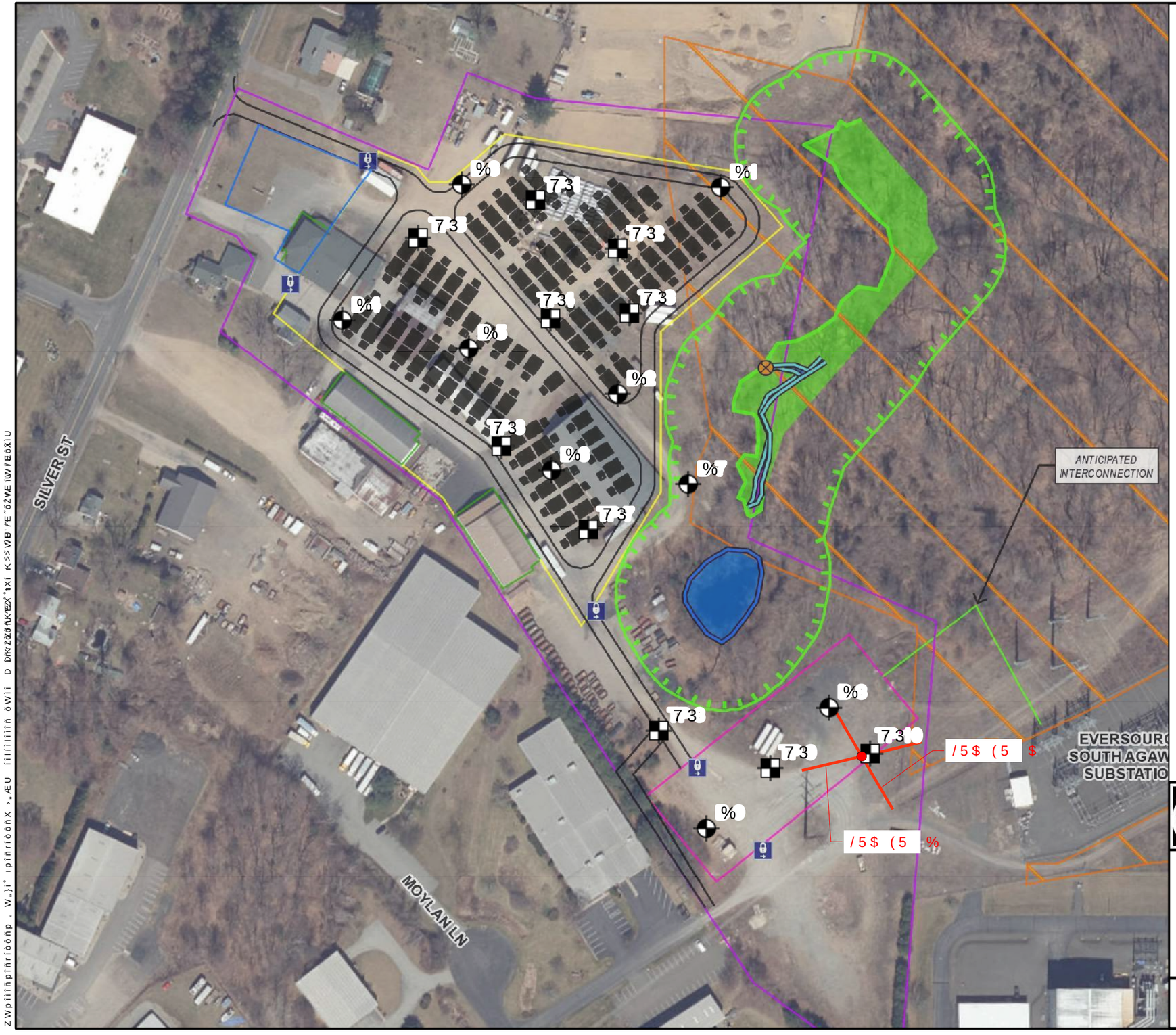
Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE's scope of services has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S.W.COLE should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S.W.COLE.

APPENDIX B

Figures



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APPENDIX C

Exploration Logs and Key

BORING LOG

CLIENT: Longroad Energy LLC
PROJECT: Proposed BESS and Substation
LOCATION: 769 Silver Street, Agawan, Massachusetts

BORING NO.: B-1
SHEET: 1 of 1
PROJECT NO. 25-1685
DATE START: 10/14/2025
DATE FINISH: 10/14/2025

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** N/A | **TOTAL DEPTH (FT):** 22.0 | **LOGGED BY:** Sean Patota
DRILLING CO.: Seaboard Drilling | **DRILLER:** Joe Nitsch | **DRILLING METHOD:** Hollow Stem Auger
RIG TYPE: Truck Mounted Mobile Drill B-53 | **AUGER ID/OD:** 2 1/4 in / 5 5/8 in | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic | **HAMMER WEIGHT (lbs):** 140 | **CASING ID/OD:** N/A /N/A | **CORE BARREL:** N/A
HAMMER CORRECTION FACTOR: | **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▽ 15 ft Saturated Soils Encountered at 15 ft
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/24	3-7-10-11			Moist, medium dense, red brown, SAND and SILT, some Gravel (Fill)		
			2D		2-4	24/14	4-11-11-9			Moist, medium dense, red brown, Gravelly SAND and SILT (Fill)		
	5		3D		5-7	24/19	8-12-12-11			Moist, medium dense, red brown, SILT and fine SAND, trace Gravel (Fill)		
	10		4D		10-12	24/22	3-3-4-4			Moist, loose, red brown, SILT and fine SAND, trace Gravel		
										11.0 Moist, loose, tan, Silty SAND		
	15		5D		15-17	24/5	5-4-7-14			Wet, medium dense, tan, SAND, trace Silt	▽	
	20		6D		20-22	24/18	3-3-4-5			Wet, loose, gray, SILT, trace fine Sand		

Bottom of Exploration at 22.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-1

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-2**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/13/2025
DATE FINISH:	10/13/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/21	3-6-6-5			Moist, medium dense, light brown and reddish, SAND, some Silt, trace Gravel		
			2D		2-4	24/18	3-4-2-3			Moist, loose, light brown, SAND, some Silt, trace Gavel		
										3.0		
	5		3D		5-7	24/14	5-4-3-4			Moist, loose, tan, SAND, some Silt		
	10		4D		10-12	24/20	2-3-3-4			Wet, loose, tan, SAND, some Silt	▽	
	15		5D		15-17	24/24	3-4-5-4			Wet, loose, tan, SAND, trace Silt		
	20		6D		20-22	24/19	3-3-3-5			20.0 Wet, loose, gray, SILT and fine SAND		

Bottom of Exploration at 22.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-2**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-3**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/13/2025
DATE FINISH:	10/13/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/20	4-3-4-3			Moist, loose, light brown, Silty medium to fine SAND (Subsoil)		
			2D		2-4	24/20	4-4-4-4			Moist, loose, light brown, Silty SAND		
										3.0		
	5		3D		5-7	24/18	3-2-3-4			Moist, loose, tan, Silty SAND		
	10		4D		10-12	24/14	2-2-2-1			10.0 Wet, very loose, tan, SILT, trace fine Sand	▽	
	15		5D		15-17	24/19	2-3-4-3			Wet, loose, tan Silty SAND		
	20		6D		20-22	24/12	11-7-6-7			Wet, medium dense, tan SAND, some Silt		
										Bottom of Exploration at 22.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-3**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-4**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/13/2025
DATE FINISH:	10/13/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0.25-2.3	24/16	7-8-7-7			Moist, medium dense, light brown, SAND, some Silt (Subsoil)		
			2D		2-4	24/16	5-5-4-5			Moist, loose, light brown, SAND, some Silt		
										3.0		
	5		3D		5-7	24/15	3-3-4-4			Moist, loose, tan, SAND, trace Silt		
	10		4D		10-12	24/20	5-7-8-11			10.0 Wet, medium dense, grayish tan, SILT and SAND	▽	
	15		5D		15-17	24/14	4-5-6-6			Wet, medium dense, grayish tan, SILT, some Sand		
	20		6D		20-22	24/13	2-2-3-3			Wet, loose, grayish tan, SILT, some Sand		

Bottom of Exploration at 22.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-4**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-5**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/13/2025
DATE FINISH:	10/13/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:

Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling

D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear

Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot

WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector

S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/12	5-3-5-5			Moist, loose, light brown, Silty SAND, trace Gravel (Subsoil)		
			2D		2-4	24/18	3-4-3-3			Moist, loose, light brown, Silty SAND		
										3.0		
	5		3D		5-7	24/0	12-13-13-13			No recovery		
	10		4D		10-12	24/17	4-1-2-2			10.0 Wet, very loose, brown, SILT and fine SAND	▽	
	15		5D		15-17	24/13	2-3-2-3			Wet, loose, grayish brown, SILT and fine SAND		
	20		6D		20-22	24	2-2-2-2			Wet, very loose, grayish brown, SILT, some fine Sand		
										Bottom of Exploration at 22.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-5**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-6**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/13/2025
DATE FINISH:	10/13/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24	5-6-6-6			Moist, medium dense, brown, Silty SAND, trace Gravel		
			2D		2-4	24	5-5-5-5			2.0 Moist, loose, tan, SAND, some Silt		
	5		3D		5-7	24/18	3-3-3-4			Moist, loose, tan, Silty SAND, trace Gravel		
	10		4D		10-12	24/24	2-1-1-1			Wet, very loose, tann, SILT and SAND	▽	
	15		5D		15-17	24/20	4-6-6-7			15.0 Wet, medium dense, gray, SILT and SAND		
	20		6D		20-22	24/17	2-3-7-12			Wet, loose, gray, SILT and SAND		

Bottom of Exploration at 22.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-6**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-7**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/14/2025
DATE FINISH:	10/14/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level; ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling; D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear; Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot; WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector; S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/14	3-4-4-4			Moist, loose, dark brown Silty SAND, some gravel (Subsoil)		
			2D		2-4	24/16	4-4-3-3			Moist, loose, light brown, Silty SAND, some gravel (Subsoil)		
										3.0		
	5		3D		5-7	24/18	2-2-2-3			Moist, very loose, tan, SAND, trace Silt		
	10		4D		10-12	24/20	3-2-1-2			10.0 Wet, very loose, tan SAND, trace Silt	▽	
	15		5D		15-17	24/19	1-1-2-5			Wet, very loose, tan SAND, trace Silt		
	20		6D		20-22	24/10	3-2-1-3			20.0 Wet, very loose, gray, Silty SAND		
										Bottom of Exploration at 22.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-7**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-8**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/14/2025
DATE FINISH:	10/14/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/16	10-10-9-9			0.5 Moist, medium dense, black, Silty SAND, some Gravel		
										Moist, medium dense, tan, Silty SAND		
			2D		2-4	24/16	8-8-8-7			Moist, medium dense, tan, SAND, some Silt, trace Gravel		
	5		3D		5-7	24/17	2-3-3-4			Moist, loose, tan, SAND, trace Silt		
	10		4D		10-12	24/15	3-6-10-13			10.0 Wet, medium dense, grayish tan, Sandy SILT	▽	
	15		5D		15-17	24/12	4-2-4-3			Wet, loose, gray, SILT and SAND		
	20		6D		20-22	24/16	5-3-5-4			Wet, loose, gray, SILT, some Sand		

Bottom of Exploration at 22.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-8**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-9**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/14/2025
DATE FINISH:	10/14/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/20	3-4-5-5			Moist, loose, brown and light brown, Silty SAND (Subsoil)		
			2D		2-4	24/18	4-4-4-4			2.0 Moist, loose, tan, Silty SAND		
	5		3D		5-7	24/20	2-2-2-3			Moist, very loose, tan, Silty SAND		
	10		4D		10-12	24/24	2-2-2-2			10.0 Wet, very loose, tan, SAND, trace Silt	▽	
	15		5D		15-17	24/24	4-3-3-4			Wet, loose, tan, SAND, trace Silt		
	20		6D		20-22	24/12	7-8-7-8			20.0 Wet, medium dense, gray, SILT and SAND		

Bottom of Exploration at 22.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-9**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

TEST PIT LOGS

CLIENT: Longroad Energy LLC
PROJECT: Proposed BESS and Substation
LOCATION: 769 Silver Street, Agawan, Massachusetts

PROJECT NO.: 25-1685
LOGGED BY: Cassie Stelmash
CONTRACTOR: Seaboard Drilling
EQUIPMENT: Komat'su PC40MR Excavator

TEST PIT TP- 1

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		0.5 Moist, brown, fine GRAVEL, some Sand, some Silt Moist, tan, SAND, some Gravel, trace Silt					
		1.5 Moist, tan, SAND, trace Silt					
5		5.0 Moist, tan, Silty SAND					
		7.0 Moist, tan, Sandy SILT					
		9.0 Wet, light tan, Sandy SILT	9				
10		Bottom of Exploration at 10.0 feet					

TEST PIT TP- 2

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, brown, fine GRAVEL, some Sand, some Silt					
		1.0 Moist, tan, silty SAND, trace fine Gravel					
5		5.0 Moist, light tan, silty SAND					
		9.0 Wet, light tan, silty SAND	▽ 9				
10		Bottom of Exploration at 10.0 feet					

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

KEY TO NOTES AND SYMBOLS:

Water Level
▽ At time of Digging
▼ At Completion of Digging
▼ After Digging

q_p = Pocket Penetrometer Strength, kips/sq.ft.

TEST PIT 25-1685 TP.GPJ SWCE TEMPLATE.GDT 12/15/25

TEST PIT LOGS

CLIENT: Longroad Energy LLC
PROJECT: Proposed BESS and Substation
LOCATION: 769 Silver Street, Agawan, Massachusetts

PROJECT NO.: 25-1685
LOGGED BY: Cassie Stelmash
CONTRACTOR: Seaboard Drilling
EQUIPMENT: Komat'su PC40MR Excavator

TEST PIT TP- 3

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 10' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, browm fine GRAVEL, some Sand, some Silt, trace Organics					
		1.5 Moist, reddish brown, fine GRAVEL (FILL)					
5		5.5 Moist, light brown, Silty SAND, some Gravel					
		9.0 Moist, brown, coarse SAND, trace Silt					
10			▽ 10				

Bottom of Exploration at 10.0 feet

TEST PIT TP- 4

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, brown, fine GRAVEL, some sand, some silt, some organics					
		1.0 Moist, tan, Silty SAND, some Gravel					
		3.0 Moist, tan, Sandy SILT					
5		6.5 Moist, greyish tan, Sandy SILT					
		9.0 Wet, greyish tan, Sandy SILT	▽ 9				
10							

Bottom of Exploration at 10.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

KEY TO NOTES AND SYMBOLS:

Water Level
▽ At time of Digging
▼ At Completion of Digging
▼ After Digging

q_p = Pocket Penetrometer Strength, kips/sq.ft.

TEST PIT 25-1685 TP.GPJ SWCE TEMPLATE.GDT 12/15/25

TEST PIT LOGS

CLIENT: Longroad Energy LLC
PROJECT: Proposed BESS and Substation
LOCATION: 769 Silver Street, Agawan, Massachusetts

PROJECT NO.: 25-1685
LOGGED BY: Cassie Stelmash
CONTRACTOR: Seaboard Drilling
EQUIPMENT: Komat'su PC40MR Excavator

TEST PIT TP- 5

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observed at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, tannish brown, silty SAND, some Organics					
		1.0 Moist, dark tan, coarse Sand, some Silt, trace Organics					
		3.0 Moist, tan, Silty SAND					
5							
		8.0 Moist, tan, Silty SAND, trace Organics					
		9.0 Wet, tan, Silty SAND, trace Organics	▽ 9				
10		Bottom of Exploration at 10.0 feet					

TEST PIT TP- 6

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils not Encountered **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, reddish brown, GRAVEL, some Sand, trace Silt, trace Organics					
		1.5 Moist, tan, course Sand, some Silt					
5		5.0 Moist, light tan, Silty SAND					
10		Bottom of Exploration at 10.0 feet					

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

KEY TO NOTES AND SYMBOLS:

Water Level
▽ At time of Digging
▼ At Completion of Digging
▼ After Digging

q_p = Pocket Penetrometer Strength, kips/sq.ft.

TEST PIT 25-1685 TP.GPJ SWCE TEMPLATE.GDT 12/15/25

TEST PIT LOGS

CLIENT: Longroad Energy LLC
PROJECT: Proposed BESS and Substation
LOCATION: 769 Silver Street, Agawan, Massachusetts

PROJECT NO.: 25-1685
LOGGED BY: Cassie Stelmash
CONTRACTOR: Seaboard Drilling
EQUIPMENT: Komat'su PC40MR Excavator

TEST PIT TP- 7

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, dark brown, fine GRAVEL, some Sand, some Silt, trace Organics					
		1.5 Moist, tan, Silty SAND					
		3.5 Moist, tan, Sandy SILT					
5							
		9.0 Wet, greyish tan, Sandy SILT	▽ 9				
10		Bottom of Exploration at 10.0 feet					

TEST PIT TP- 8

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, brown, Silty SAND, some Gravel, some Organics (TOPSOIL)					
		0.5 Moist, tan, Silty SAND					
		1.5 Moist, tan., coarse SAND, some Silt					
5							
		9.0 Wet, tan, course SAND, some Silt	▽ 9				
10		Bottom of Exploration at 10.0 feet					

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

KEY TO NOTES AND SYMBOLS:

Water Level
▽ At time of Digging
▼ At Completion of Digging
▼ After Digging

q_p = Pocket Penetrometer Strength, kips/sq.ft.

TEST PIT 25-1685 TP.GPJ SWCE TEMPLATE.GDT 12/15/25

TEST PIT LOGS

CLIENT: Longroad Energy LLC
PROJECT: Proposed BESS and Substation
LOCATION: 769 Silver Street, Agawan, Massachusetts

PROJECT NO.: 25-1685
LOGGED BY: Cassie Stelmash
CONTRACTOR: Seaboard Drilling
EQUIPMENT: Komat'su PC40MR Excavator

TEST PIT TP- 9

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		0.2 Moist, Brown, silty SAND and Gravel, some Organics (TOPSOIL)					
		Moist, tan, Silty SAND with Gravel, trace Organics					
		1.5 Moist, tan, coarse SAND, some Silt					
5		5.0 Moist, ligth tan, coarse SAND, some Silt					
		6.0 Moist, light tan, Sandy SILT					
		9.0 Wet, light tan, Sandy SILT	▽ 9				
10		Bottom of Exploration at 10.0 feet					

TEST PIT TP-10

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils not Encountered **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, brown, GRAVEL, some Sand, some Silt, trace Organics (TOPSOIL)					
		1.5 Moist, brown, GRAVEL, some Sand, some Silt,					
		2.5 Moist, brown, Silty SAND, trace Gravel					
		3.0 Moist, tan, Sandy SILT					
5							
		9.0 Moist, loose, tan, SILT with SAND					
10		Bottom of Exploration at 10.0 feet					

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

KEY TO NOTES AND SYMBOLS:
Water Level
▽ At time of Digging
▼ At Completion of Digging
▼ After Digging

q_p = Pocket Penetrometer Strength, kips/sq.ft.

TEST PIT 25-1685 TP.GPJ SWCE TEMPLATE.GDT 12/15/25

KEY TO NOTES & SYMBOLS

Test Boring and Test Pit Explorations

Stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q_u	-	unconfined compressive strength, kips/sq. ft. - laboratory test
S_v	-	field vane shear strength, kips/sq. ft.
L_v	-	lab vane shear strength, kips/sq. ft.
q_p	-	unconfined compressive strength, kips/sq. ft. – pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W_L	-	liquid limit - Atterberg test
W_P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass.
γ_T	-	total soil weight
γ_B	-	buoyant soil weight

Description of Proportions:

Trace:	0 to 5%
Some:	5 to 12%
"Y"	12 to 35%
And	35+%
With	Undifferentiated

Description of Stratified Soils

Parting:	0 to 1/16" thickness
Seam:	1/16" to 1/2" thickness
Layer:	½" to 12" thickness
Varved:	Alternating seams or layers
Occasional:	one or less per foot of thickness
Frequent:	more than one per foot of thickness

REFUSAL: **Test Boring Explorations** - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: **Test Pit Explorations** - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.

APPENDIX D

Laboratory Test Results

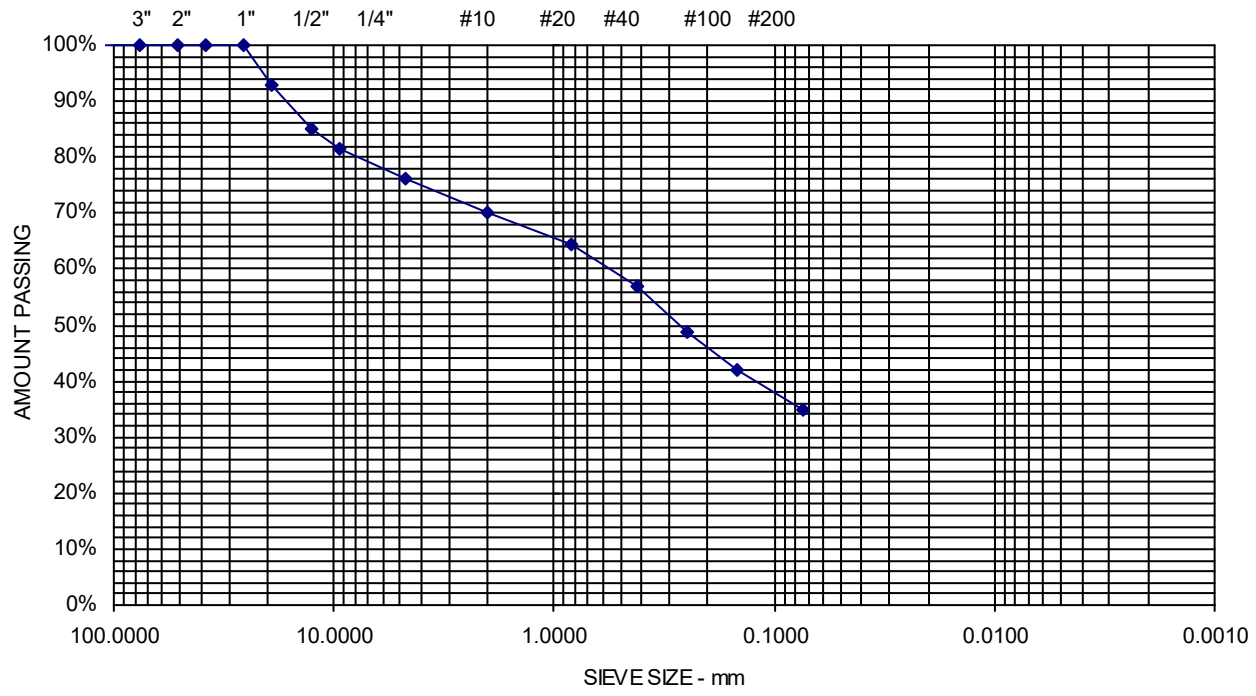
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	AGAWAM MA - BESS AND SUBSTATION - GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	2526R
		Date Received	10/28/2025
		Date Completed	10/29/2025
Material Source	**B-1 2D 2'-4'**	Tested By	SEAN PATOTA

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**93**	
12.5 mm	**1/2"**	**85**	
9.5 mm	**3/8"**	**82**	
4.75 mm	**No. 4**	**76**	23.8% Gravel
2.00 mm	**No. 10**	**70**	
850 um	**No. 20**	**64**	
425 um	**No. 40**	**57**	41.4% Sand
250 um	**No. 60**	**49**	
150 um	**No. 100**	**42**	
75 um	**No. 200**	**34.8**	34.8% Fines



Comments: MC = 9.31%

Sheet

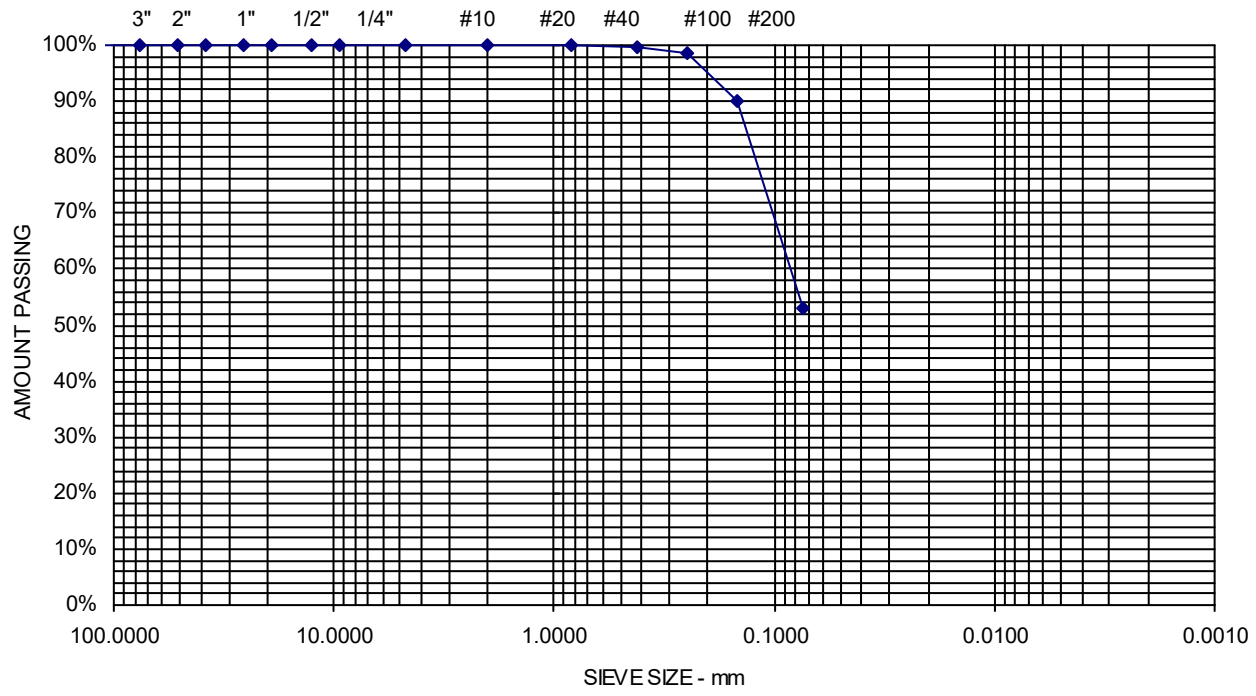
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	AGAWAM MA - BESS AND SUBSTATION - GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	2527R
		Date Received	10/28/2025
		Date Completed	10/29/2025
Material Source	**B-6 4D 10'-12'**	Tested By	SEAN PATOTA

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	47.1% Sand
250 um	**No. 60**	**99**	
150 um	**No. 100**	**90**	
75 um	**No. 200**	**52.9**	52.9% Fines



Comments: MC = 36.13%

Sheet

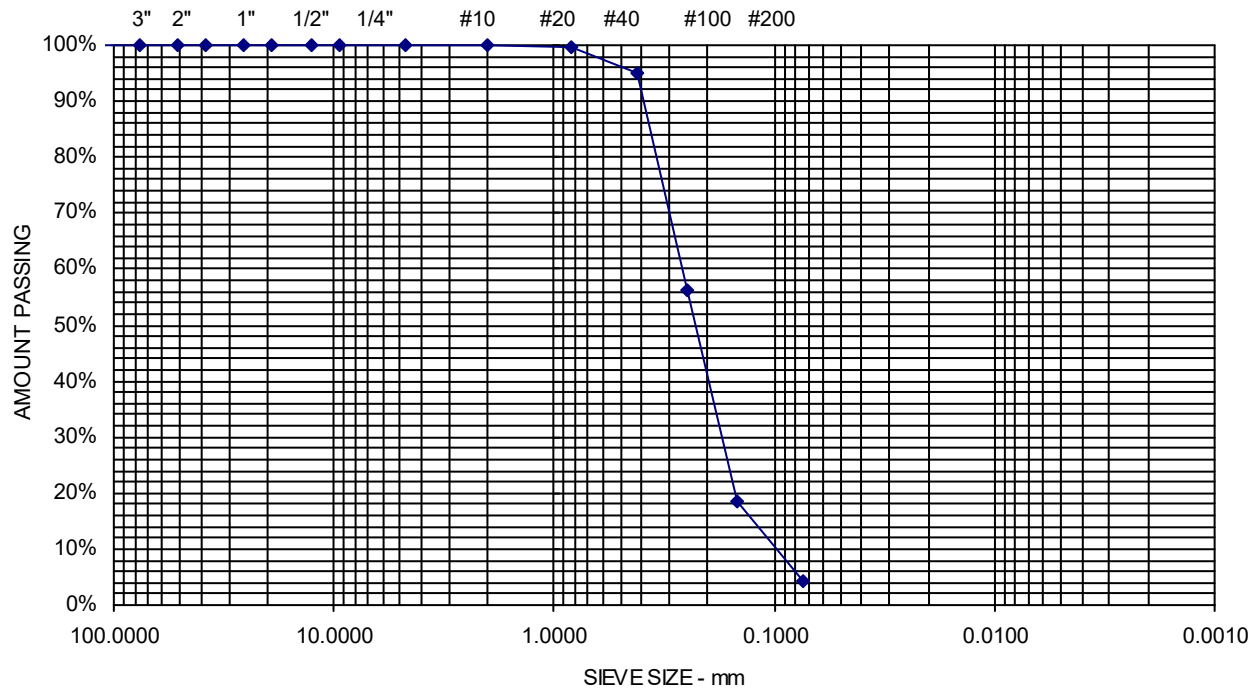
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	AGAWAM MA - BESS AND SUBSTATION - GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	2528R
		Date Received	10/28/2025
		Date Completed	10/29/2025
Material Source	**B-8 3D 5'-7'**	Tested By	SEAN PATOTA

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**95**	95.8% Sand
250 um	**No. 60**	**56**	
150 um	**No. 100**	**18**	
75 um	**No. 200**	**4.2**	4.2% Fines



Comments: MC = 6.24%

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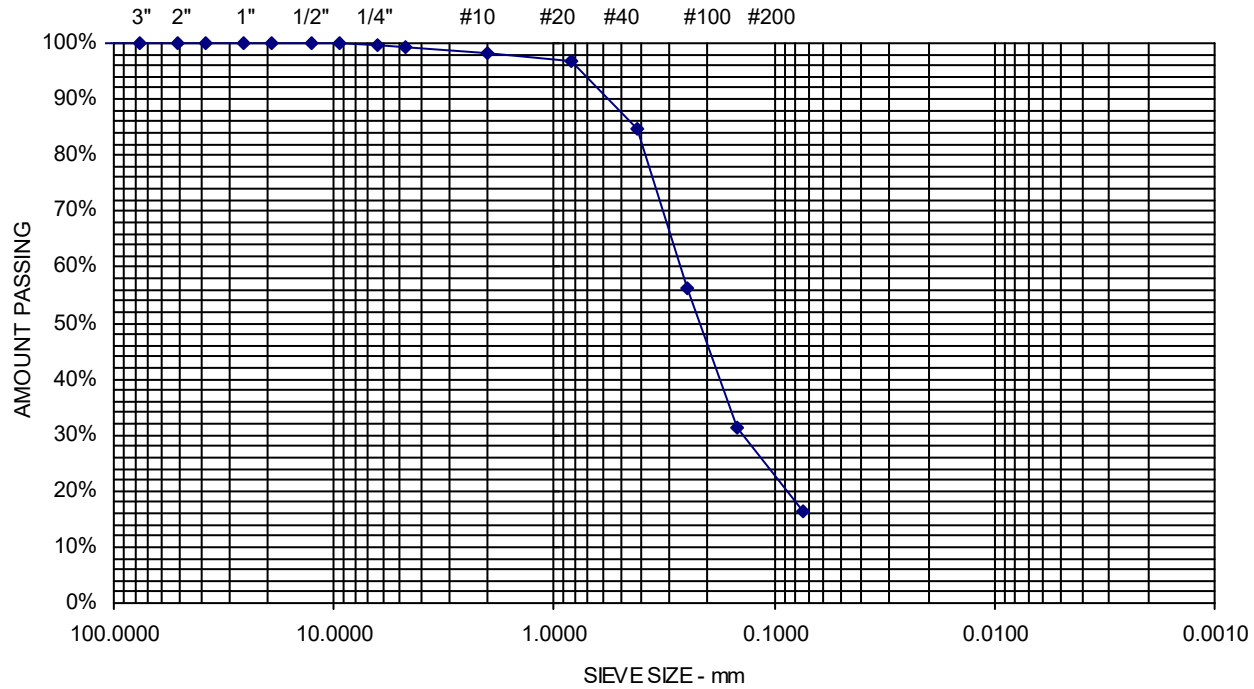
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	AGAWAM MA - BESS AND SUBSTATION - EXPLORATIONS AND GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	9857M
		Date Received	11/5/2025
		Date Completed	11/11/2025
Material Source	**TP4 1.5'**	Tested By	ELIZABETH HALSTEAD

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**99**	0.7% Gravel
2.00 mm	**No. 10**	**98**	
850 um	**No. 20**	**97**	
425 um	**No. 40**	**85**	83.1% Sand
250 um	**No. 60**	**56**	
150 um	**No. 100**	**31**	
75 um	**No. 200**	**16.2**	16.2% Fines



Comments:

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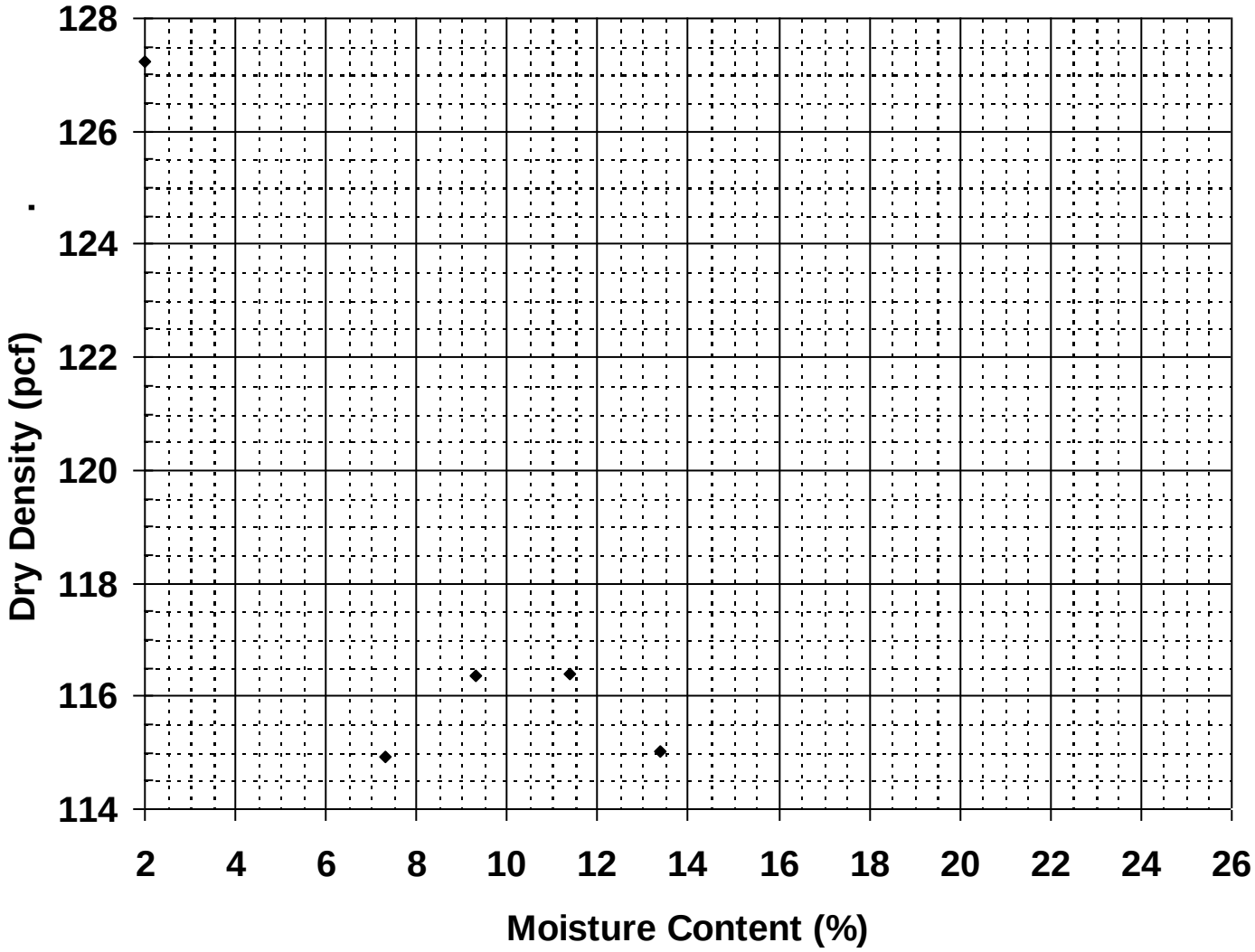
S.W.COLE ENGINEERING, INC.

Report of Moisture-Density

Method ASTM D-1557 MODIFIED Procedure A

Project Name	AGAWAM MA - BESS AND SUBSTATION - EXPLORATIONS AND GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	9857M
Material Type	SOIL	Date Received	11/5/2025
Material Source	TP4 1.5'	Date Completed	11/13/2025
		Tested By	ELIZABETH HALSTEAD

Moisture-Density Relationship Curve



Maximum Dry Density (pcf)	116.8
Optimum Moisture Content (%)	10.4
Percent Oversized	0.7%

Corrected Dry Density (pcf)	**117**
Corrected Moisture Content (%)	**10.3**

Comments

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S.W.COLE ENGINEERING, INC.

Report of Thermal Resistivity
Dryout Curve

Project Name:	BESS and Substation	**Project Number:**	25-1685
Project Location:	Agawam, MA	**Lab ID:**	9857M
Client:	Longroad Energy Management, LLC	**Date Received:**	11/5/2025
Material Description:	Soil	**Date Completed:**	11/18/2025
Material Source:	TP4 1.5'	**Test By:**	D. Jack

Thermal properties were tested, per customers request, at optimum moisture content of 10.4% and at 95% compaction per ASTM Standard D1557. The thermal tests were conducted using the IEEE Standard 442-2017.

Sample Information

Sample ID

TP4 1.5'

Sample Description

Soil

Dry Bulk Density (lb/ft³)

116.8

Moisture Content (%)

10.4

Thermal properties

Thermal resistivity (°C-cm/W)

Wet	48
Dry	212

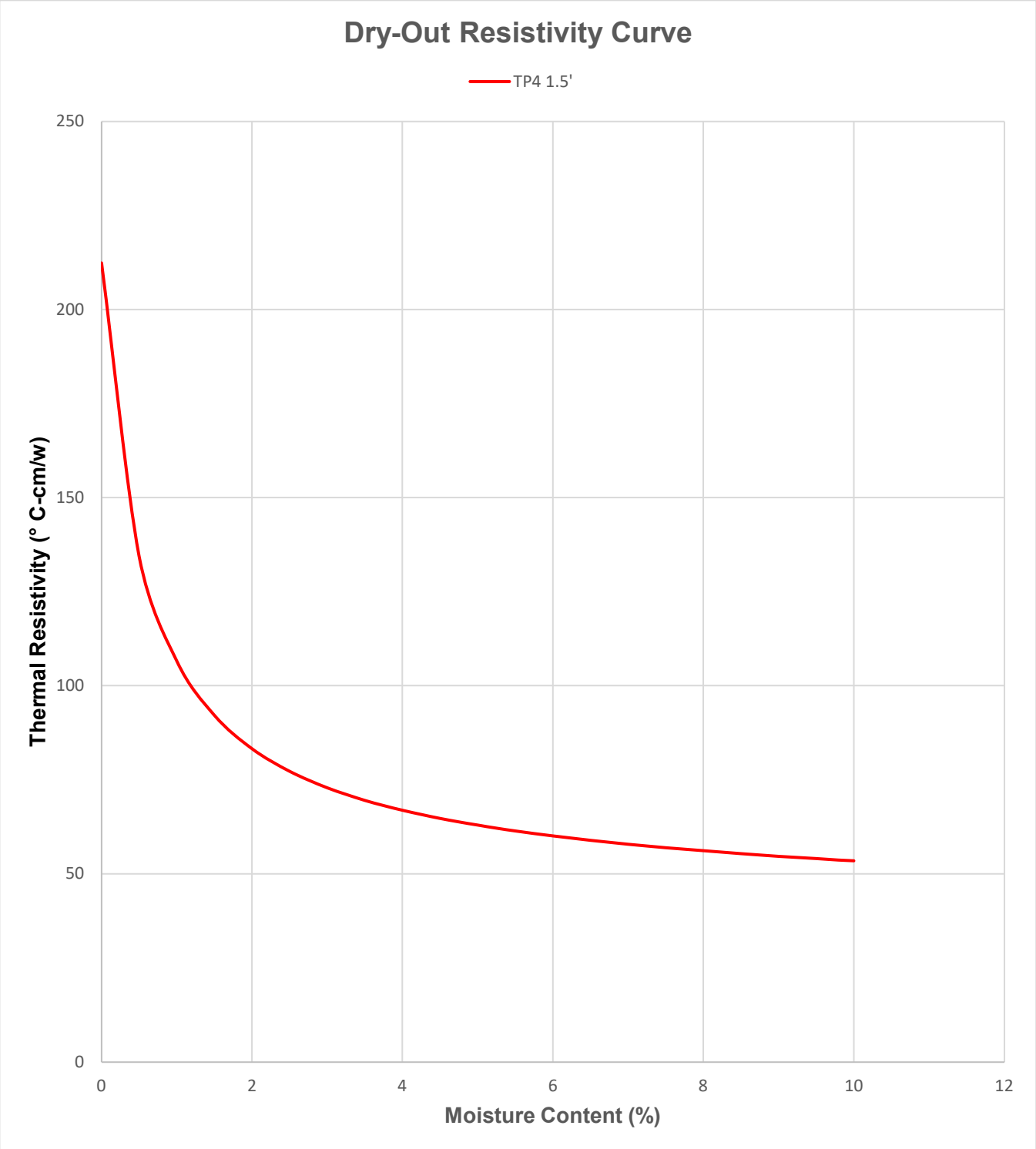
Dryout Resistivity curve was created utilizing the data on this report.
Please contact us with any questions related to the report or its contents.

Reviewed by: Richard Smith
Richard Smith

13 Delta Drive, Unit 8, Londonderry NH 03053 • P: (603) 716.2111 • F: (603) 716.2112 • E: infolondonderry@swcole.com

S.W.COLE ENGINEERING, INC.

Project Number: 25-1685
Lab ID: 9857M



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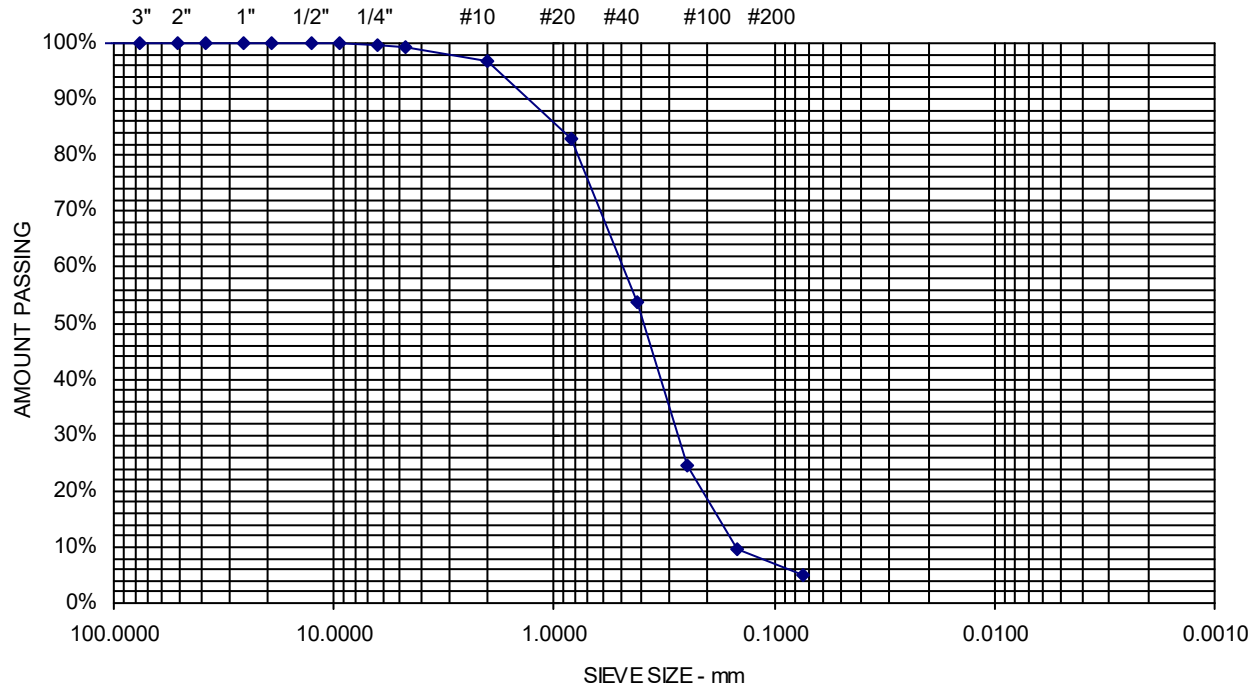
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	AGAWAM MA - BESS AND SUBSTATION - EXPLORATIONS AND GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	9858M
		Date Received	11/5/2025
		Date Completed	11/12/2025
Material Source	**TP9 1.5'**	Tested By	ELIZABETH HALSTEAD

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**99**	
4.75 mm	**No. 4**	**99**	0.9% Gravel
2.00 mm	**No. 10**	**97**	
850 um	**No. 20**	**83**	
425 um	**No. 40**	**54**	94.1% Sand
250 um	**No. 60**	**25**	
150 um	**No. 100**	**10**	
75 um	**No. 200**	**5.0**	5% Fines



Comments:

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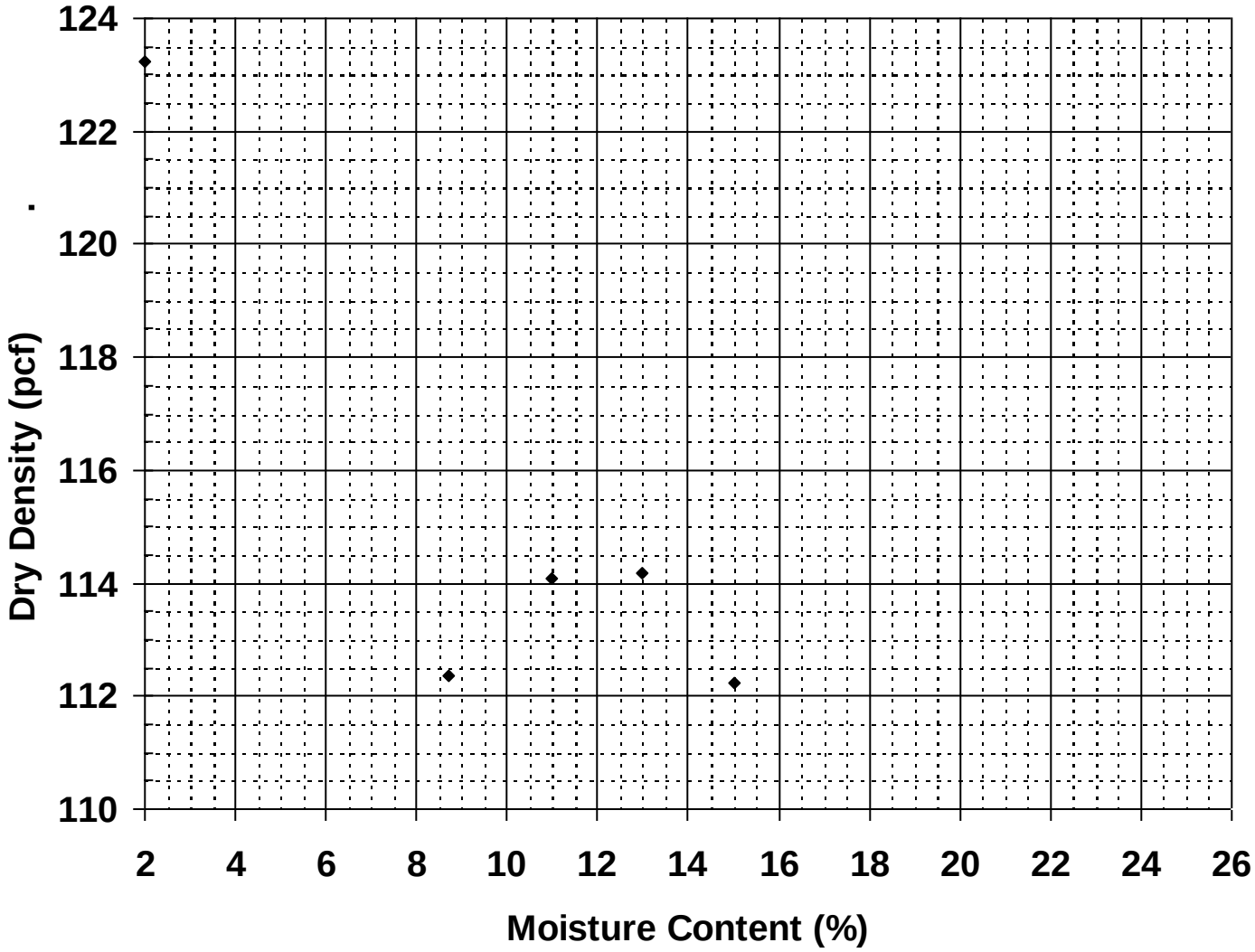
S.W.COLE ENGINEERING, INC.

Report of Moisture-Density

Method ASTM D-1557 MODIFIED Procedure A

Project Name	AGAWAM MA - BESS AND SUBSTATION - EXPLORATIONS AND GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	9858M
Material Type	SOIL	Date Received	11/5/2025
Material Source	TP9 1.5'	Date Completed	11/14/2025
		Tested By	ELIZABETH HALSTEAD

Moisture-Density Relationship Curve



Maximum Dry Density (pcf)	114.6
Optimum Moisture Content (%)	12.1
Percent Oversized	0.9%

Corrected Dry Density (pcf)	**114.9**
Corrected Moisture Content (%)	**12.0**

Comments

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S.W.COLE ENGINEERING, INC.

Report of Thermal Resistivity
Dryout Curve

Project Name:	BESS and Substation	**Project Number:**	25-1685
Project Location:	Agawam, MA	**Lab ID:**	9858M
Client:	Longroad Energy Management, LLC	**Date Received:**	11/5/2025
Material Description:	Soil	**Date Completed:**	11/18/2025
Material Source:	TP9 1.5'	**Test By:**	D. Jack

Thermal properties were tested, per customers request, at optimum moisture content of 12.1% and at 95% compaction per ASTM Standard D1557. The thermal tests were conducted using the IEEE Standard 442-2017.

Sample Information

Sample ID

TP9 1.5'

Sample Description

Soil

Dry Bulk Density (lb/ft³)

114.6

Moisture Content (%)

12.1

Thermal properties

Thermal resistivity (°C-cm/W)

Wet	54
Dry	217

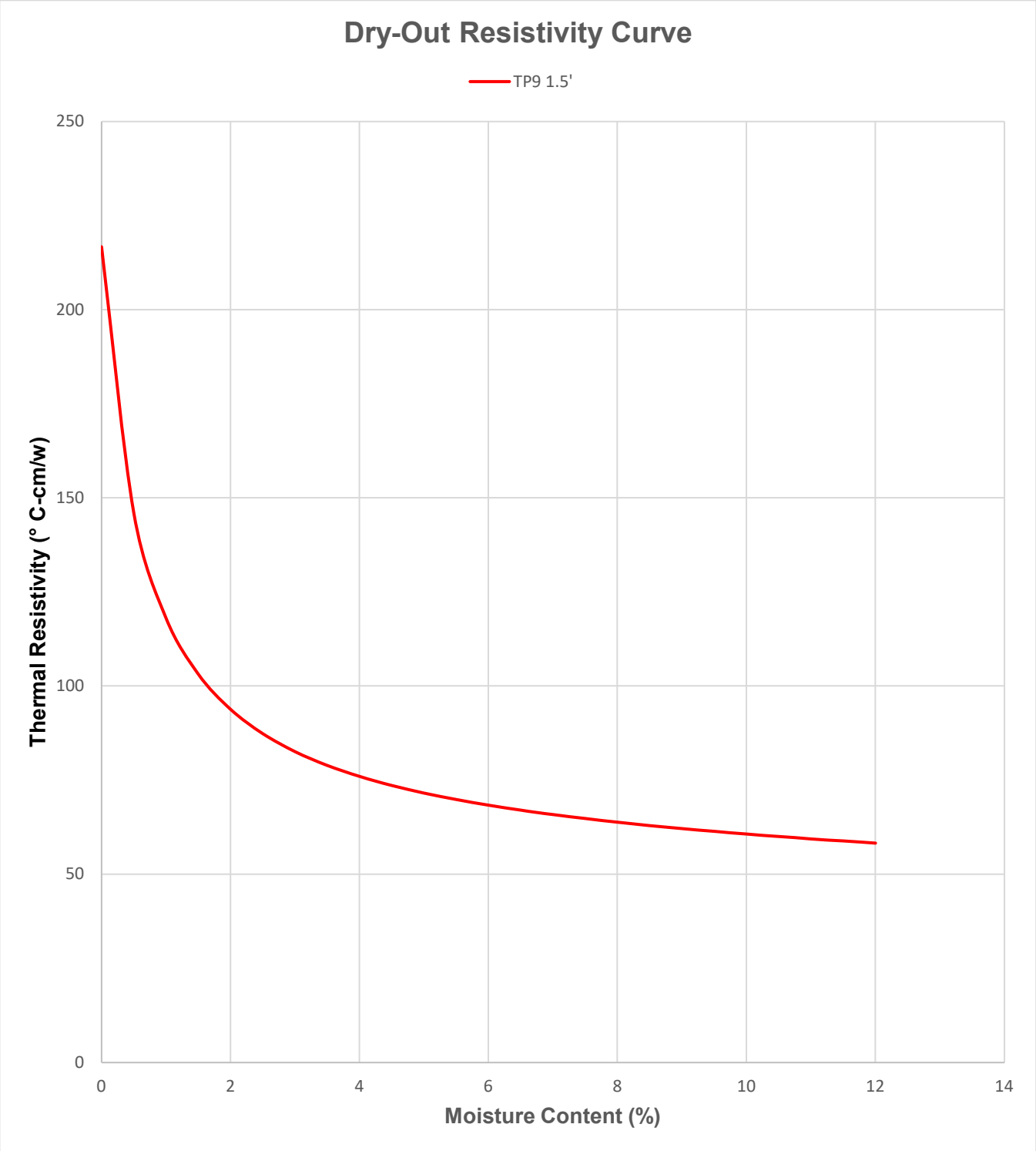
Dryout Resistivity curve was created utilizing the data on this report.
Please contact us with any questions related to the report or its contents.

Reviewed by: Richard Smith
Richard Smith

13 Delta Drive, Unit 8, Londonderry NH 03053 • P: (603) 716.2111 • F: (603) 716.2112 • E: infolondonderry@swcole.com

S.W.COLE ENGINEERING, INC.

Project Number: 25-1685
Lab ID: 9858M



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SW COLE ENGINEERING INCORPORATED
227 WAMPANOG TRAIL
RIVERSIDE RI 02915-2211
USA

Analysis No.	TS-A2513211
Report Date	30 October 2025
Date Sampled	21 October 2025
Date Received	27 October 2025
Where Sampled	Riverside, RI USA
Sampled By	Client

This is to attest that we have examined: Soils, Project: Long Road Energy – Agawam, MA BESS and Substation; Site Location: 769 Silver Street Agawam, MA; Job Number: 25-1685

When examined to the applicable requirements of:

ASTM D 1411–09*	"Standard Test Methods for Water-Soluble Chlorides Present as Admixtures in Graded Aggregate Road Mixes" Method A
ASTM D 516-22	"Standard Test Method for Sulfate Ion in Water"
ASTM D 4658-15	"Standard Test Method for Sulfide Ion in Water"
ASTM G 51-23	"Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing"
ASTM G 200-20	"Standard Test Method for Measurement of Oxidation-Reduction Potential (ORP) of Soil"
ASTM G 187–18	"Standard Test Method for Measurement of Soil Resistivity Using the Two-Electrode Soil Box Method"
EPA/600/4-90/027F	"Alkalinity Method 310.1"

Results:

ASTM D 1411 – Chloride Method A

Sample		Results		Detection Limit
		ppm (mg/kg)	%[1]	
TP-3		105.	0.0105	10.
– — –	2'			
TP-5		78.	0.0078	
– — –	2'			
TP-7		82.	0.0082	
– — –	2'			
TP-8		77.	0.0077	
– — –	2'			
TP-10		82.	0.0082	
– — –	2'			

NOTE: [1]Percent by weight after drying and prepared as per the Standard. *Withdrawn 2018

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CERTIFICATE OF ANALYSIS

ASTM D 516 – Sulfates (Soluble)

Sample		Results		Detection Limit
		ppm (mg/kg)	%[1]	
TP-3		< 10.	< 0.0010	10.
– — –	2’			
TP-5		< 10.	< 0.0010	
– — –	2’			
TP-7		< 10.	< 0.0010	
– — –	2’			
TP-8		< 10.	< 0.0010	
– — –	2’			
TP-10		< 10.	< 0.0010	
– — –	2’			

NOTE: [1]Percent by weight after drying and prepared as per the Standard.

ASTM D 4658 – Sulfide

Sample		Results		Detection Limit
		ppb (µg/kg)	%[1]	
TP-3		< 10.	< 0.0000010	10.
– — –	2’			
TP-5		10.	0.0000010	
– — –	2’			
TP-7		160.	0.0000160	
– — –	2’			
TP-8		< 10.	< 0.0000010	
– — –	2’			
TP-10		170.	0.0000170	
– — –	2’			

NOTE: [1]Percent by weight after drying and prepared as per the Standard.

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CERTIFICATE OF ANALYSIS

ASTM G 51 – pH

Sample		Results	Detection Limit
TP-3		5.85	0.01
– — –	2’		
TP-5		5.76	
– — –	2’		
TP-7		5.78	
– — –	2’		
TP-8		5.79	
– — –	2’		
TP-10		5.47	
– — –	2’		

NOTE: Prepared as per the Standard.

ASTM G 200 – Reduction Oxidation Potential (REDOX)

Sample		Results	Detection Limit
TP-3		85.9 @ 20.1 ºC	0.1mV
– — –	2’		
TP-5		121.9 @ 20.3 ºC	
– — –	2’		
TP-7		125.0 @ 20.5 ºC	
– — –	2’		
TP-8		126.7 @ 20.5 ºC	
– — –	2’		
TP-10		126.0 @ 20.4 ºC	
– — –	2’		

NOTE: Prepared as per the Standard.

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CERTIFICATE OF ANALYSIS

ASTM G 187 – Resistivity (Saturated using Soil Box)

Sample		Results	
		ohms-cm	mho/cm
TP-3		8 700	0.000114
– — –	2’		
TP-5		79 200	0.0000126
– — –	2’		
TP-7		51 000	0.0000196
– — –	2’		
TP-8		100 600	0.00000993
– — –	2’		
TP-10		41 700	0.0000240
– — –	2’		

NOTE: Prepared as per the Standard.

EPA Method 310.1 – Alkalinity

Sample		Results		Detection Limit
		ppm (mg/kg)	%[1]	
TP-3		233.	0.0233	10.
– — –	2’			
TP-5		636.	0.0636	
– — –	2’			
TP-7		115.	0.0115	
– — –	2’			
TP-8		101.	0.0101	
– — –	2’			
TP-10		118.	0.0118	
– — –	2’			

NOTE: [1]Percent by weight after drying and prepared as per the Standard.

END OF ANALYSIS

USEPA Laboratory ID UT00930



Merrill Gee P.E. – Engineer in Charge

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APPENDIX E

Resistivity Test Data Sheet

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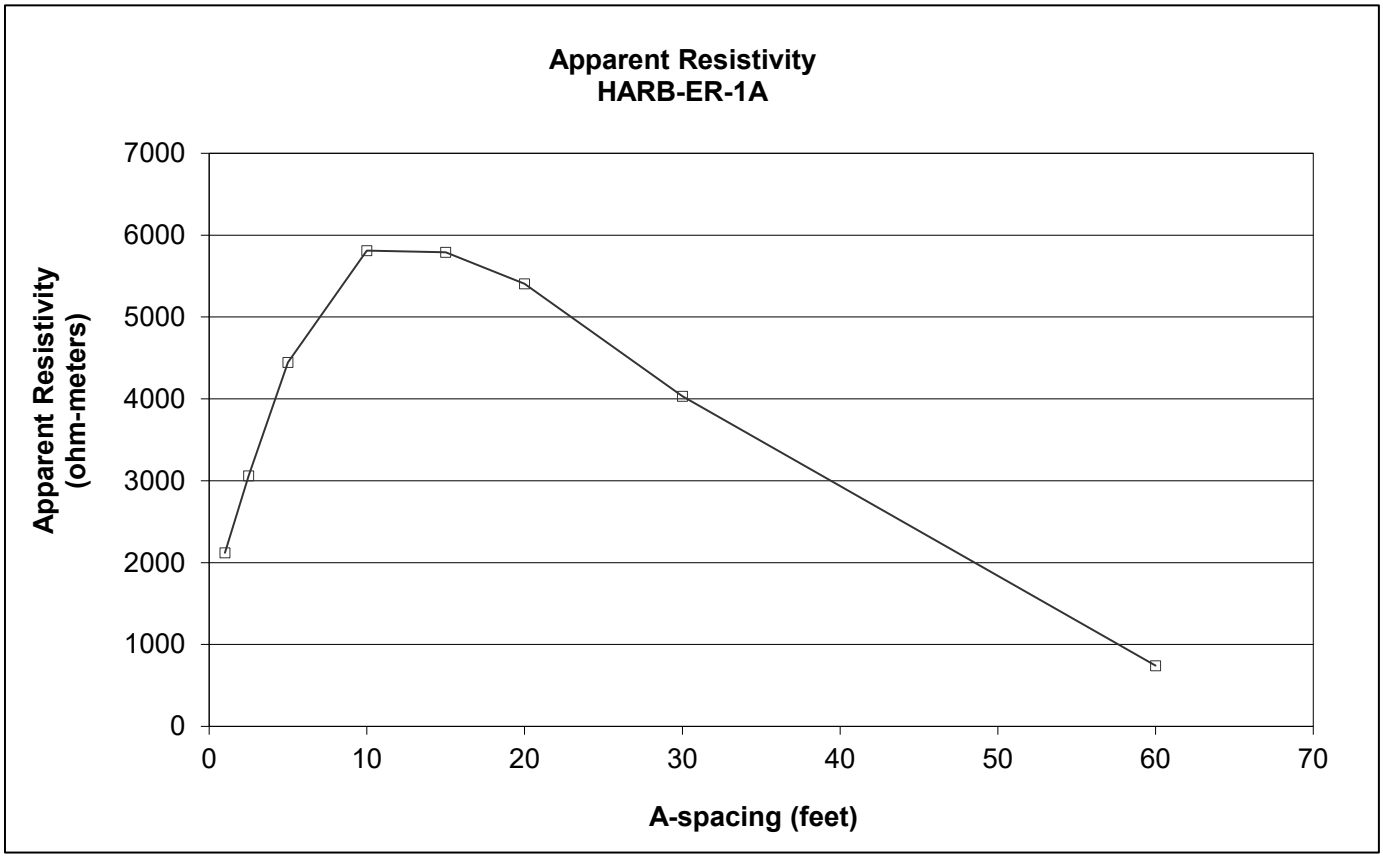
RESISTIVITY COMPUTATION DATA SHEET
Wenner Configuration
Fixed Center

Project #: 25-1685
Site: 769 Silver Street Agawam, MA
Spread No.: LRA-ER-1A
Orientation: 343N

Date: 10/17/2025
Mid point GPS Coordinates: See Exploration Location Plan
Instrument: AGI SuperSting R1

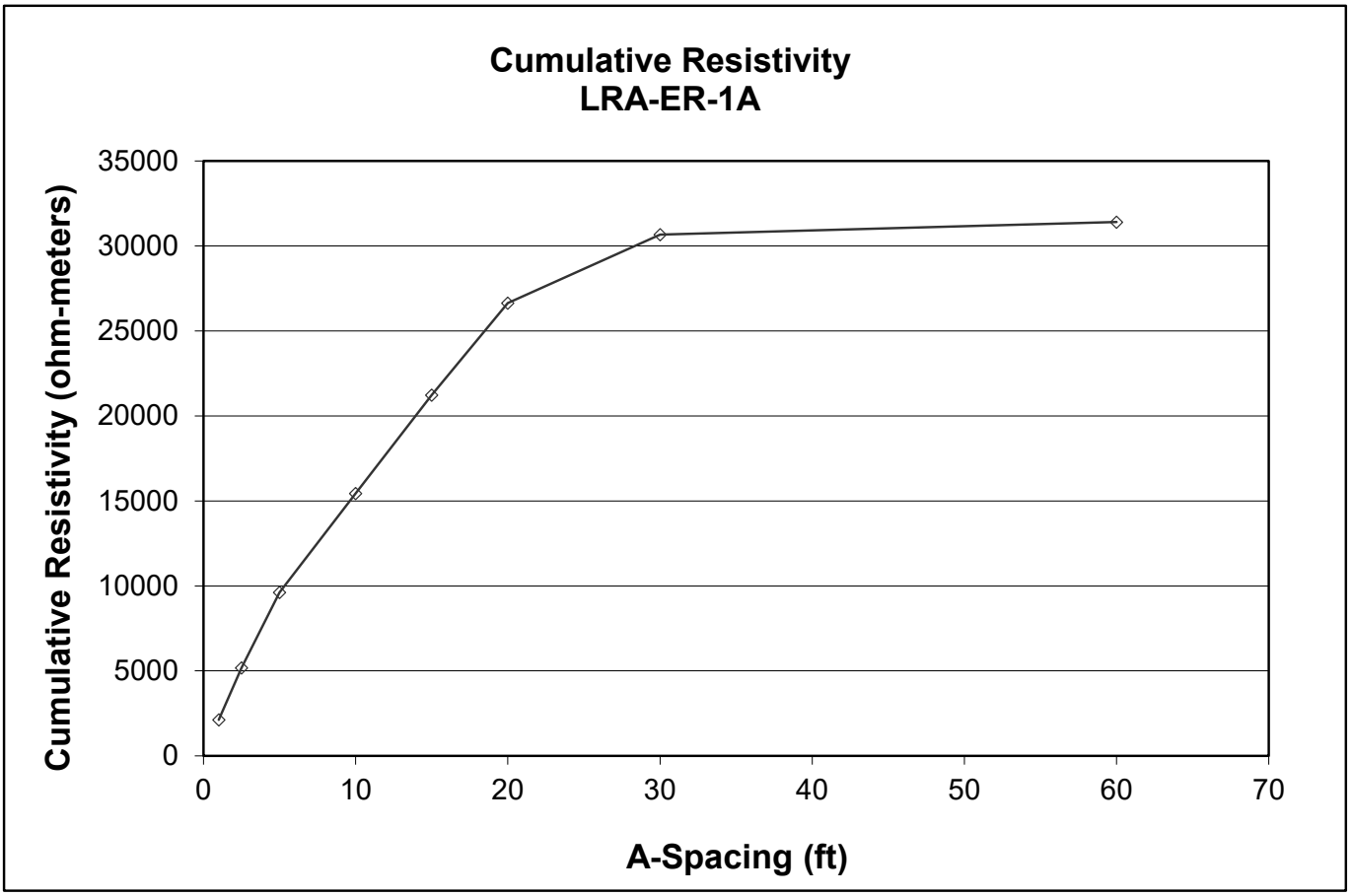
A - Spacing (distance-feet)	A/2 ft	A+A/2 ft	I mA	V mV	Resistance (v/I) Ω	Apparent Resistivity (ohm-meters)	% Error
1	0.5	1.5	3.8	1292	337.4	2120	0.0
2.5	1.3	3.8	2.3	397	194.8	3060	0.1
5	2.5	7.5	2.0	276	141.5	4445	0.0
10	5.0	15.0	8.3	770	92.5	5811	0.0
15	7.5	22.5	6.8	417	61.5	5792	0.0
20	10.0	30.0	7.9	338	43.0	5407	0.0
30	15.0	45.0	4	85	21.4	4032	0.0
60	30.0	90.0	2	4	2.0	742	0.4



Cumulative Resistivity Sheet

LRA-ER-1A

A - Spacing (distance-feet)	A/2 ft	A+A/2 ft	I mA	Apparent Resistivity (ohm-meters)	% Error	Cumulative Resistivity
1	0.5	1.5	3.8	2120	0.0	2120
2.5	1.3	3.8	2.3	3060	0.1	5180
5	2.5	7.5	2.0	4445	0.0	9625
10	5.0	15.0	8.3	5811	0.0	15437
15	7.5	22.5	6.8	5792	0.0	21229
20	10.0	30.0	7.9	5407	0.0	26636
30	15.0	45.0	4.0	4032	0.0	30668
60	30.0	90.0	2.3	742	0.4	31411



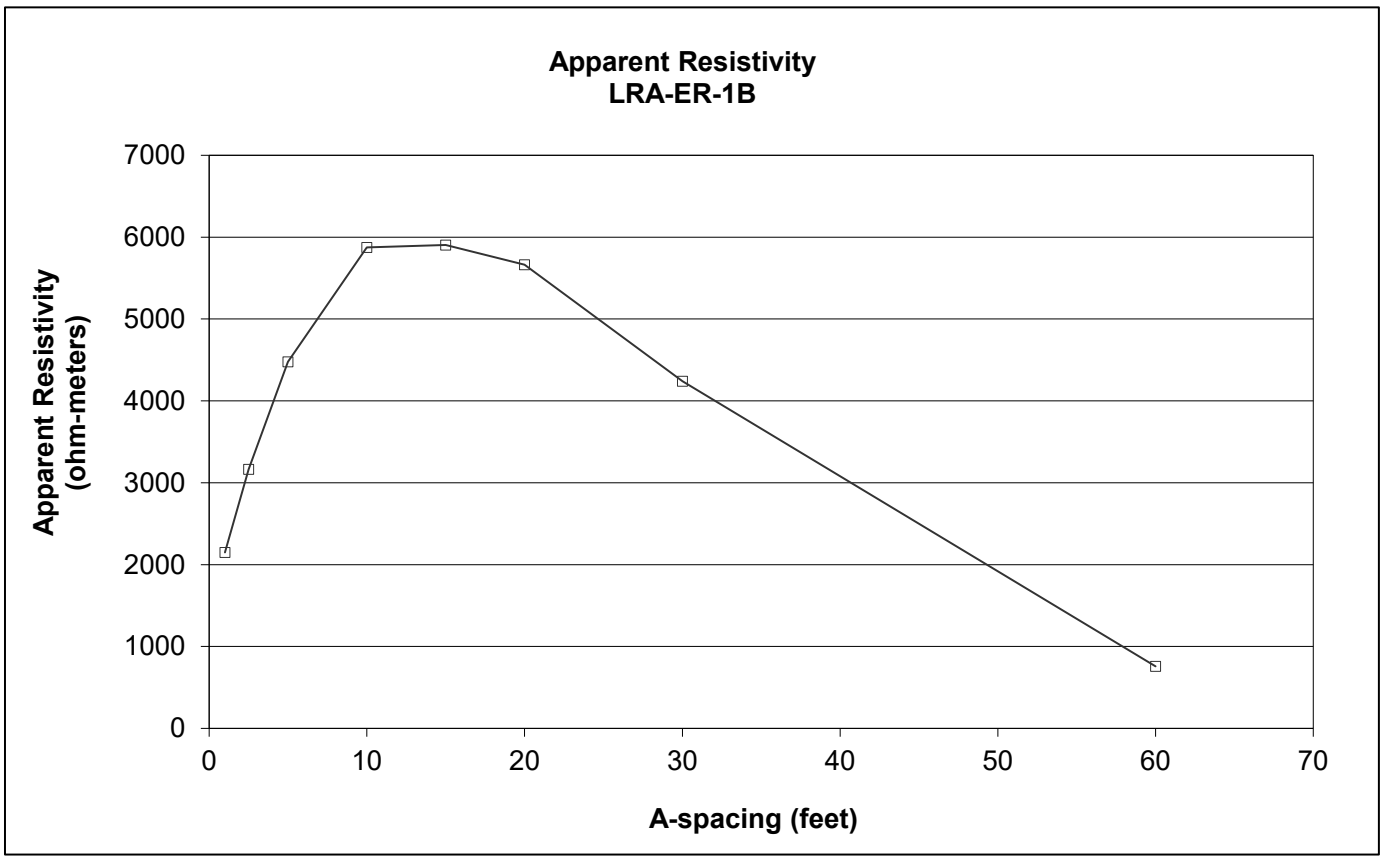
S.W.COLE ENGINEERING & CONSULTING, P.C.

RESISTIVITY COMPUTATION DATA SHEET
Wenner Configuration
Fixed Center

Project #: 25-1685
Site: 769 Silver Street Agawam, MA
Spread No.: LRA-ER-1B
Orientation: 73NE

Date: 10/17/2025
Mid point GPS Coordinates: See Exploration Location Plan
Instrument: AGI SuperSting R1

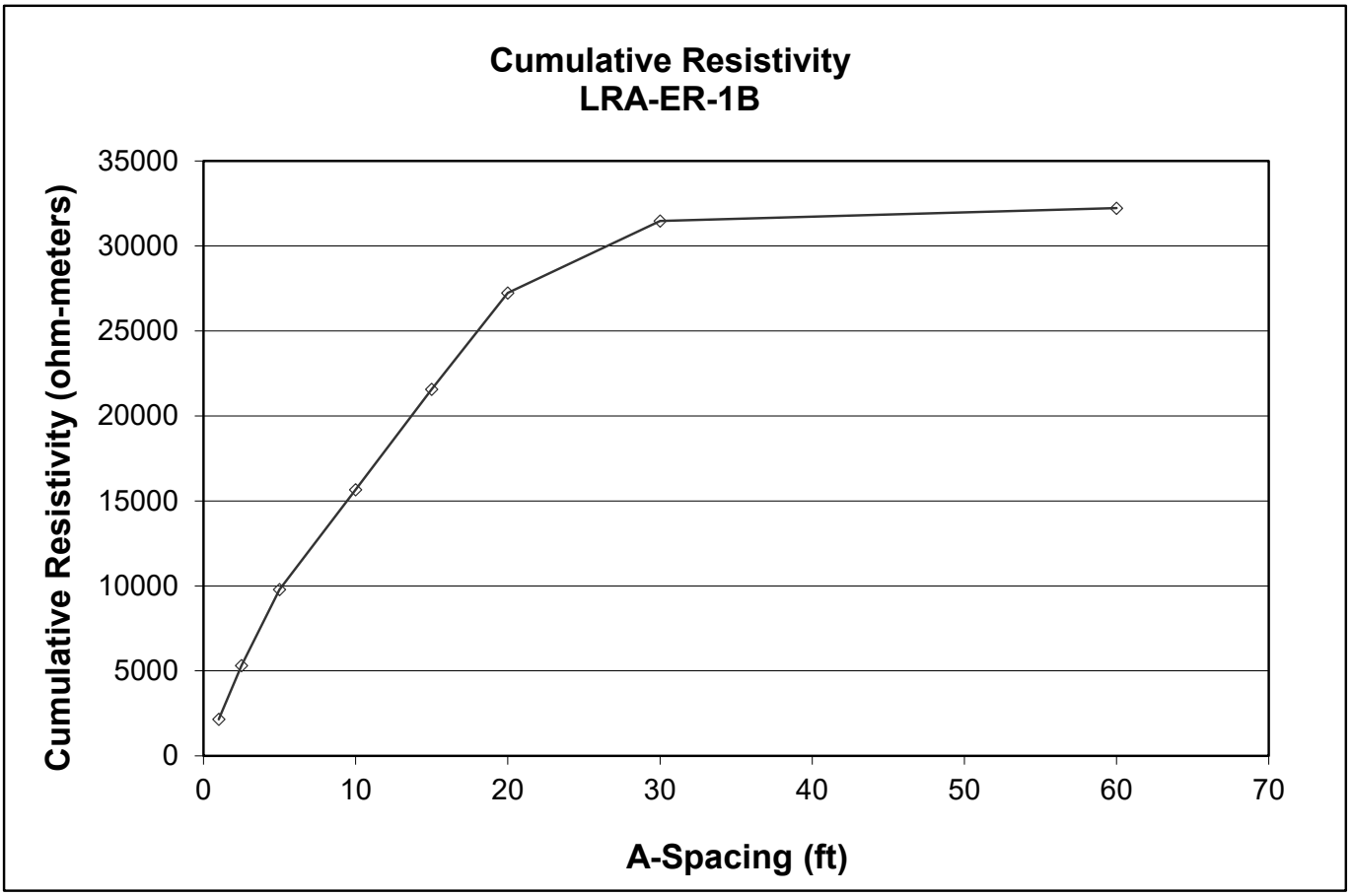
A - Spacing (distance-feet)	A/2 ft	A+A/2 ft	I mA	V mV	Resistance (v/I) Ω	Apparent Resistivity (ohm-meters)	% Error
1	0.5	1.5	3.8	1331	337.4	2150	0.0
2.5	1.3	3.8	2.3	419	194.8	3165	0.1
5	2.5	7.5	2.0	282	141.5	4477	0.0
10	5.0	15.0	8.3	798	92.5	5874	0.0
15	7.5	22.5	6.8	431	61.5	5905	0.0
20	10.0	30.0	7.9	356	43.0	5662	0.0
30	15.0	45.0	4	90	21.4	4239	0.0
60	30.0	90.0	2	5	2.0	758	0.4



Cumulative Resistivity Sheet

LRA-ER-1B

A - Spacing (distance-feet)	A/2 ft	A+A/2 ft	I mA	Apparent Resistivity (ohm-meters)	% Error	Cumulative Resistivity
1	0.5	1.5	3.8	2150	0.0	2150
2.5	1.3	3.8	2.3	3165	0.1	5315
5	2.5	7.5	2.0	4477	0.0	9792
10	5.0	15.0	8.3	5874	0.0	15666
15	7.5	22.5	6.8	5905	0.0	21570
20	10.0	30.0	7.9	5662	0.0	27233
30	15.0	45.0	4.0	4239	0.0	31472
60	30.0	90.0	2.3	758	0.4	32230



AGAWAM PLANNING BOARD MEETING
APPLICATION FOR SITE PLAN APPROVAL
769 SILVER STREET

MARCH 5, 2026



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PROJECT TEAM

- **BSC Group**
  - Adam Duchesneau and Melissa Kaplan
- **Sevee & Maher Engineers (SME)**
  - Tom Henaghen
- **Fire & Risk Alliance**
  - Thomas Harris



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PROJECT OVERVIEW

- 769 Silver Street (Map G6, Block 2, Lot 6)
- 17.2-acre site located in the Industrial District B zoning district
- Battery Energy Storage System (BESS): 250 megawatt (MW), 4 megawatt hour (MWh)
- Site Plan Approval Required under:
  - Article I General Provisions, Section 180-13 Site Plans
  - Article XXIII Battery Energy Storage Systems, Sections:
    - 180-167 General Requirements
    - 180-169 Permitting Requirements for Tier 2 and Tier 3 Battery Energy Storage Systems
    - 180-170 Site Plan Application

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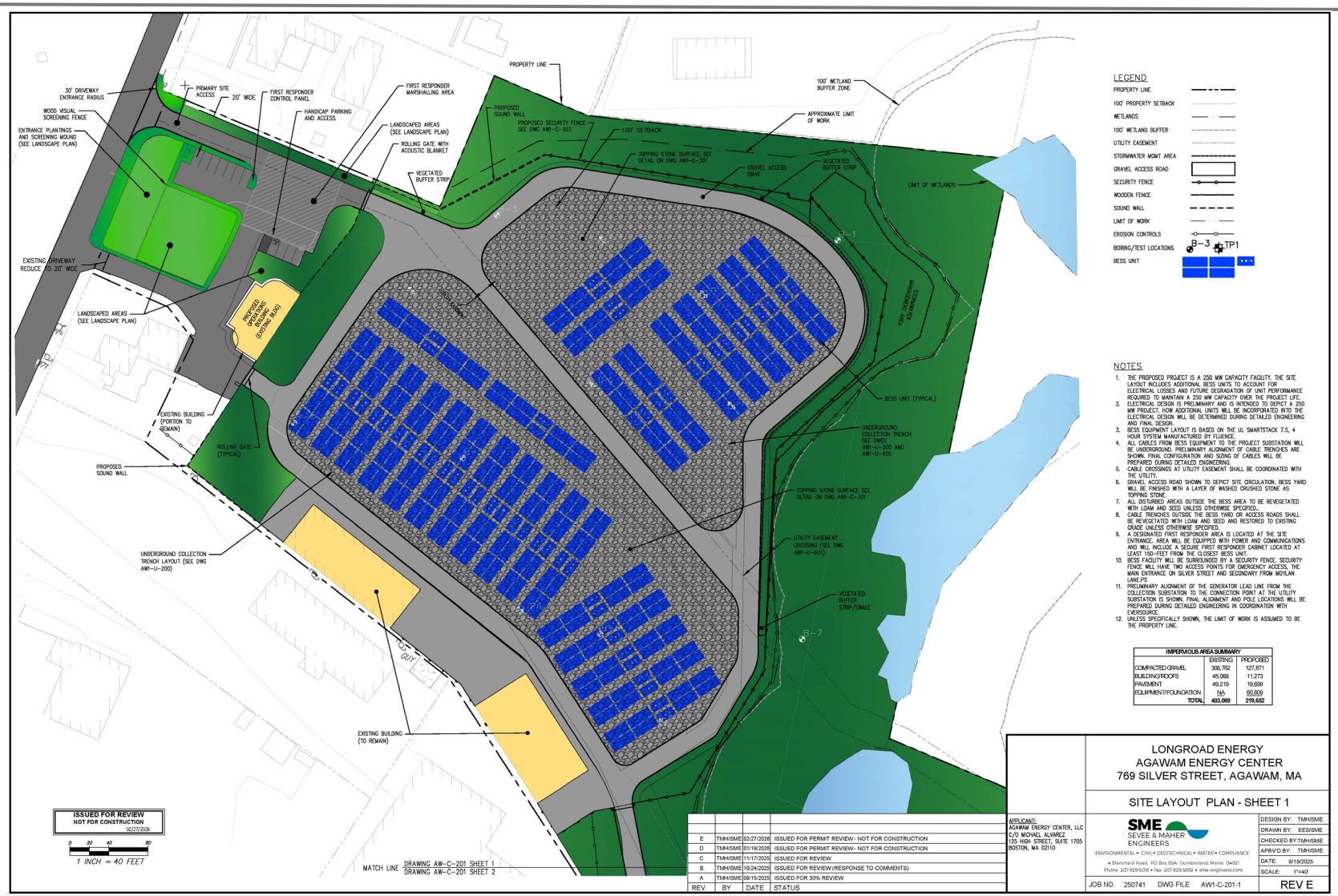
AGAWAM ENERGY CENTER – SITE PLAN (NORTH)



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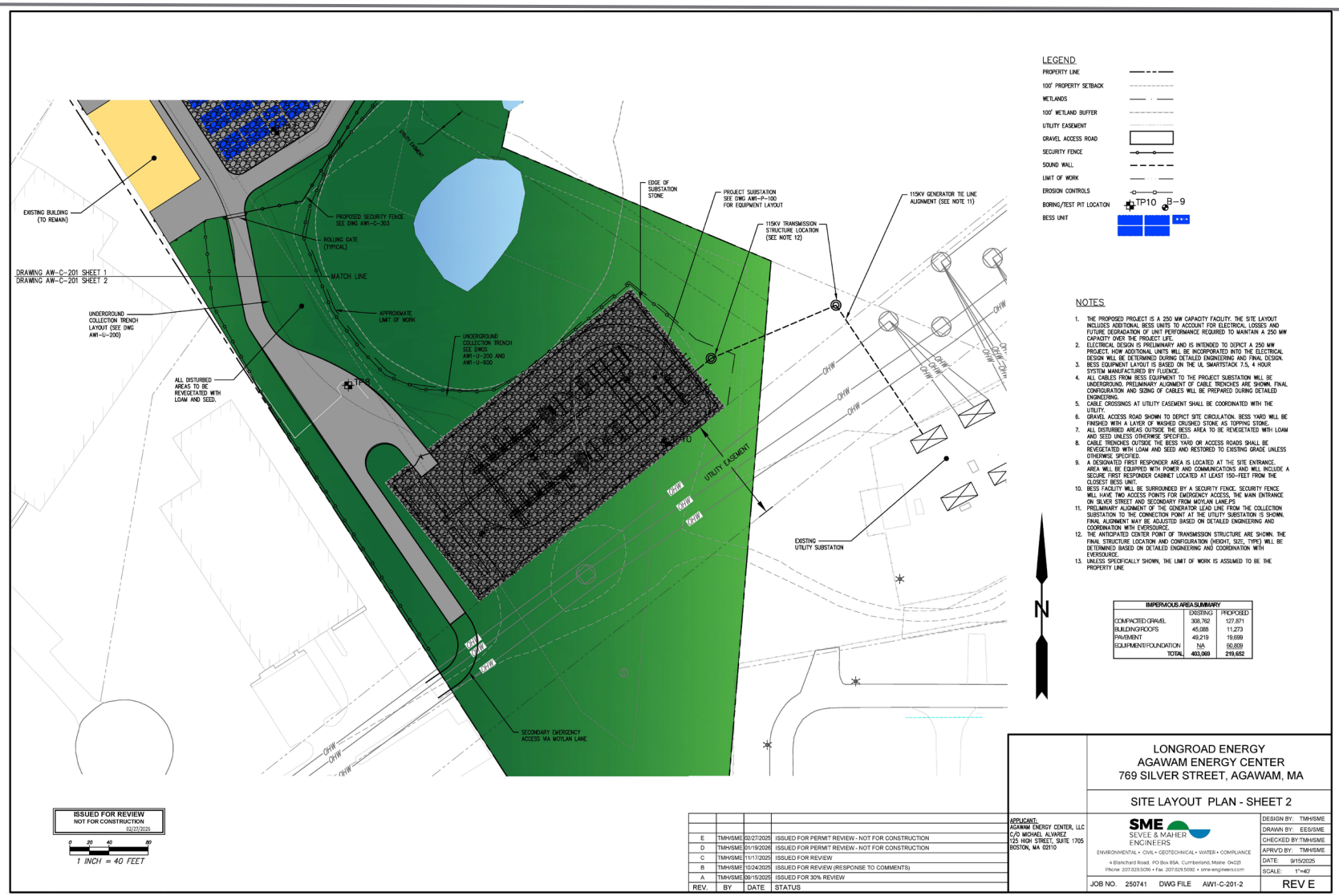
AGAWAM ENERGY CENTER – SITE PLAN (SOUTH)



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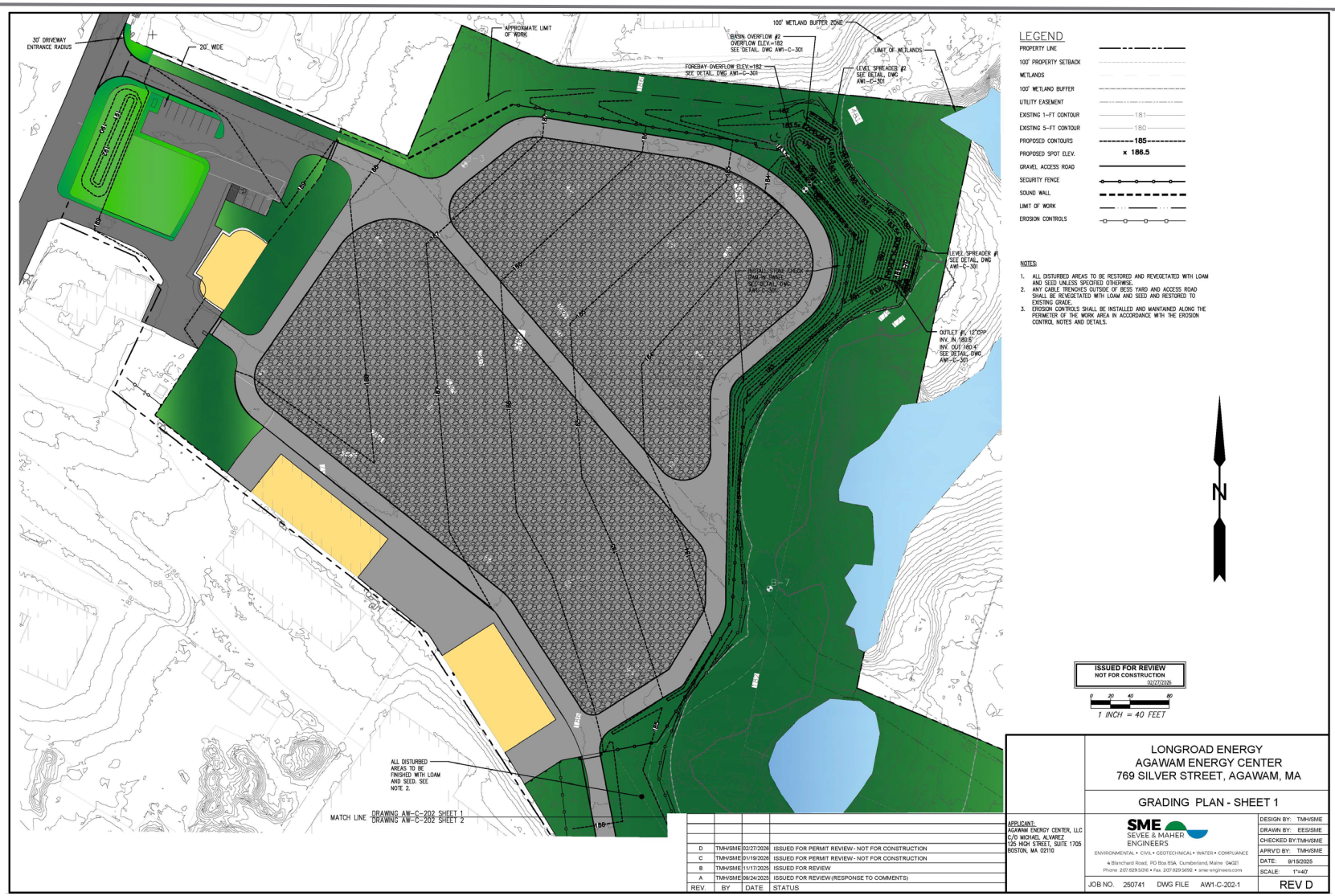
AGAWAM ENERGY CENTER – GRADING PLAN (NORTH)



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AGAWAM ENERGY CENTER – GRADING PLAN (SOUTH)



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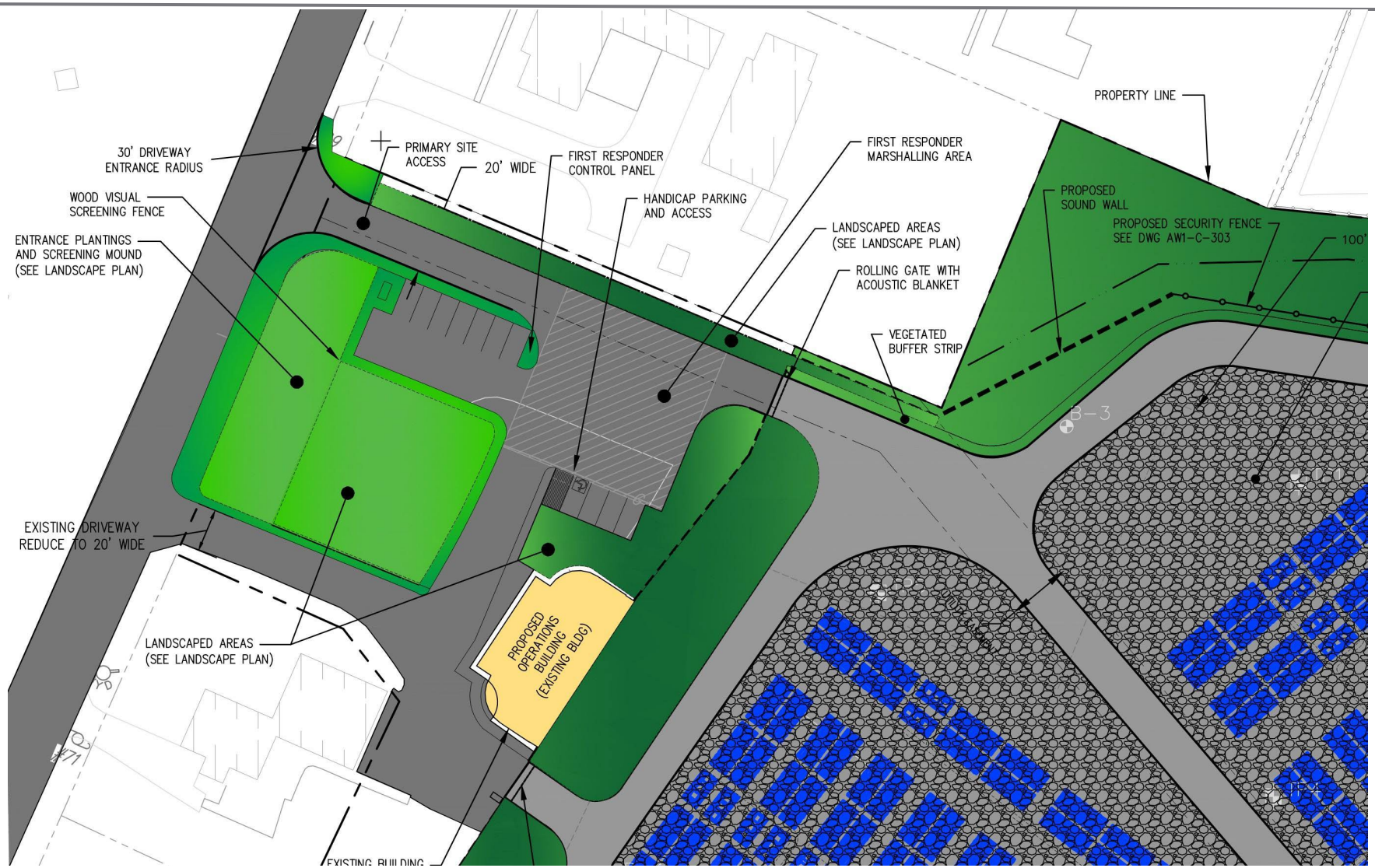
AGAWAM ENERGY CENTER – PARKING AREA



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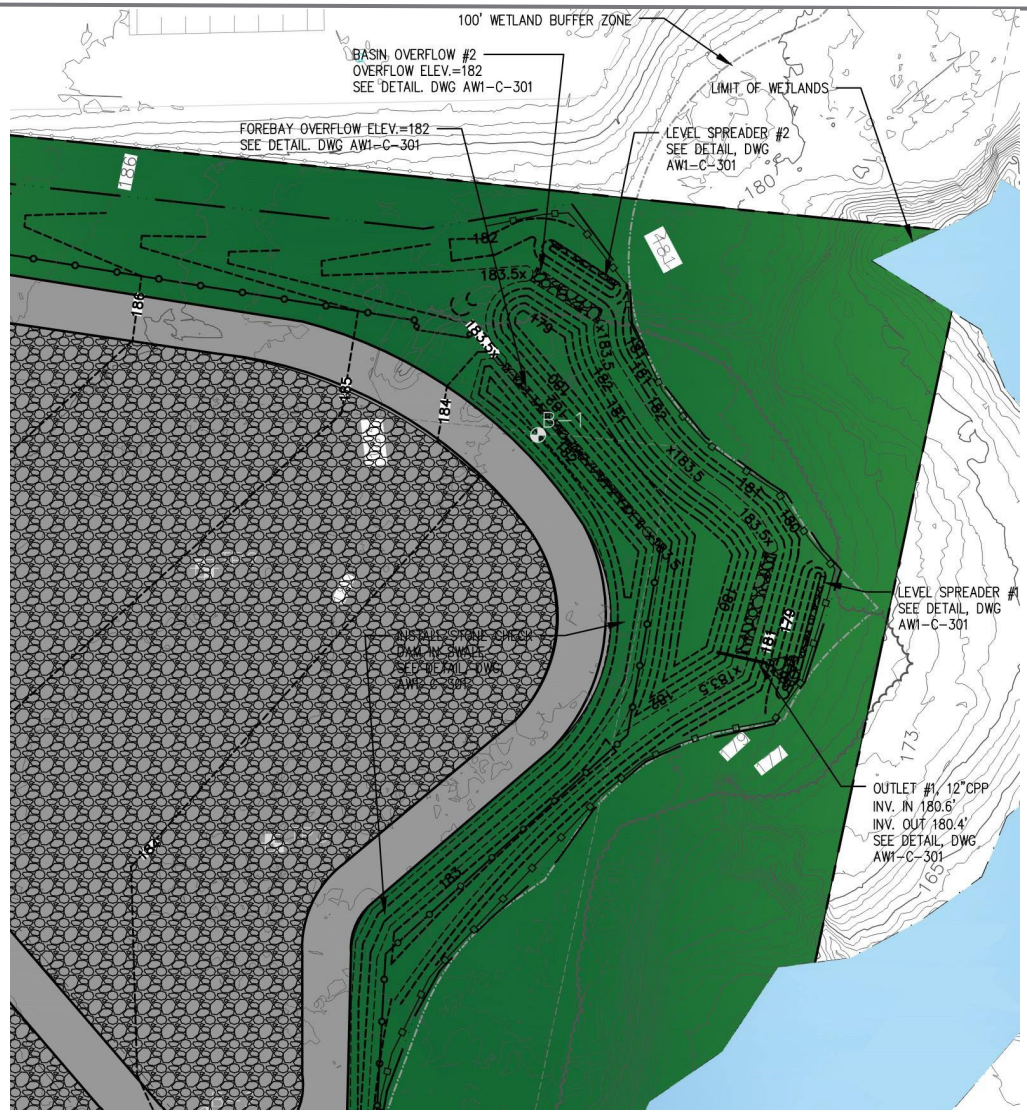
AGAWAM ENERGY CENTER – STORMWATER AREA



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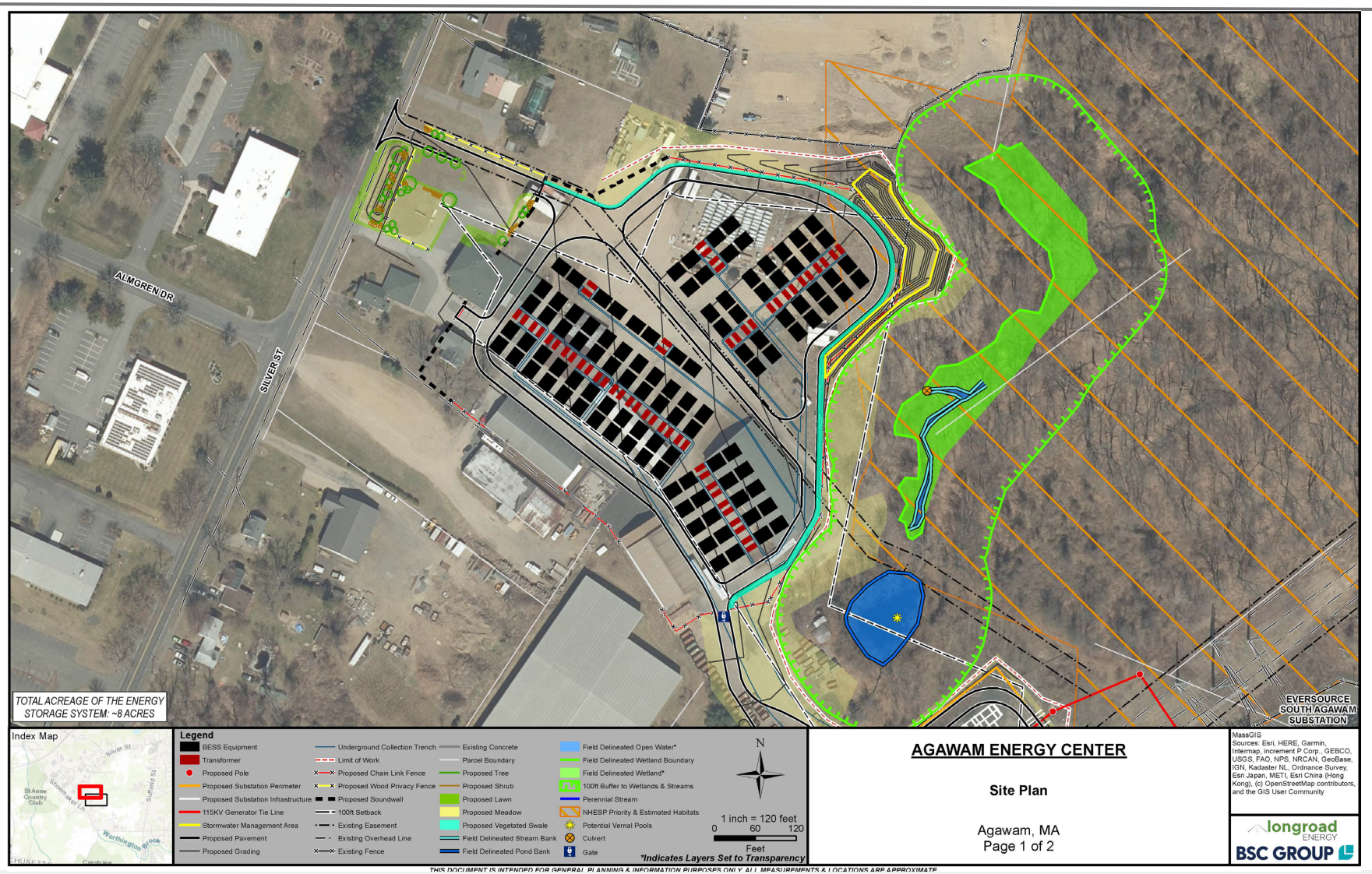
AGAWAM ENERGY CENTER – CONCEPT SITE PLAN (NORTH)



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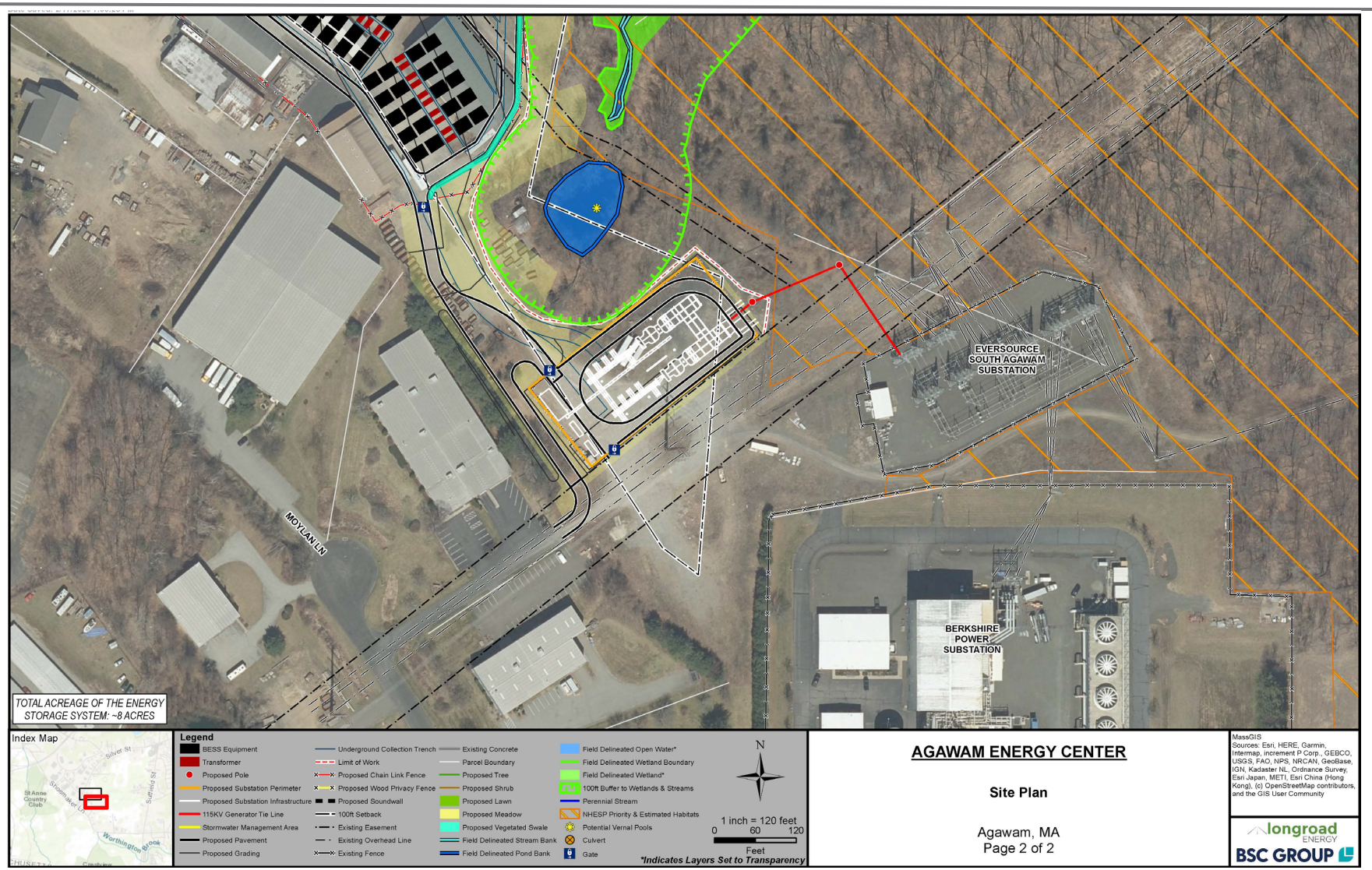
AGAWAM ENERGY CENTER – CONCEPT SITE PLAN (SOUTH)



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longroad ENERGY

769 SILVER STREET – EXISTING CONDITIONS



Front of 769 Silver Street - Looking Southeast



North Side of 769 Silver Street - Looking Southeast

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769 SILVER STREET – EXISTING CONDITIONS



Field in Northeast Section of 769 Silver Street
Looking Northeast



Between Buildings at 769 Silver Street
Looking Southeast

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769 SILVER STREET – EXISTING CONDITIONS



Rear of 769 Silver Street – Looking Northwest



Rear of 769 Silver Street – Looking Southeast

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AGAWAM ENERGY CENTER – EXISTING CONDITIONS

South Side Warehouses



North Side Self Storage



East Side Power Substation



West Side, Opposite Silver Street Light Industrial



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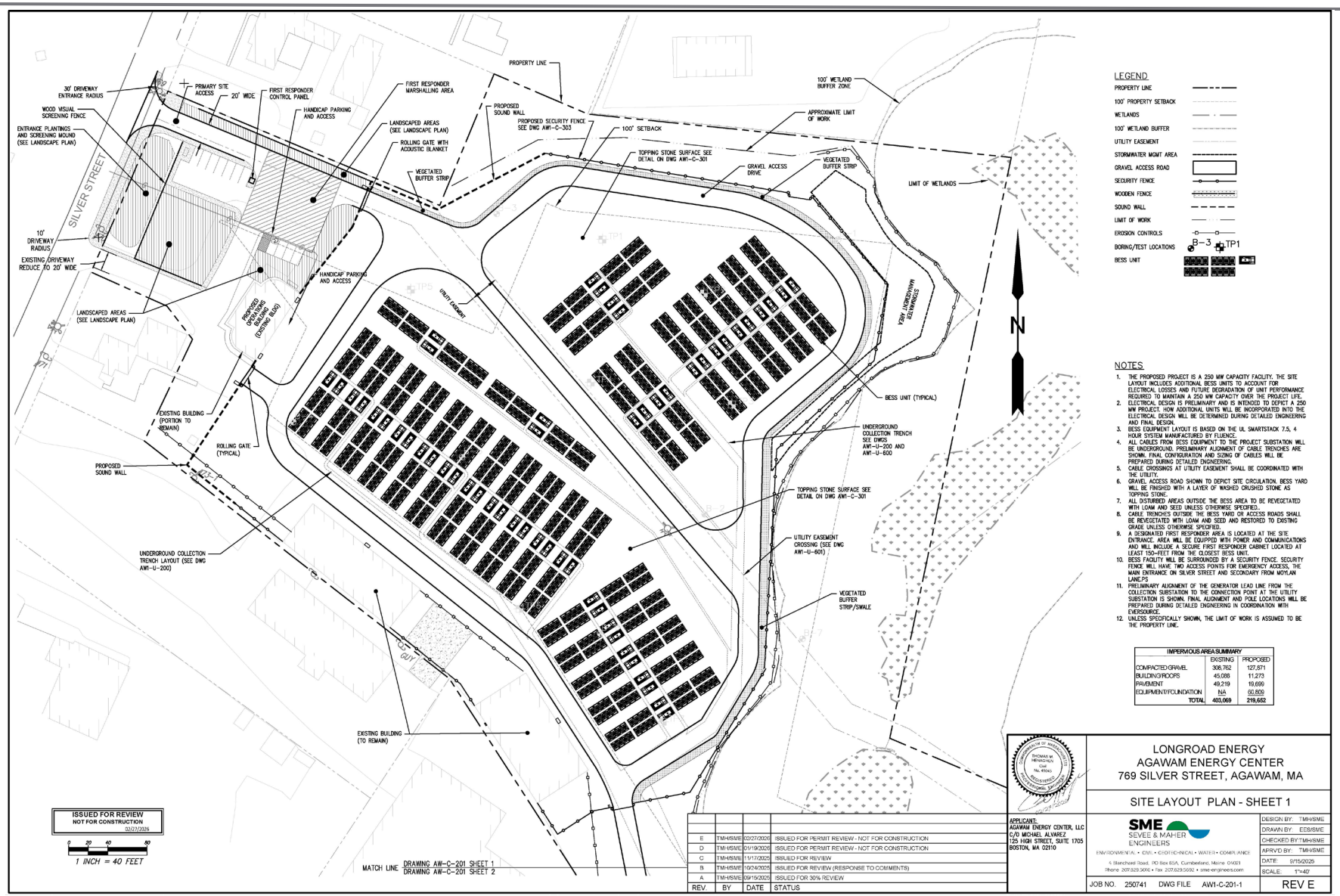
AGAWAM ENERGY CENTER – SITE PLAN (NORTH)



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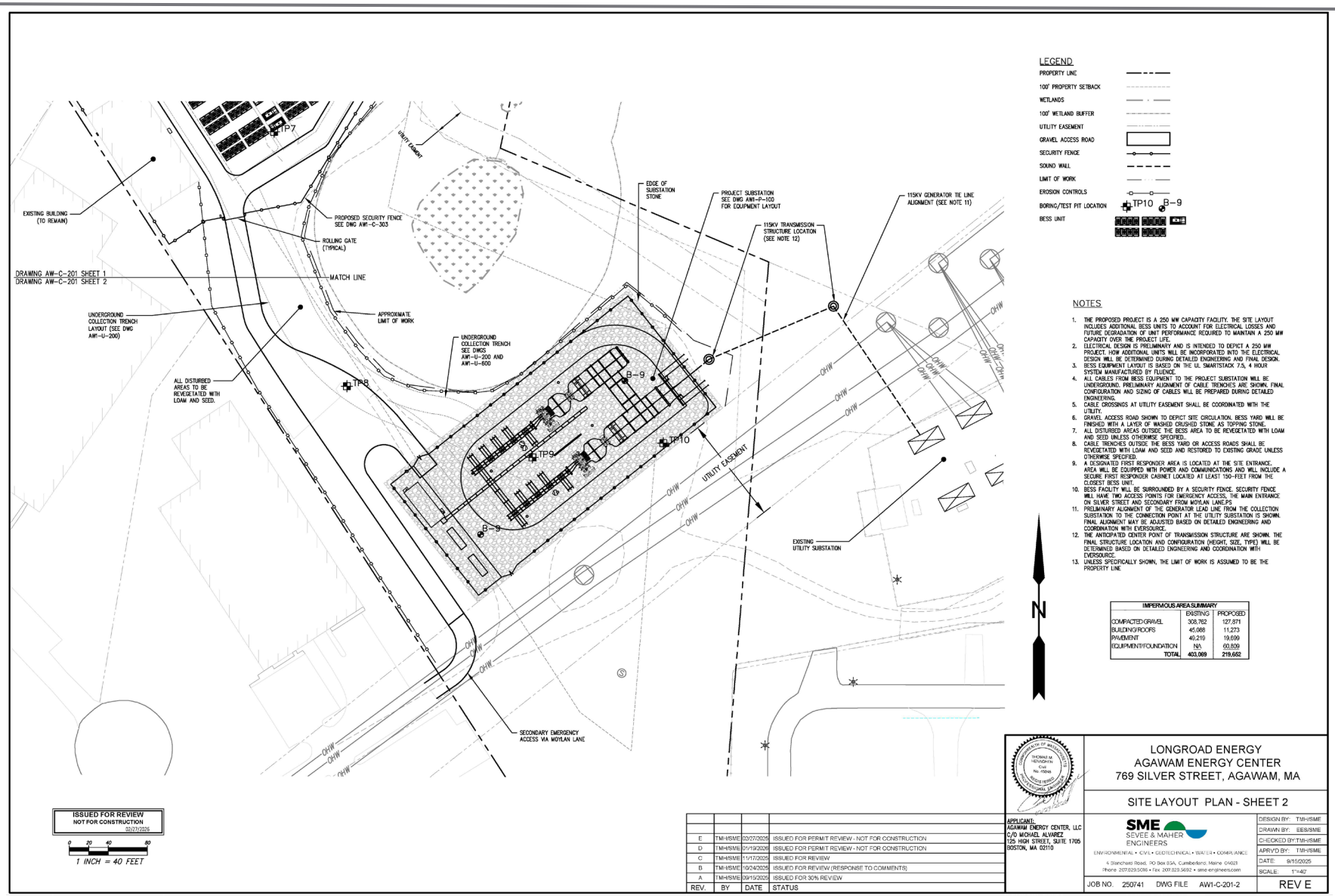
AGAWAM ENERGY CENTER – SITE PLAN (SOUTH)



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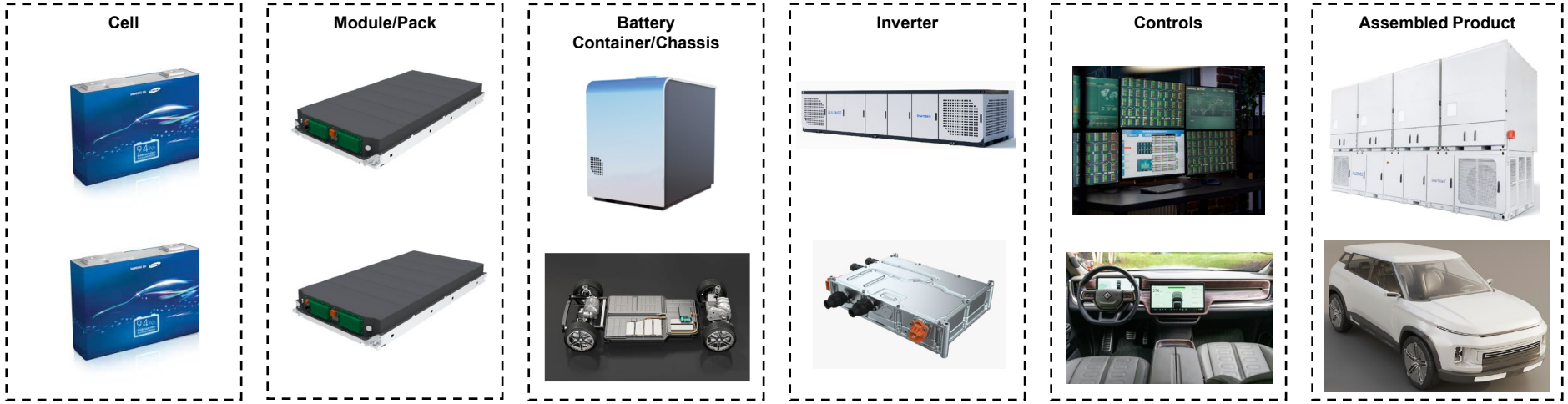
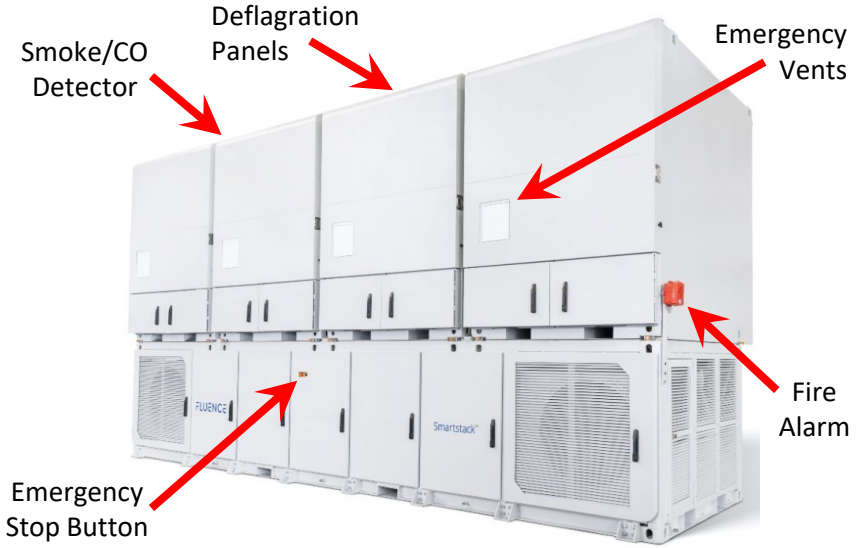
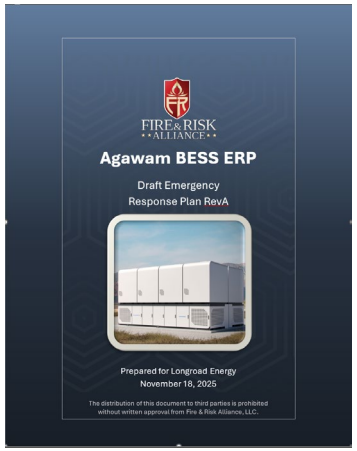
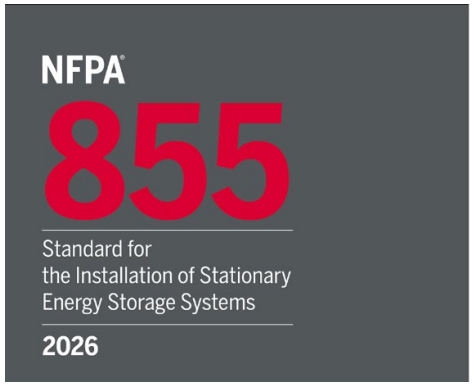
WHAT IS A BATTERY ENERGY STORAGE SYSTEM (BESS)?

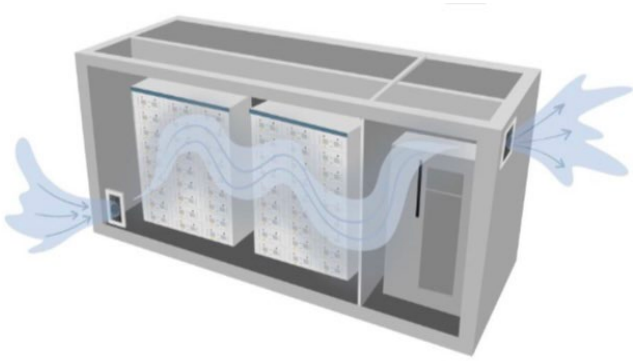




Approaches to Safety







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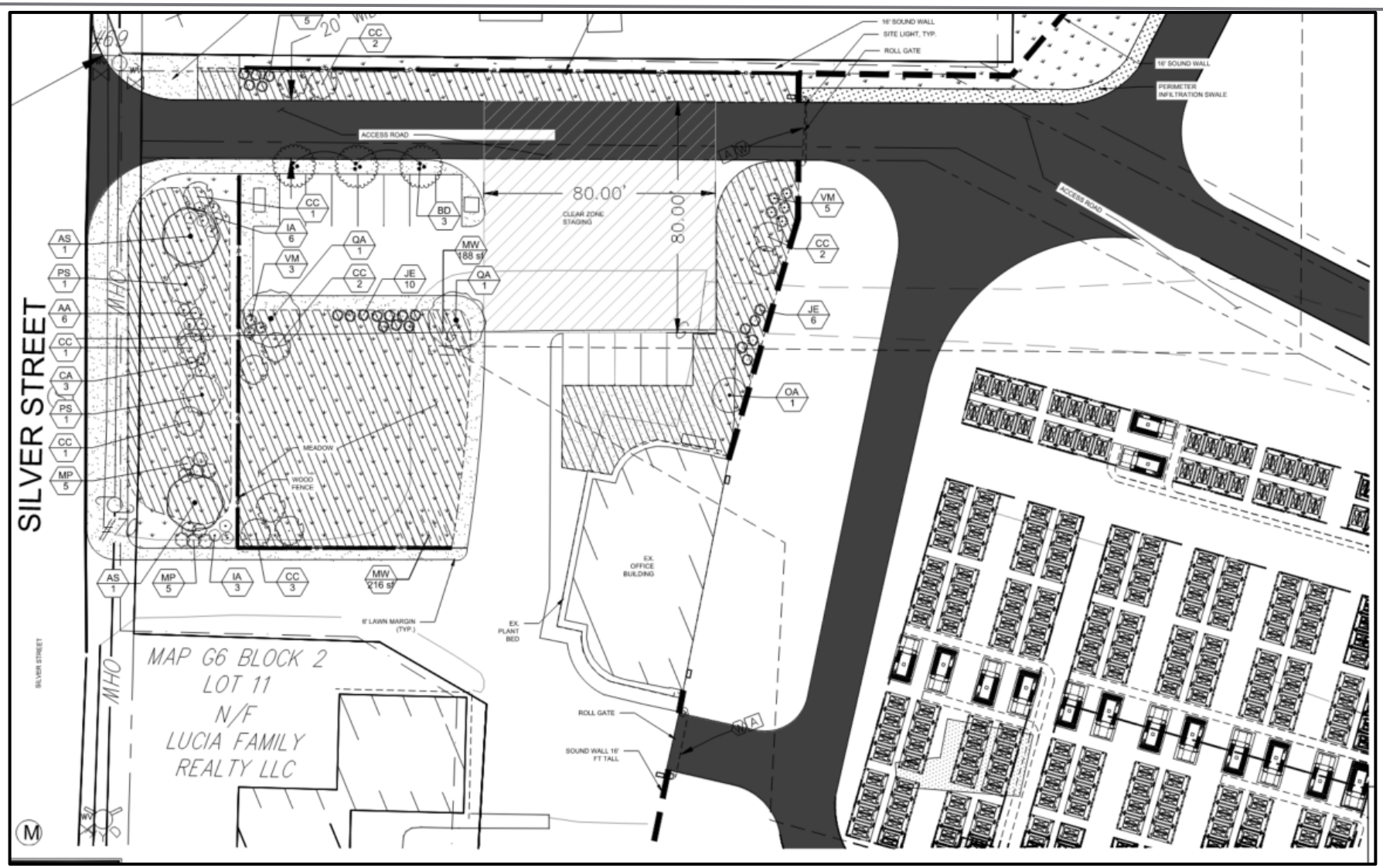
AGAWAM ENERGY CENTER – LANDSCAPE PLAN



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CONSERVATION COMMISSION



Work will be Conducted Outside of Jurisdictional Areas



RDA Requested

Confirm Wetland Delineation

Confirm No Permit Required



Waiting on Peer Review

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AGAWAM ENERGY CENTER – CONCEPT RENDERINGS

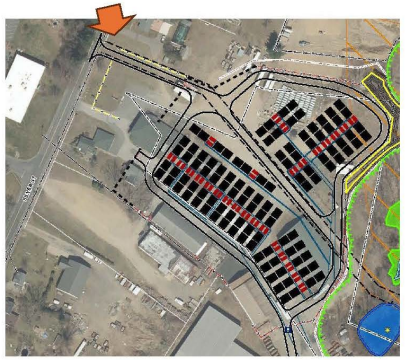
Existing Condition Photos



Proposed Condition



Camera Location Plan



North Driveway near 777 Silver Street

Existing Condition Photos



Proposed Condition



Camera Location Aerial Photo



South Driveway near 777 Silver Street

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AGAWAM ENERGY CENTER – CONCEPT RENDERINGS

Birds Eye Perspective Site Layout





Entry from Silver Street North



Entry from Silver Street South



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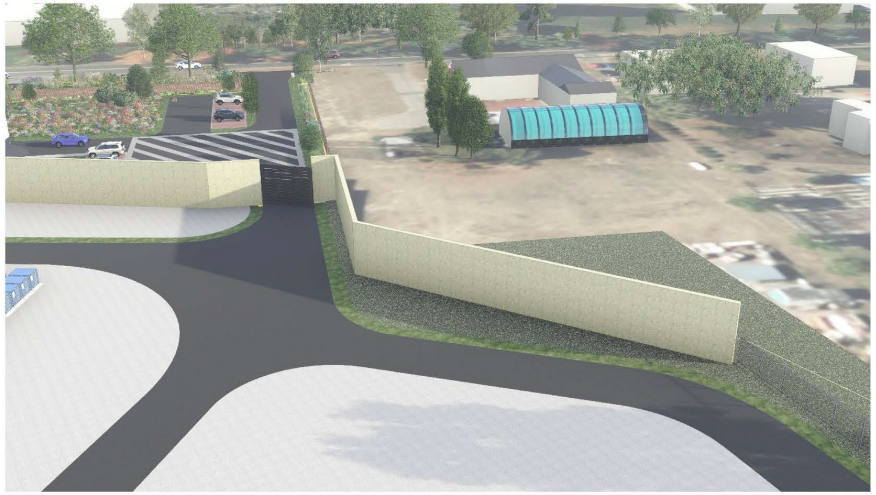
AGAWAM ENERGY CENTER – CONCEPT RENDERINGS

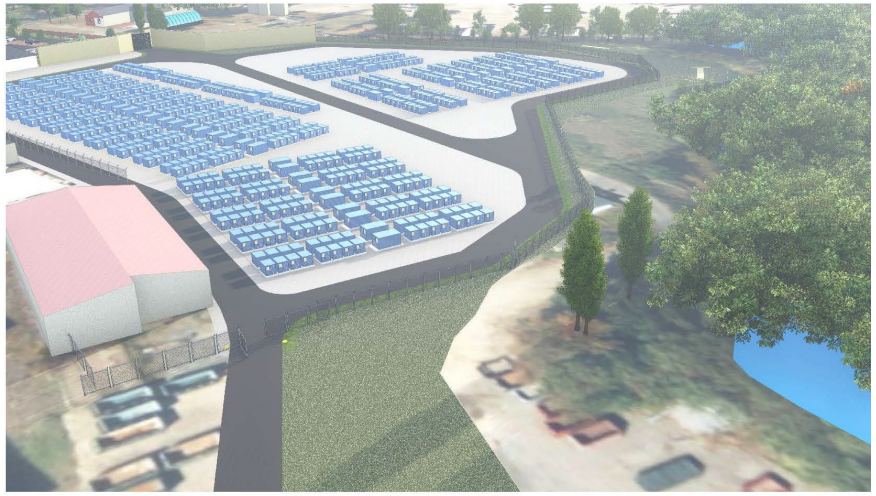
Birds Eye Along Silver Street



Birds Eye Toward Silver Street from Inside the Site



Birds Eye from the Power Station Toward the BESS



Front Gardens Office Parking and Staging



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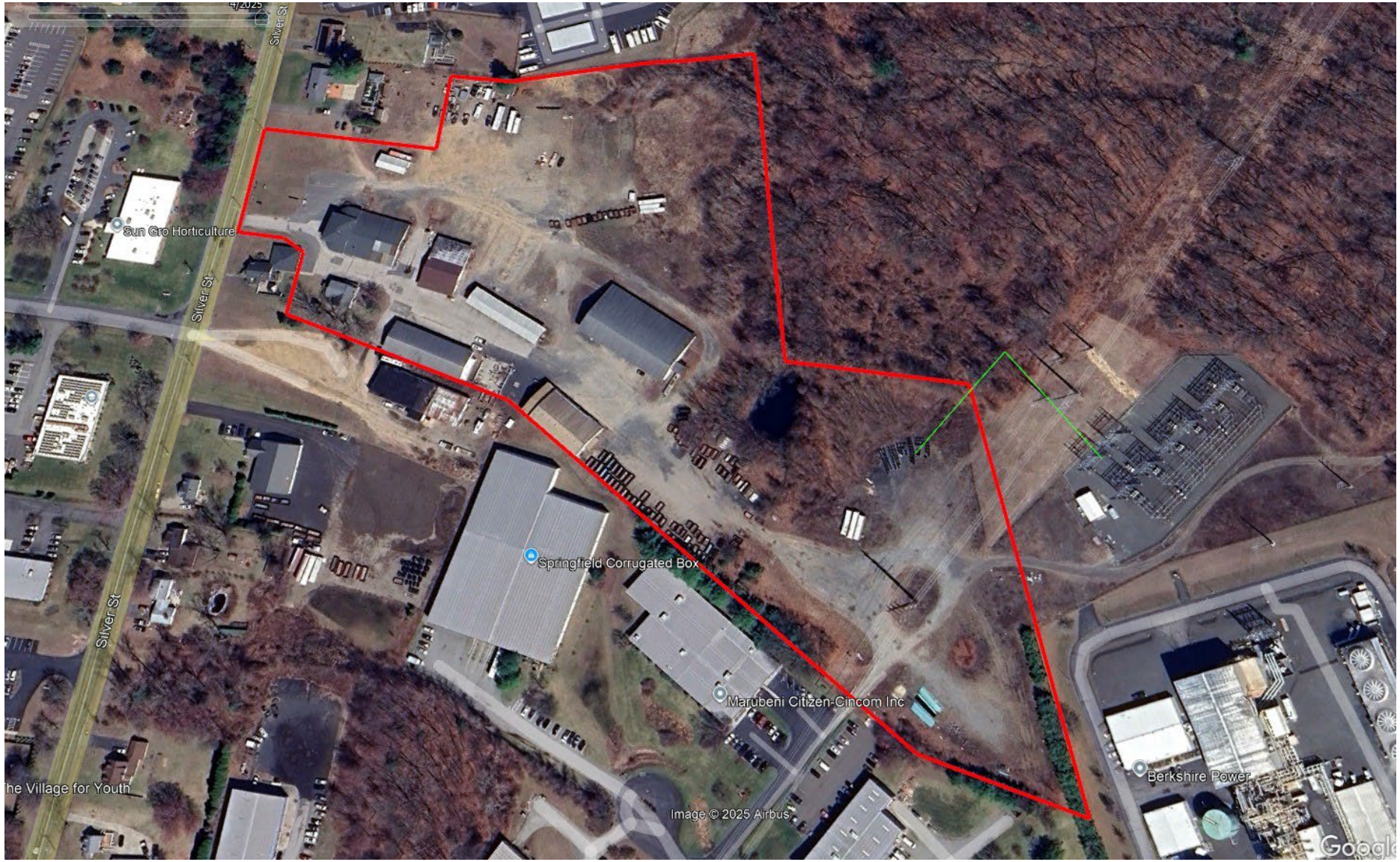
AGAWAM ENERGY CENTER – AERIAL IMAGE



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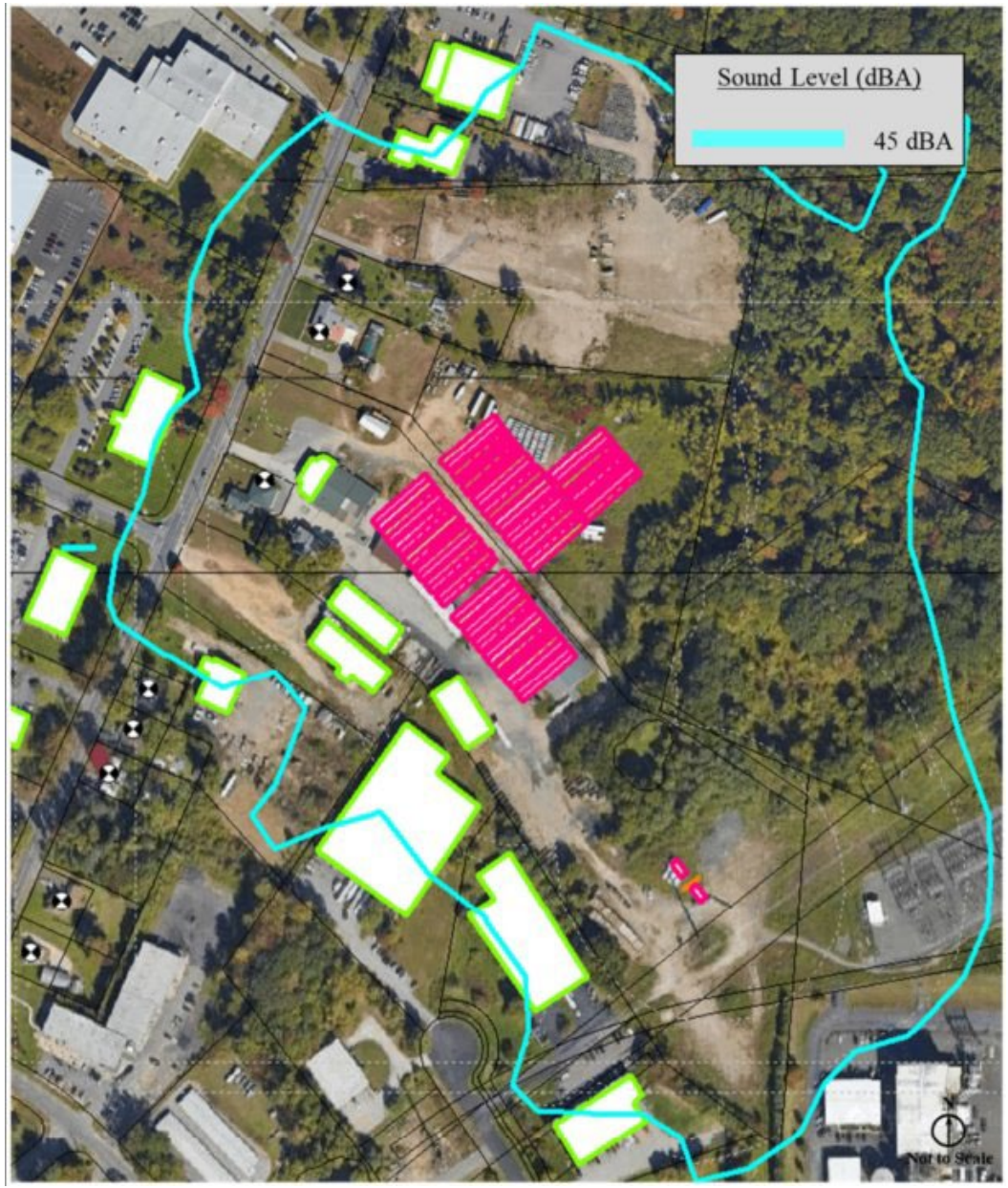
AGAWAM ENERGY CENTER – SOUND MODELING RESULTS



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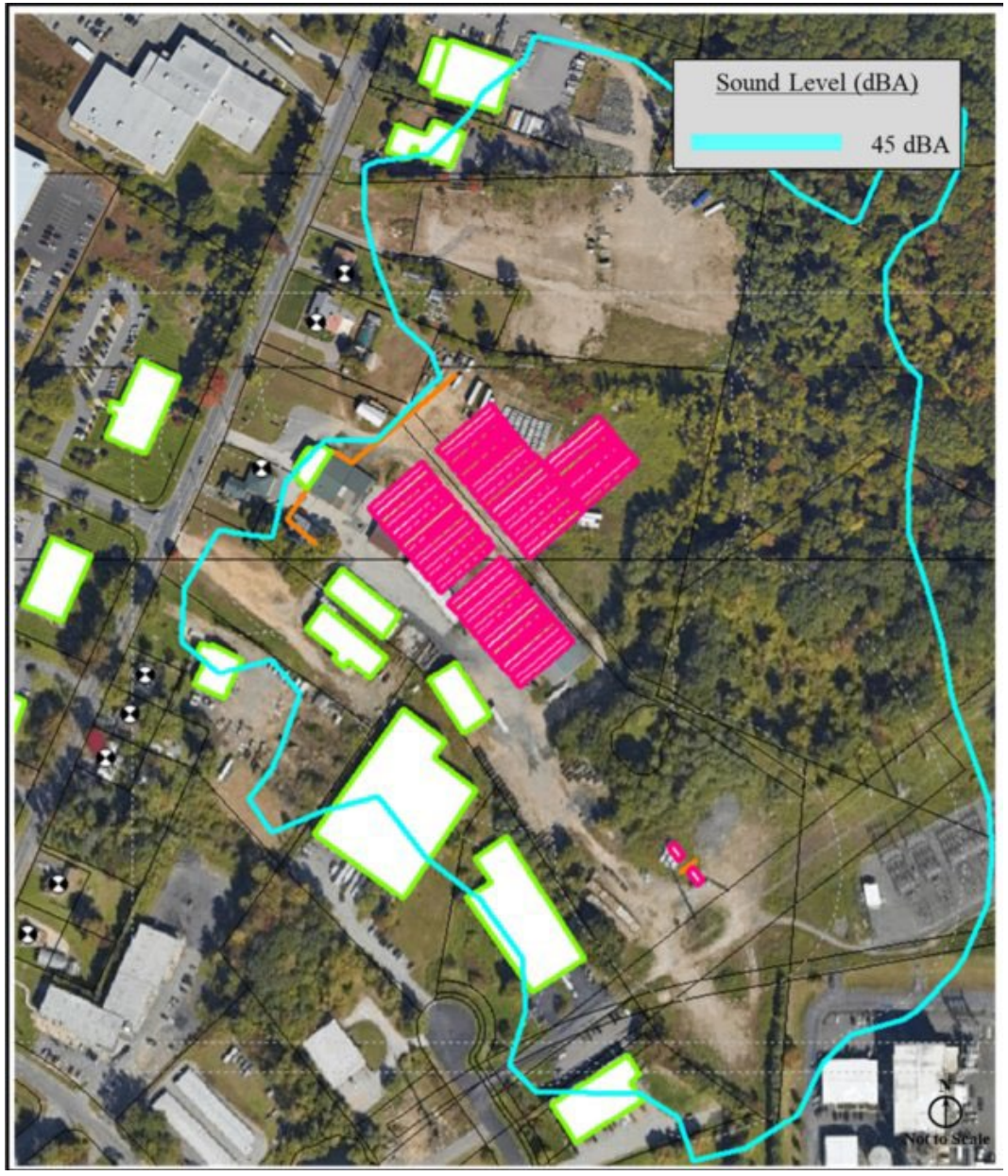
AGAWAM ENERGY CENTER – SOUND MITIGATION MODEL RESULTS



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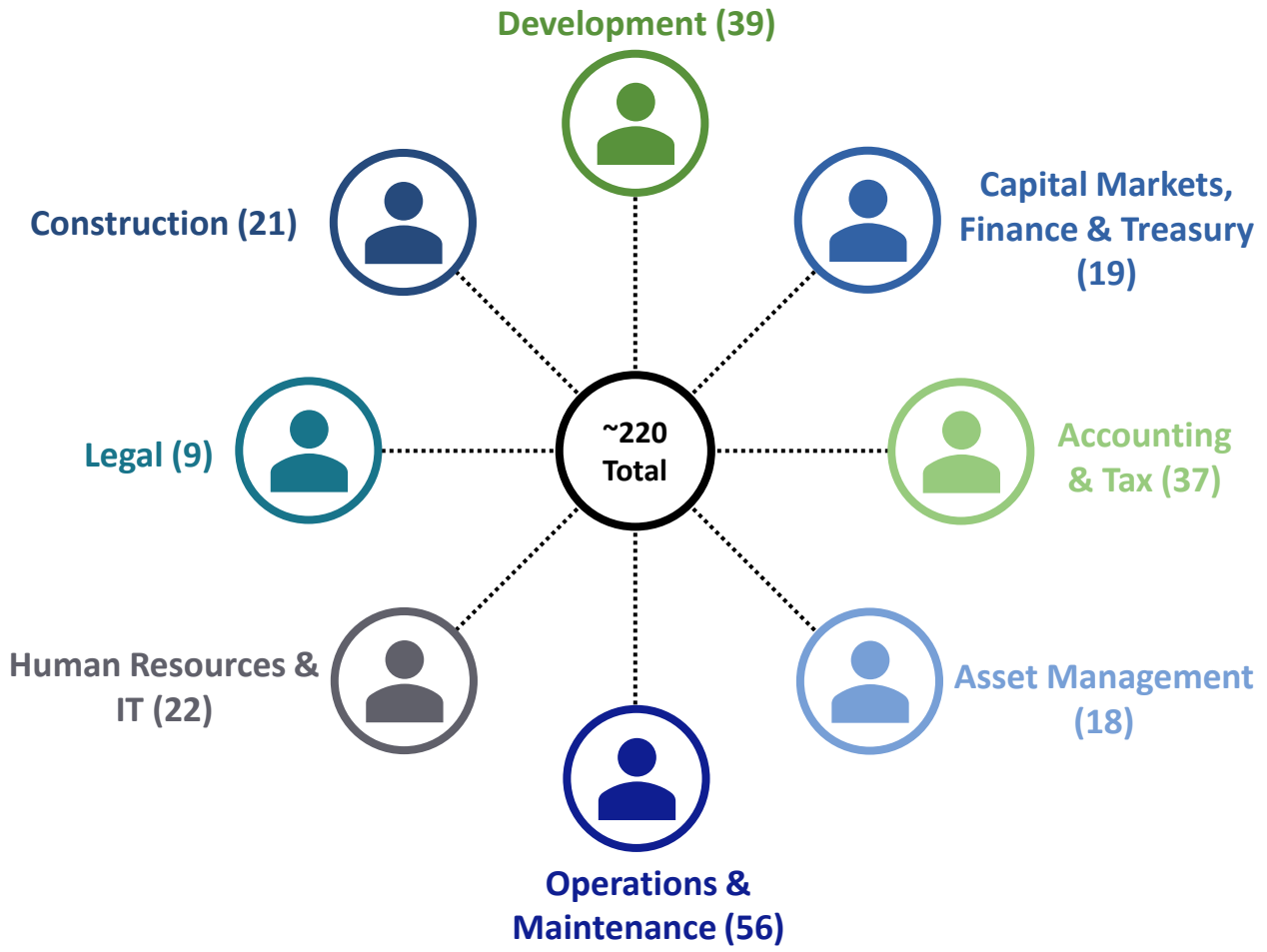
LONGROAD ENERGY – DEVELOP TO OWN & OPERATE

Longroad is a fully resourced organization from early development through construction and operations, supported by subject matter experts across the company.



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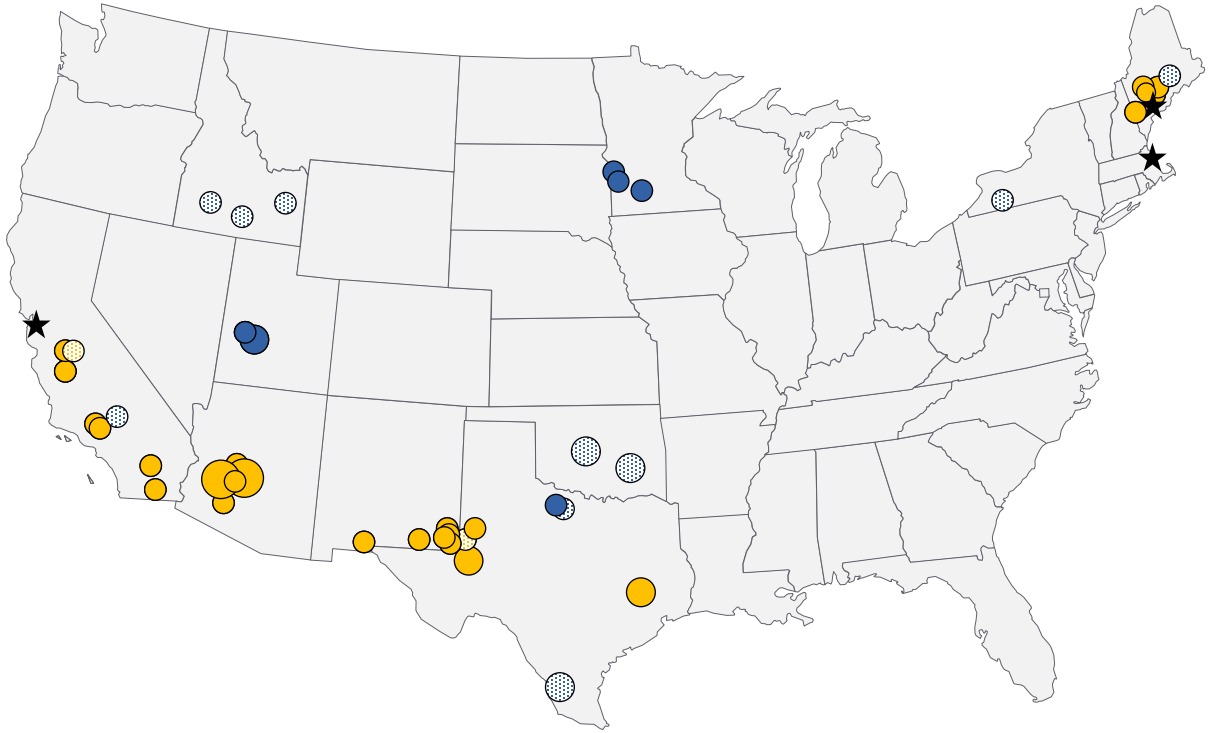
LONGROAD ENERGY – OVERVIEW

Longroad has developed and acquired 6.0 GW of projects. Longroad Energy Services manages 6.1 GW of projects, 4.1 GW of which is owned by the Company.



401+ MW
201 – 400 MW
0 – 200 MW
Longroad Office
Solar and Hybrid Projects Owned and Operated by Longroad
Third-party Solar Services
Wind Projects Owned and Operated by Longroad
Third-party Wind Services

* Solar sizes are counted as MWdc, BESS and wind sizes are in Mwac, projects sold are not shown on map



Remote Operations Center, Portland, ME

6.0
GW DEVELOPED & ACQUIRED

4.1
GW OWNED

6.1
GW UNDER SERVICES CONTRACT

$17.3 B
Third Party Capital Raised

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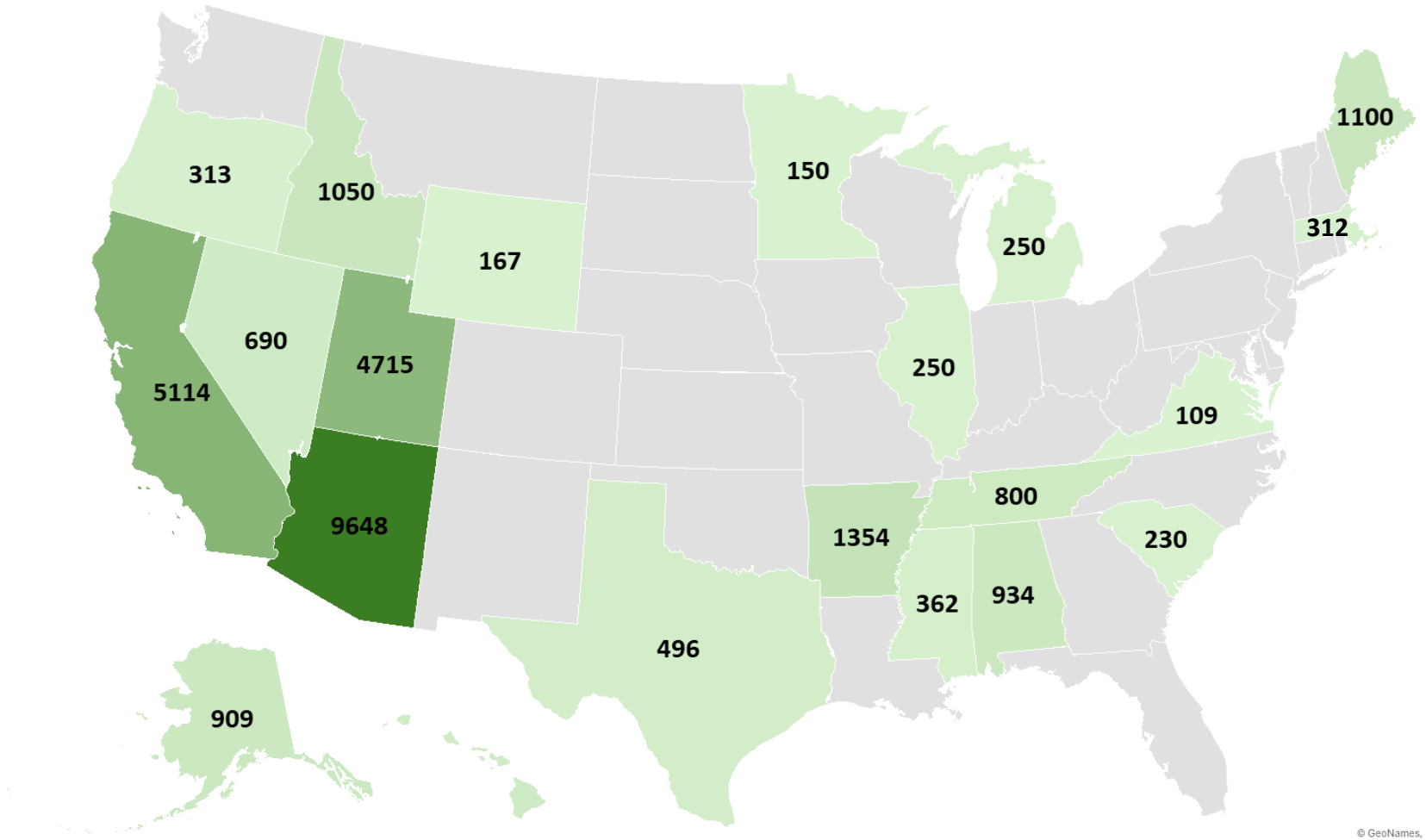
LONGROAD ENERGY – DEVELOPMENT PIPELINE (MW)



Solar reflected as MWdc, BESS and wind reflected as MWac

Greenfield development pipeline is 29.7 GW, which includes:

- 13.8 GW of Solar
- 2.0 GW of Wind
- 13.8 GW of Storage

Of the 29.7 GW, 6.6 GW is positioned for FNTP by end of 2026

- All projects either have land signed or are in interconnection queue, and 75% have both
- Generally located in markets where Longroad has a history of successful development

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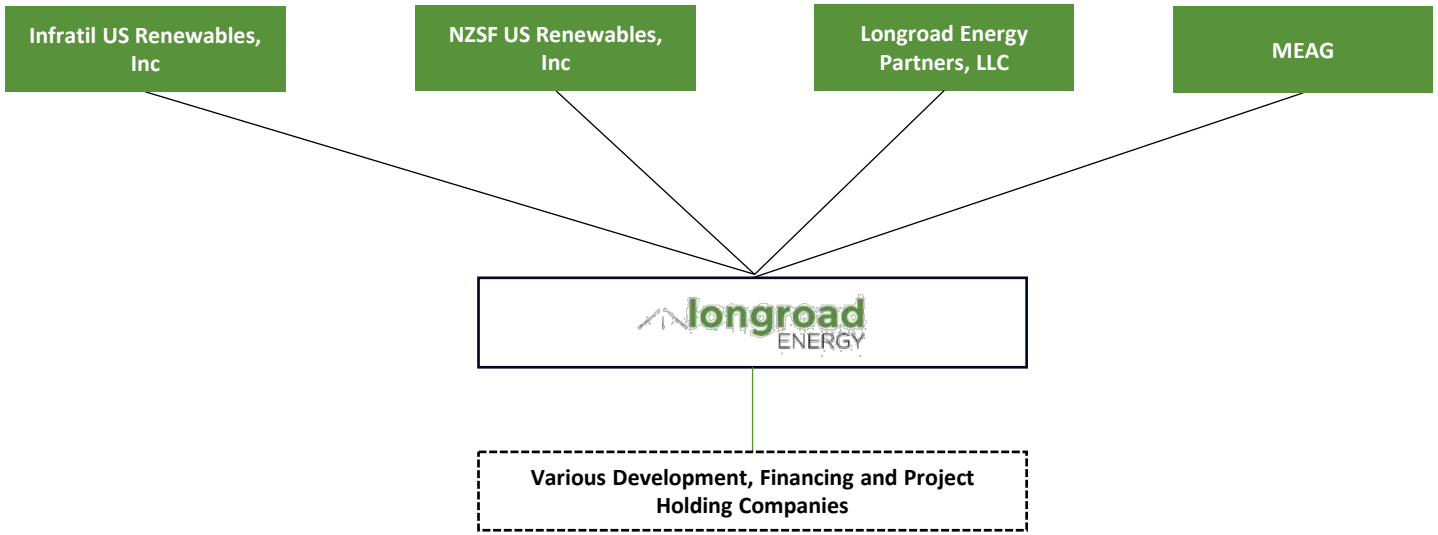
LONGROAD ENERGY

Longroad is owned by Infratil, the New Zealand Superannuation Fund ("NZSF"), Longroad's Management Team, and MEAG.



Infratil

Infratil is an owner and operator of businesses in the energy (mainly renewable), transport, data center and social infrastructure sectors. Infratil is listed on both the New Zealand and Australian Stock Exchanges (IFT.NZ and IFZ.ASX, respectively) and owns assets in excess of NZ$15.6 billion.

NEW ZEALAND SUPERANNUATION FUND

The NZSF is a NZ$82.8 billion sovereign wealth fund established by the New Zealand Government to partially pre-fund the future cost of universal pension payments. A long-term, growth-oriented investor, the NZSF has returned 9.99% p.a. since inception in 2003. The Fund is managed by the Guardians of New Zealand Superannuation, a Crown entity.

Longroad Energy Partners

Longroad Energy Partners, which was founded in 2016, is a Delaware limited liability company that is indirectly owned the executives of Longroad:

- Paul Gaynor: Chief Executive Officer
- Michael Alvarez: Chief Operating Officer
- Peter Keel: Chief Financial Officer
- Charles Spiliotis: Chief Investment Officer

MEAG

MEAG manages the assets of Munich Re and ERGO. It has representations in Europe, Asia, and North America and currently manages assets to the value of around € 355 billion.

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LONGROAD TEAM TRACK RECORD – STORAGE

Longroad has successfully developed over 1,000 MW of storage projects to date, with an additional 10,000 MW of future projects in development.

Project Name	Size (MWac)	State	COD
Sun Streams 3	215 MW / 860 MWh	AZ	2024
Sun Streams 4	300 MW / 1200 MWh	AZ	2025
Serrano	300 MW / 1200 MWh	AZ	2025
Sun Pond	214 MW / 856 MWh	AZ	Under Construction
Zeta	75 MW / 300 MWh	CA	Under Construction
Development Pipeline	15,192 MW of BESS	Various	N/A

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Key Steps Remaining



Key Milestones:

- October 2025 - ISO NE Cluster Study Start
- December 2025 - 83E Clean Peak Award Notice
- April 2025 - Submit 83E contract for Regulatory Approval
- October 2026 - Interconnection Agreement
- April 2027 - Close Financing, Start Construction
- June 2029 - Start of Operations

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Large Scale Fire Test:
Fluence Smartstack

SUMMARY REPORT | REV 00 | February 16th, 2026



Prepared by Fire & Risk Alliance, LLC. for:

Allan Rhodes
Principal Fire Protection Engineer
Fluence Energy, Inc.

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Fire & Risk Alliance, LLC. did not select the sample(s), determine whether the sample(s) was representative of production samples, witness the productions of the test sample(s), nor was FRA provided with information relative to the formulation or identification of component materials used in the test sample(s).

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Revision Notes:

			Authored:	Reviewed:	Approved:
Revision 00	February 16th, 2026	Initial release	JI, LG, CB	RH	BT

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Contents

Contents **2**

List of Acronyms, Initialisms, and Nomenclature **3**

1 Summary of Test Results **4**

2 Introduction **6**

3 Battery Energy Storage System Description **7**

4 Large Scale Fire Test Description **9**

4.1 Test Configuration and Naming Conventions 9

4.2 Test Equipment & Instrumentation 13

4.2.1 Ignition Device 13

4.2.2 Gas Measurements 14

4.2.3 Heat Flux Measurements 14

4.2.4 Temperature Measurements 17

5 Test Results **31**

5.1 Charging Summary 31

5.2 Test Overview 31

5.3 Temperature Results 36

5.3.1 Initiating BESS 37

5.3.2 Target BESS 1 48

5.3.3 Target BESS 2 54

5.3.4 Target BESS 3 57

5.3.5 Target Wall and Egresses 63

5.4 Heat Flux Results 65

5.5 Gas Concentration Results 70

6 Post-Test Damage Evaluation **82**

References **88**

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List of Acronyms, Initialisms, and Nomenclature

’	Foot
”	Inch
AZ	Arizona
BESS	Battery Energy Storage System
BMS	Battery Management System
C	Celsius
℄	Center Line
DAQ	Data Acquisition
ft	Feet
FRA	Fire & Risk Alliance, LLC.
FTIR	Fourier Transform Infrared Spectroscopy
HFG	Heat Flux Gauge
lb(s)	Pound(s)
LFP	Lithium Iron Phosphate
LSFT	Large Scale Fire Test
MST	Mountain Standard Time
ppm	Parts Per Million
SLPM	Standard Liters per Minute
SOC	State-of-charge
TC	Thermocouple
TR	Thermal Runaway
UL	Underwriters Laboratories Inc.

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1 Summary of Test Results

Large Scale Fire Test
General Test Information

Unit Configuration	Utilized units were Fluence Smartstack Pods each comprised of 18 P333-104L1 Sunwoda modules with each containing 104 SBP-01-3140 Sunwoda LIB cells; one full BESS consisted of 4 units on a skid containing the BMS and cooling systems.
Test Configuration	Outdoor test consisting of 3 BESS (one initiating BESS and two target BESS) and a fourth skid with only one unit (Pod) to serve as a third target; 12-ft x 12-ft wall placed 20 ft from edge of initiating BESS.
Internal Fire Protection	Each Pod was equipped with 2 deflagration panels, 1 smoke detector, and 1 H_2 gas detector; each BESS as a whole had 3 multi detectors (heat and smoke) and an active fire alarm system that, when tripped, opens louvers to uncover an air inlet and a fan/air outlet.

Large Scale Fire Test
Overall Test Results

TR Propagation	TR and resulting cell-to-cell and module-to-module propagation initiated with exposure of one module within initiating Pod to a burner flame (15:1 air-to-fuel ratio); TR propagated to all modules in initiating Pod; no Pod-to-Pod propagation observed.
External Flaming	Flaming observed outside the initiating Pod.
Flame Venting Location	Front face of initiating Pod and top face of Pod through deflagration panels.
Flying Debris	No flying debris, but inlet louver cover fell and molten metal dripped from front face of initiating pod over the course of the test.
Explosion Hazards	None observed.
Max Cell Temps	Initiating Cell: 1,260°C[1]; Neighboring Cells: 1,260°C[1]
Max Wall and Egress Temps	Target Wall: 66.3°C; Egress: 103.5°C
Maximum Heat Flux	Target Wall: 1.65 kW/m^2; Target BESS 1: 1.45 kW/m^2; Target BESS 2: 4.74 kW/m^2; Target BESS 3: 35.6 kW/m^2; Egress: 5.69 kW/m^2

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Large Scale Fire Test
BESS Temp. Results

Max Initiating BESS Temps	Internal to Pod A, External to Modules: 99.1°C; Internal to Pod A, Internal to Modules: 24.4°C; Internal to Pod B, External to Modules: 111°C; Internal to Pod B, Internal to Modules: 60.1°C; Internal to Pod C, External to Modules: 1260°C[1]; Internal to Pod C, Internal to Modules: 1260°C[1]; Internal to Pod D, External to Modules: 200.°C; Internal to Pod D, Internal to Modules: 64.8°C
Max Target 1 BESS Temps	External to BESS: 328°C; Internal to Pod A, External to Modules: 78.1°C; Internal to Pod A, Internal to Modules: 59.7°C; Internal to Pod B, External to Modules: 64.0°C; Internal to Pod B, Internal to Modules: 34.6°C; Internal to Pod C, External to Modules: 23.8°C; Internal to Pod C, Internal to Modules: 47.8°C; Internal to Pod D, External to Modules: 29.2°C; Internal to Pod D, Internal to Modules: 34.7°C
Max Target 2 BESS Temps	External to BESS: 198°C; Internal to Pod A, External to Modules: 31.3°C; Internal to Pod A, Internal to Modules: 62.3°C
Max Target 3 BESS Temps	External to BESS: 404°C; Internal to Pod A, External to Modules: 46.8°C; Internal to Pod A, Internal to Modules: 70.0°C; Internal to Pod B, External to Modules: 57.6°C; Internal to Pod B, Internal to Modules: 24.2°C; Internal to Pod C, External to Modules: 50.0°C; Internal to Pod C, Internal to Modules: 53.2°C; Internal to Pod D, External to Modules: 36.6°C; Internal to Pod D, Internal to Modules: 40.5°C

[1] 1260°C is the maximum reliable temperature measured by the utilized TCs (type-K).

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2 Introduction

This report documents the large scale fire test (LSFT) which Fluence contracted Fire & Risk Alliance, LLC (FRA) to conduct on the Fluence Smartstack Battery Energy Storage System (BESS), which is displayed in Figure 1 below. The LSFT was performed on the Smartstack BESS on December 10, 2025. Testing was conducted by FRA at a testing facility in Coolidge, AZ. Such testing entailed creating a setup with multiple Smartstack BESS configured in a manner consistent with an actual installation, then intentionally initiating thermal runaway (TR) within one BESS through external heating and documenting the resulting behavior of the involved BESSs.



Figure 1: Smartstack BESS.

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3 Battery Energy Storage System Description

As shown in Figure 2 below, the Smartstack BESS is made up of two parts. The first part is a "skid" which includes the Battery Management System (BMS) and follows the dimensions provided in Table 1. The second component of the BESS is comprised of four (4) units, henceforth referred to as "Pods," that sit and lock on top of the skid and follow the dimensions provided in Table 2. Typically, each Pod is comprised of eighteen (18) P333-104L1 Sunwoda modules, an example of which is shown in Figure 3 and specifications for which are listed in Table 4. Each module contains one-hundred four (104) lithium iron phosphate (LFP) chemistry, SBP-01-3140 Sunwoda, lithium-ion battery (LIB) cells, specifications for which are provided in Table 3. Further details on the Pod and overall Smartstack specifications are provided in Tables 5 and 6, respectively. Safety features on a Pod include two (2) deflagration panels, one (1) smoke detector, and one (1) hydrogen (H_2) gas detector. Each Pod was additionally equipped with an NFPA 69 ventilation system which had a fan mounted into the roof of the Pod and an inlet air vent on the front-face of the pod. The BESS as a whole had an active fire alarm system that, when tripped, opened louvers covering the ventilation system vents and activated the ventilation fan. For the LSFT, each Pod was filled either partially or fully with battery modules, with some of these modules containing live cells, others containing thermal mass to mimic cells, and others remaining empty.



Figure 2: Smartstack BESS illustrating Pods and skid.

Table 1: Smartstack skid dimensions.

Length	24	ft
Depth	7.22	ft
Height	5	ft
Weight	23,353	lbs

Table 2: Smartstack Pod dimensions.

Length	5.78	ft
Depth	8.29	ft
Height	8.36	ft
Weight	33,400	lbs

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Table 3: Smartstack cell specifications.

Manufacturer	Sunwoda Mobility Energy Technology Co.	
Model Number	SBP-01-3140	
Form-factor	prismatic	
Chemistry	LFP ($LiFePO_4$)	
Nominal Voltage	3.2	V
Nominal Capacity	314	Ah
Weight	5,600	g
Width	174.3	mm
Depth	71.5	mm
Height	206.8	mm

Table 4: Smartstack module specifications.

Manufacturer	Sunwoda Electronic Co.	
Model Number	P333-104L1	
Electrical Configuration	series	
Total Cells	104	
Rated Capacity	314	Ah
Rated Energy	104.5	kWh
Nominal Voltage	332.8	V
Length	2,213	mm
Width	780	mm
Height	240	mm

Table 5: Smartstack unit (Pod) specifications.

Manufacturer	Fluence Energy, LLC	
Model Number	SSTKPOD314L-18PFLSCC5-UA	
Electrical Configuration	4.5 strings in parallel (1 string = 4 modules in series)	
Total Modules	18	
Total Cells	1,872	
Rated Capacity	1,256	Ah
Rated Energy	1,881	kWh
Nominal Voltage	1,500	V

Table 6: Smartstack BESS specifications.

Manufacturer	Fluence Energy, LLC	
Model Name	Smartstack	
Total Pods	4	
Total Modules	72	
Total Cells	7,488	
Rated Energy	7,523	kWh

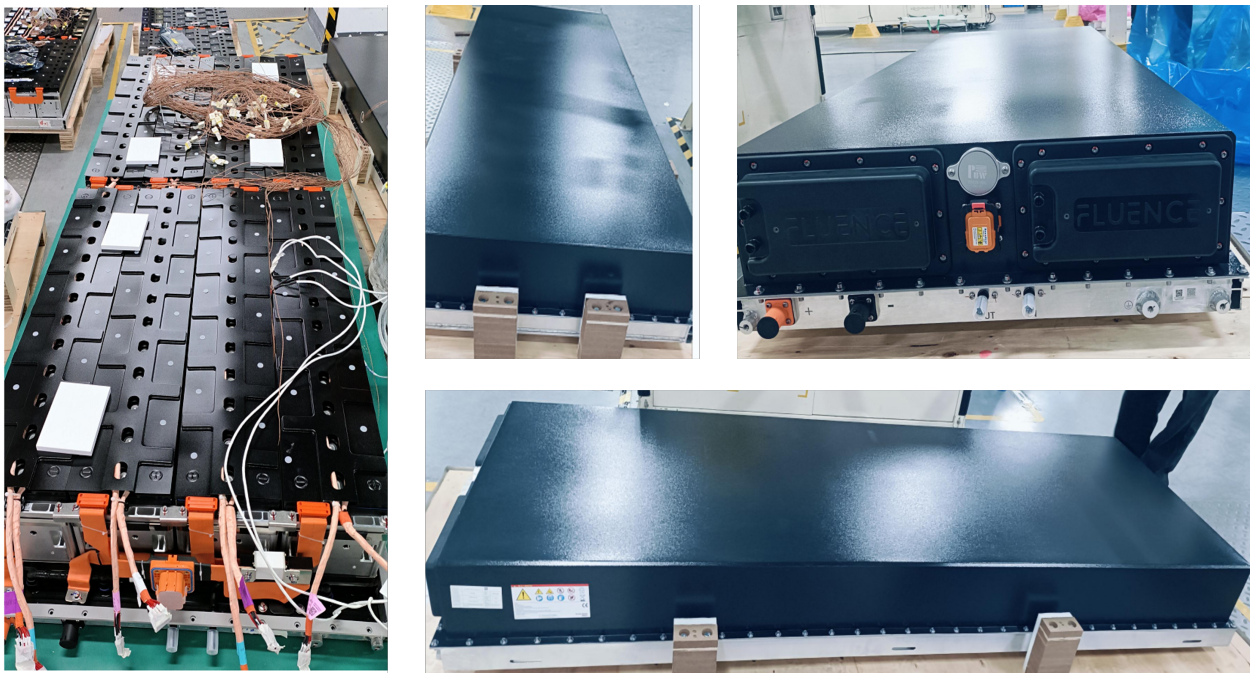

Figure 3: Wiring and casing of Smartstack module.

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4 Large Scale Fire Test Description

4.1 Test Configuration and Naming Conventions

The LSFT for the Smartstack was configured for a BESS designated for outdoor, floor-mounted, non-residential application. As such, testing was conducted outside on graded soil. The configuration included four (4) Smartstack BESS, three (3) of which had four (4) Pods, while the fourth Smartstack BESS was populated with just one (1) Pod. Of these BESS, one (1) was considered the Initiating BESS, while the other three (3) were considered target BESSs, designated as Target BESS 1, Target BESS 2, and Target BESS 3. The Initiating BESS was distinguished as such because this is where TR would be initiated for the LSFT. As such, per NFPA 855 LSFT requirements, in preparation for testing, the deflagration panels on the Initiating BESS were opened to simulate a post-LIB cell failure which caused activation of the NFPA 69 system, *i.e.* a post-deflagration scenario. Additionally, as subsequently detailed, the Initiating BESS was fully populated with 100% SOC modules, whereas the Target BESSs had reduced numbers of modules.

The orientations of each of the four (4) BESSs are shown in Figure 4, with Target BESS 1, 2, and 3 surrounding three sides of the Initiating BESS and a Target Wall located on the fourth side of the Initiating BESS. The distances between BESSs as well as the distance between the Initiating BESS and Target Wall that were selected for the LSFT are representative of the Smartstack's intended installment.

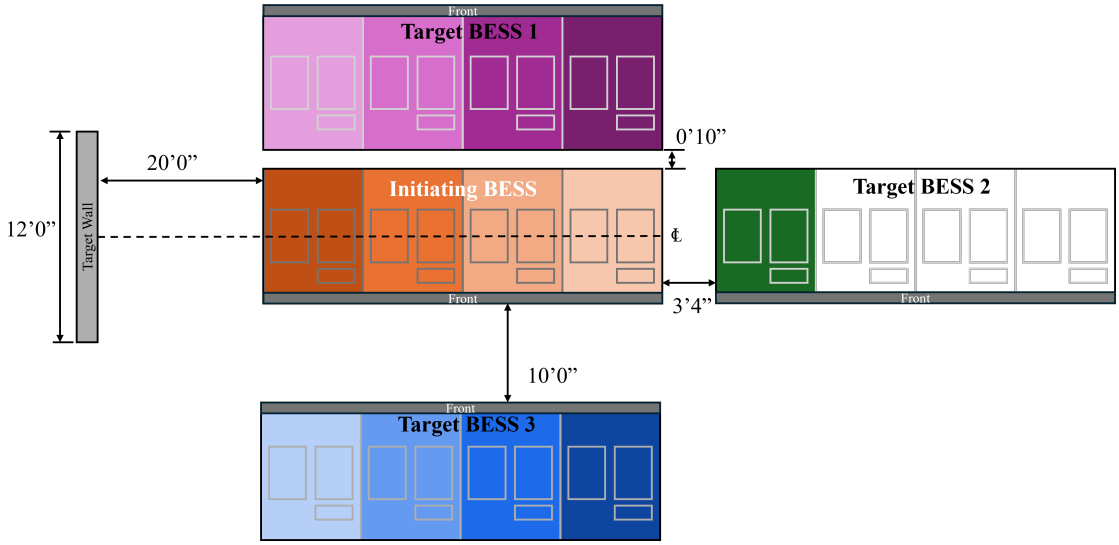

Figure 4: Top view of LSFT layout; not to scale.

The nomenclature used to refer to each of the Smartstack Pods is shown in Figure 5. The Pods of each BESS were labeled A, B, C, and D, from left to right from the front view of that BESS. For the Initiating BESS, its Pods were given the additional label of "IN" for "initiating," so they are henceforth referred to as Pods INA through IND. For the Pods of the target BESSs, each was given an additional label corresponding to the target number of that BESS. As such, the Target BESS 1 Pods are designated as Pods 1A through 1D; the Target BESS 2 Pod is designated as Pod 2A, and the Target BESS 3 Pods are designated as Pods 3A through 3D.

For clarity of the role each Pod will play in the LSFT, Figure 5 color-codes each Pod. Most notably, each BESS is given a color family to denote which Pods belong to which BESS. Pods on the Initiating BESS are always orange, and Pods on Target BESSs 1, 2, and 3 are always magenta, green, and blue, respectively. Additionally, Pod A on each BESS will always be the darkest shade of its color family, and Pod D will always be the lightest. The outlines of each Pod also indicate a Pod's significance. For example, Pod INC on the

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Initiating BESS is the Pod where TR is initiated, so it is outlined in red. The closest surrounding Pods, Pods INB and IND on the Initiating BESS and Pods 1B and 3B on Target BESSs 1 and 3, respectively, are the closest target Pods and are outlined in yellow. This color coordination is applied to all schematics of the various BESSs throughout the report.



Figure 5: Nomenclature of Initiating BESS and Target BESSs; not to scale.

As previously mentioned, each Pod in the LSFT setup was populated either partially or fully with battery modules, dependent on the Pod's location. Additionally, the makeup of a Pod's modules, containing either live cells, a thermal mass to mimic cells, or remaining empty, was also dependent on its role in the LSFT. The live modules are representative of modules typically used in the Smartstack and consist of one-hundred four (104) of the LIB cells specified in Table 3. These cells are wired in series and covered with a metal casing to form the module, as shown in Figure 3. Modules which contain no cells within their metal casings were used for size and volume representation as well as providing thermal mass when it was included. These modules are referred to as "dummies" or "dummy modules."

Figure 5 provides a brief description of the number of live and dummy modules within each Pod, while Figures 6 through 9 show more detailed views of the internals of all the Pods for each BESS. In Figures 6 through 9, each white or colored module (dark green, green, light green, dark yellow, yellow, or red) indicates a live module fully populated with cells, while gray modules indicate dummy modules containing either thermal mass (dark gray) or remaining empty (light gray).

As shown in Figure 6, all four (4) Pods within the Initiating BESS had eighteen (18) live modules that were charged to 100% state-of-charge (SOC) prior to the start of the LSFT. Figures 7 and 9 show that Pods 1B and 3B, respectively, which were located directly in front of and behind the initiating Pod INC, were each populated with two (2) live modules and sixteen (16) dummy modules. These same figures also show that Pods 1C and 3C were each populated with two (2) live modules and four (4) dummy modules and that Pods 1A, 1D, 3A, and 3D were each populated with one (1) live module and five (5) dummy modules.

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Finally, Figure 8 shows that Pod 2A was populated with one (1) live module and one (1) dummy module. It should be noted that none of the live modules within the target BESSs were charged to 100% SOC prior to the start of the LSFT.

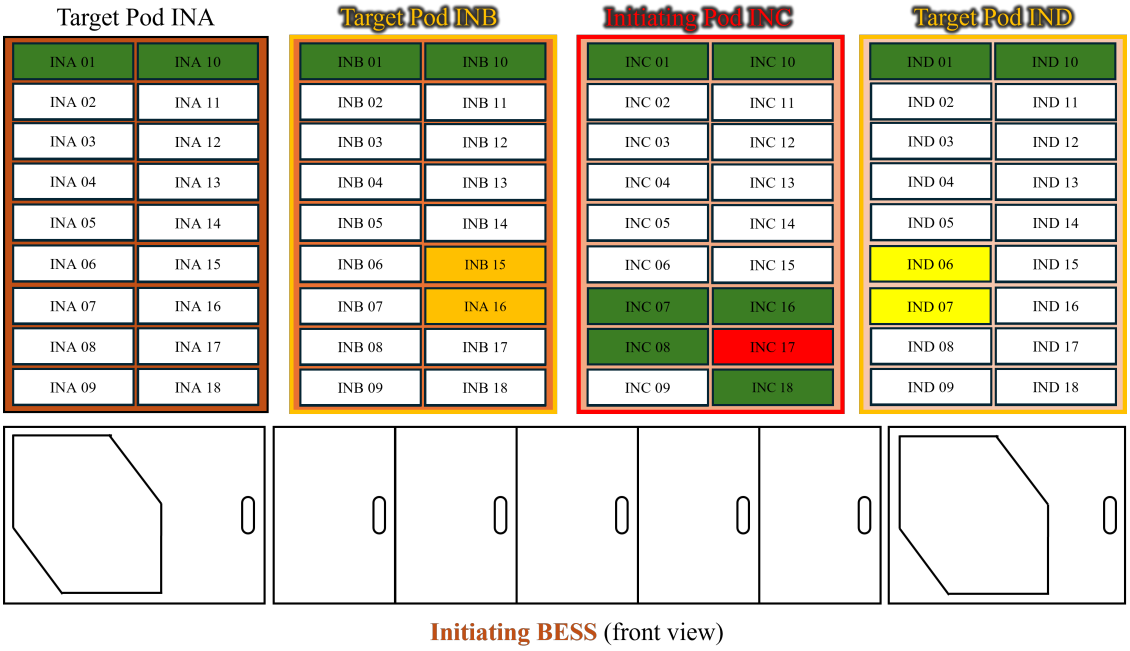

Figure 6: Nomenclature of Initiating BESS.

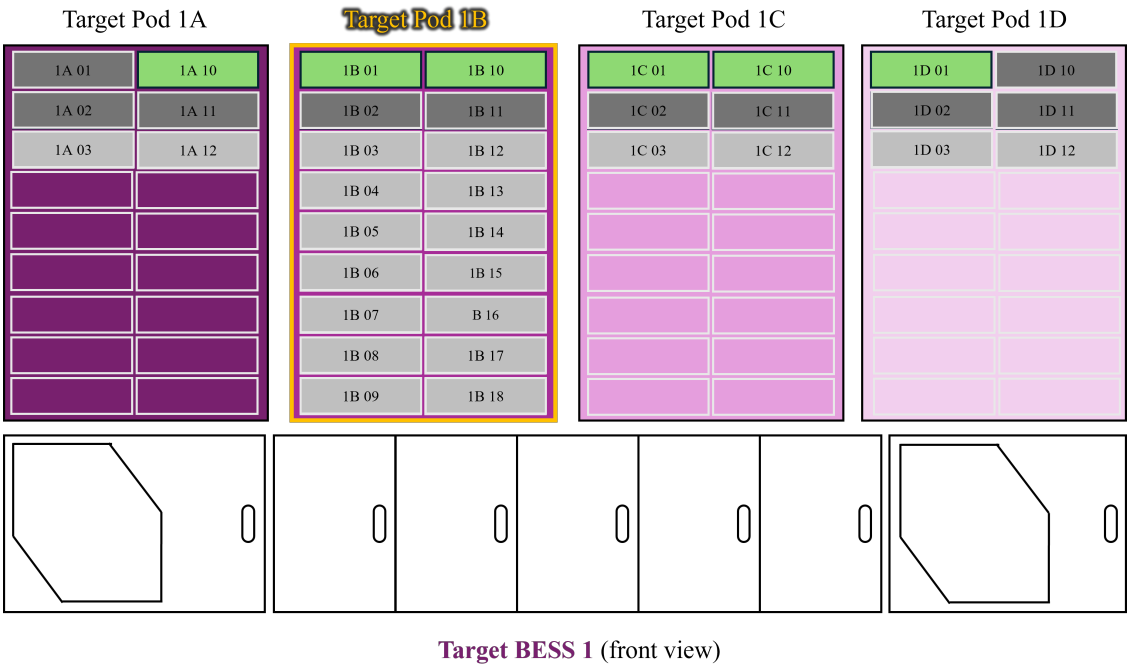

Figure 7: Nomenclature of Target BESS 1.

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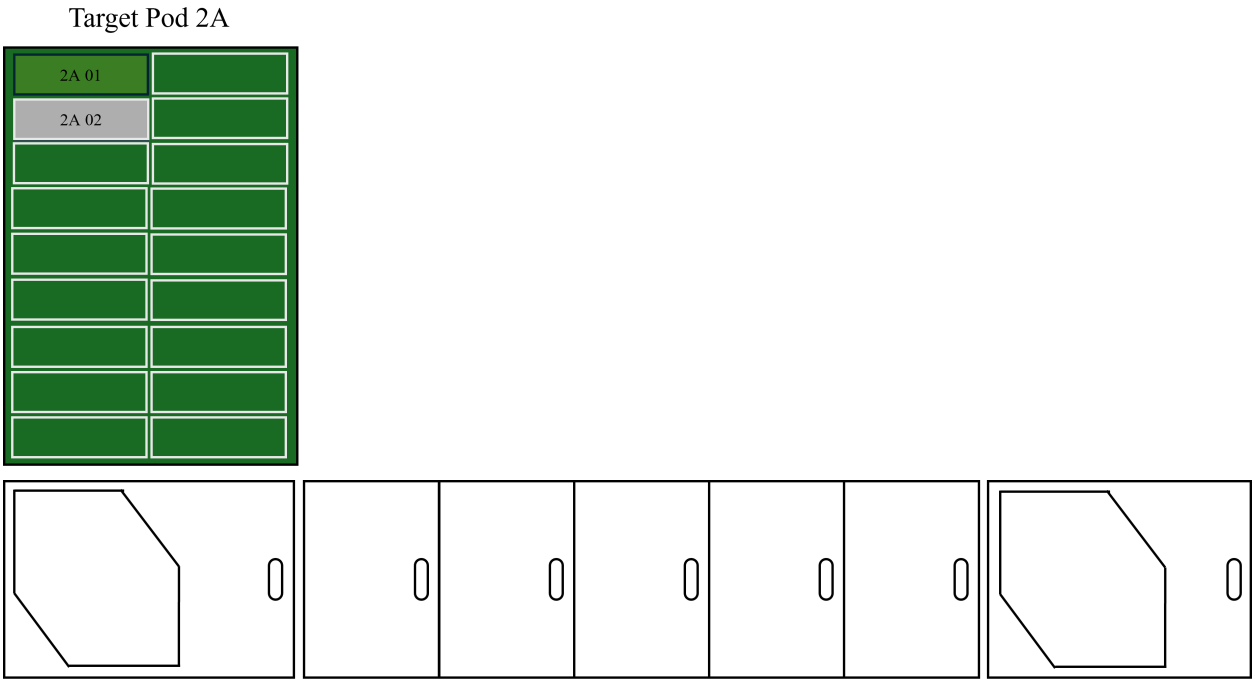

Target BESS 2 (front view)

Figure 8: Nomenclature of Target BESS 2.



Target BESS 3 (front view)

Figure 9: Nomenclature of Target BESS 3.

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Figures 6 through 9 additionally display the naming convention used to differentiate individual modules within each Pod on their respective BESS. The naming convention is as follows for all modules: modules are designated one (1) through nine (9) from top to bottom on the left column of a Pod and ten (10) through eighteen (18) from top to bottom on the right column of a Pod. The modules are also given an additional signifier corresponding to the Pod in which they are contained. For example, the modules in Pod INA are labeled INA 01 through INA 18. Figures 6 through 9 can be referenced for each individual module's name.

Finally, it should be noted that the colors of each module depicted in Figures 6 through 9 indicate the exact instrumentation these modules are equipped with, as subsequently described in detail in Section 4.2.

4.2 Test Equipment & Instrumentation

The LSFT was instrumented with an ignition device to initiate TR, a gas sampling probe to measure concentrations of gases produced during the test, as well as heat flux gauges (HFGs) and type-K thermocouples (TCs) in numerous locations throughout the setup to measure heat flux exposure and temperature, respectively. The locations and specifications of each piece of instrumention is detailed in the following subsections.

4.2.1 Ignition Device

The burner assembly depicted in Figure 10 was used to initiate TR in Pod INC of the Initiating BESS. At the start of the test, a flame, produced through a mixture of air and propane at an air-to-fuel ratio of 15:1 via 30 standard liters per minute (SLPM) air to 2 SLPM propane[2] (later increased to 60 SLPM air and 4 SLPM propane while keeping the 15:1 ratio), was used to keep a sustained flame in contact with the front face of module INC 06. To keep the general structure of the Pod casing intact, the burner was placed inside of the air inlet louver on Pod INC, as shown on the right side of Figure 10, such that no unnecessary holes were drilled into the casing that could cause additional airflow into the Pod.

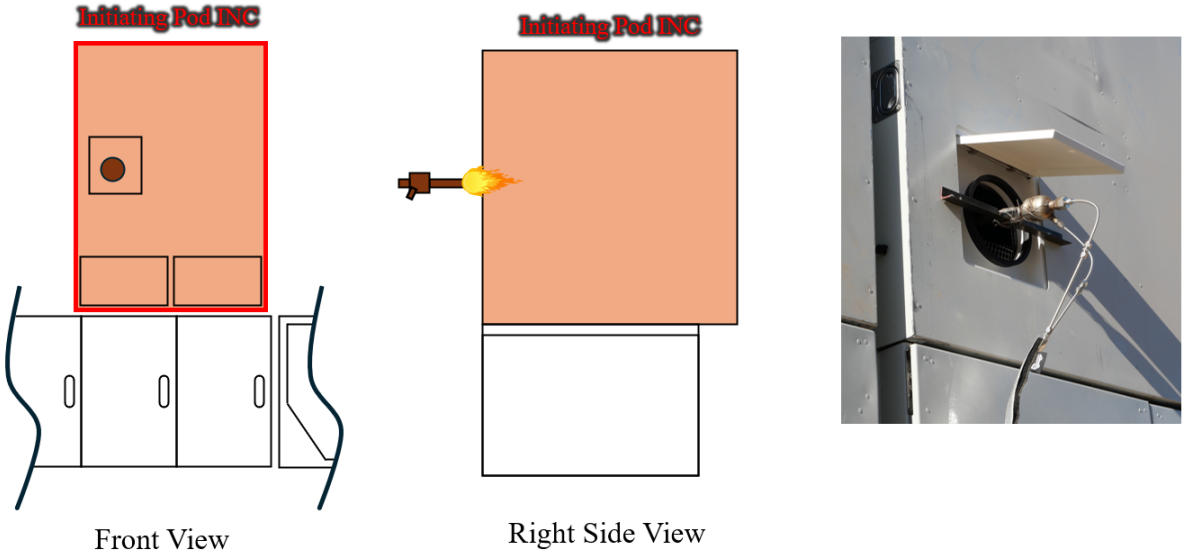

Figure 10: Burner assembly on initiating Pod INC.

[2]The stoichiometric ratio for air to propane is 15.7:1 by mass.

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4.2.2 Gas Measurements

Gas samples were collected continuously from a custom sampling probe and pulled through a Fourier Transform Infrared Spectroscopy (FTIR) spectrometer to measure concentrations of various gases. The probe was fixed to the platform of an articulating boom lift. This allowed for dynamic sampling during the test. As the plume location shifted, an operator from the ground was able to use controls on the machine to reposition the sampling probe and measure the densest region of gas. The height of the sampling probe above the initiating BESS ranged between 4 and 50 feet (ft) depending on the height of the plume. The sampled gas was fed through a sampling line to the FTIR where concentrations were determined and recorded. Figure 11 shows the schematic and setup of the gas sample probe. The gases analyzed by the FTIR at include 1,3 butadiene (C_4H_6), acetylene (C_2H_2), methane (CH_4), carbon monoxide (CO), carbon dioxide (CO_2), carbonyl sulfide (COS), octane (C_8H_{18}), diethyl carbonate ($C_5H_{10}O_3$), dimethyl carbonate ($C_3H_6O_3$), ethane (C_2H_6), ethylene (C_2H_4), ethylene oxide (C_2H_4O), ethyl methyl carbonate ($C_4H_8O_3$), formaldehyde (CH_2O), sulfuric acid (H_2SO_4), hydrogen bromide (HBr), hydrogen chloride (HCl), hydrogen cyanide (HCN), hydrogen fluoride (HF), isobutylene (C_4H_8), methanol (CH_3OH), nitrous oxide (N_2O), ammonia (NH_3), nitric oxide (NO), phosphoryl fluoride (POF_3), propane (C_3H_8), and propylene (C_3H_6).

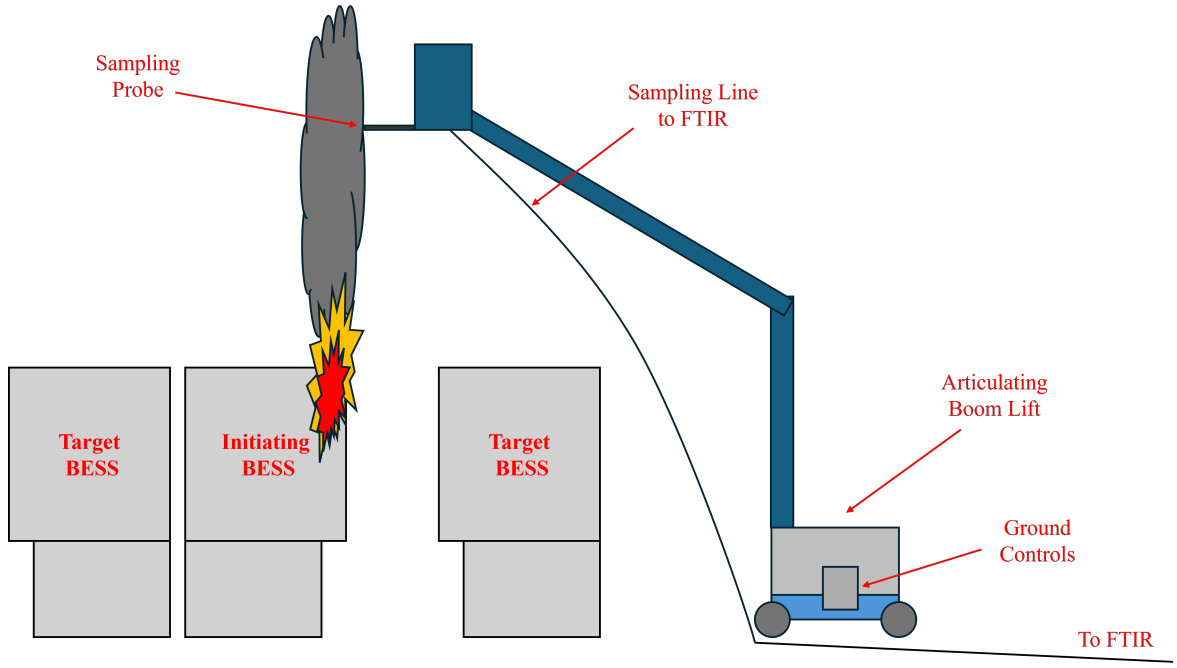

Figure 11: Gas measurement probe setup schematic.

4.2.3 Heat Flux Measurements

As detailed in Figures 12 to 15, a total of twenty-six (26) water-cooled Schmidt-Boelter type HFGs were used to measure the heat flux at key locations throughout the LSFT setup. Figures 12 to 14 specifically show that there were a total of six (6) HFGs on each target BESS, three (3) of which were at heights of 4.5 ft, with the other three (3) being at heights of either 11 ft or 12.75 ft, depending on the geometry of the Pod at the location which the HFG was mounted. Figure 15 shows that there were a total of six (6) HFGs on the Target Wall, three (3) of which were at heights of 4.5 ft, with the other three (3) being at heights of 12.75 ft. Lastly, Figure 16 shows there were two (2) HFGs at two (2) different egress locations. One (1) egress HFG, located in the egress between the Initiating BESS and Target BESS 3, was placed in front of initiating Pod INC, 5 ft from its front face and centered along the width of the Pod's right column of modules, and one (1) egress HFG, located between the Initiating BESS and Target Wall, was centered on the side of the Initiating BESS, 3.33 ft from its side face. Both egress HFGs were placed at heights of 4.5 ft.

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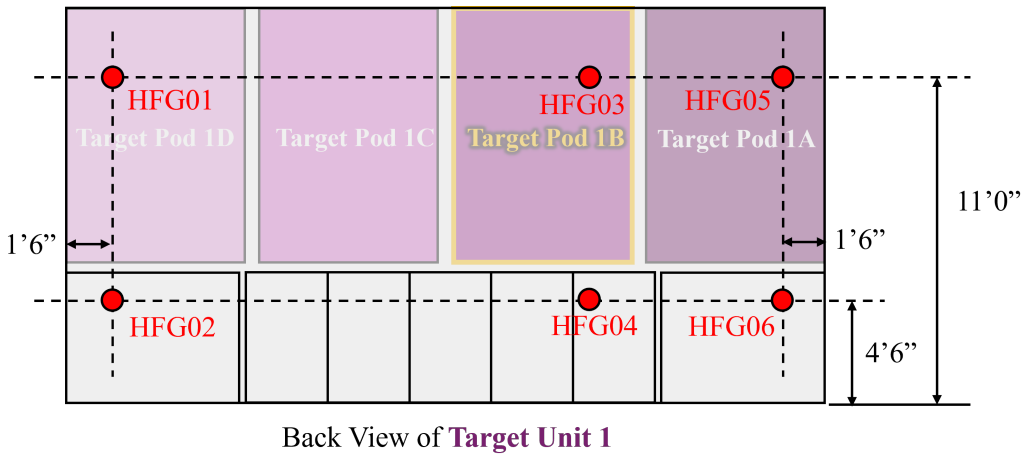

Figure 12: HFG placement on Target BESS 1.

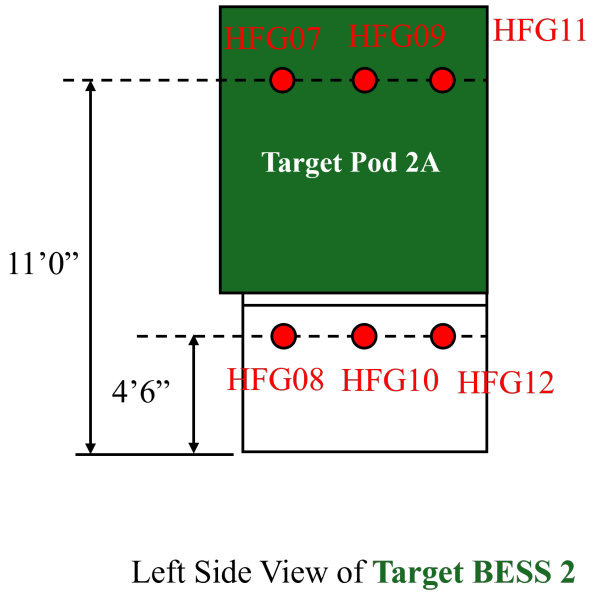

Figure 13: HFG placement on Target BESS 2.

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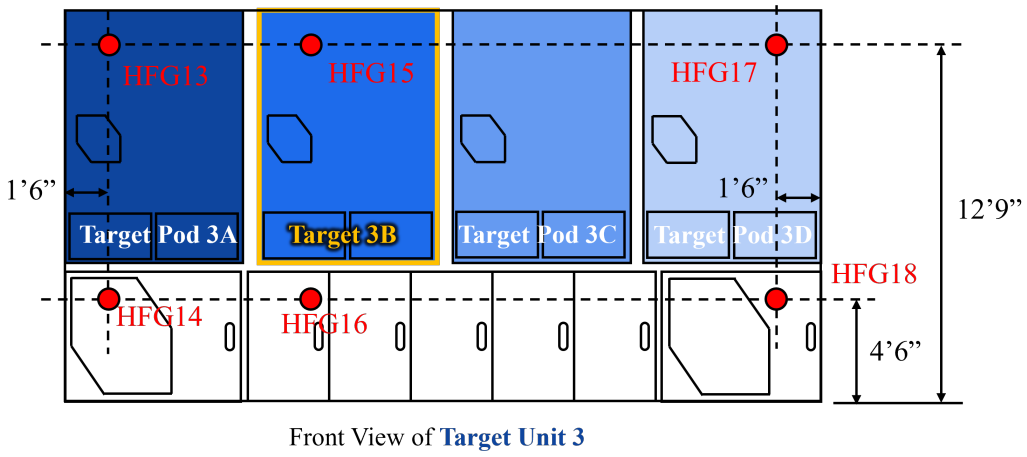

Figure 14: HFG placement on Target BESS 3.

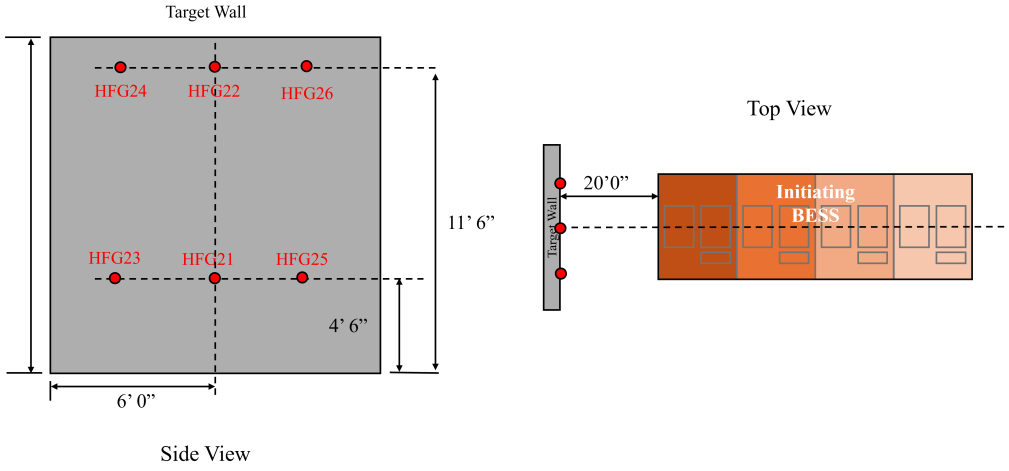

Figure 15: HFG placement on Target Wall.

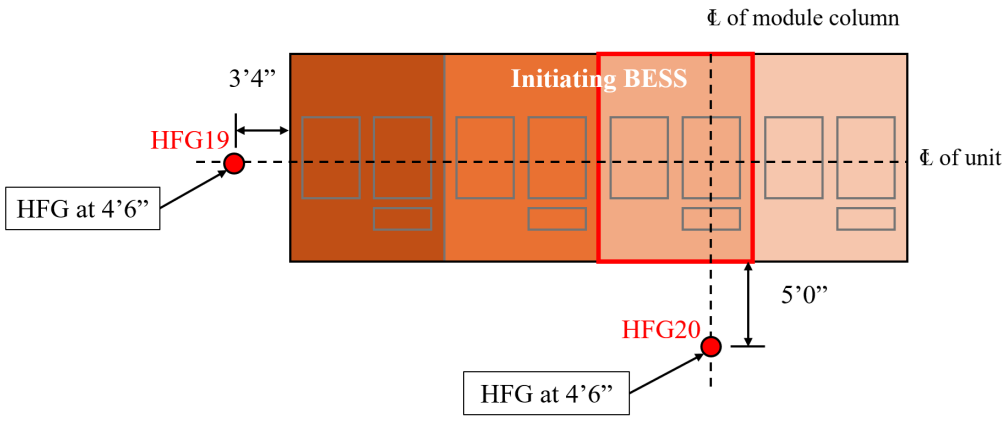

Figure 16: Egress HFG placement.

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4.2.4 Temperature Measurements

The majority of TCs used in the LSFT were located in and on the initiating and target BESSs with the remaining TCs located either on the Target Wall or paired with the HFGs located throughout the setup. The TCs located in and on the initiating and target BESSs were placed in one (1) of three (3) location types - either on the outer surface of the Pods, inside the Pods on the module exterior surfaces, or inside the modules.

Overall, the utilized TC instrumentation included:

- twenty-six (26) TCs instrumented near the HFGs located around the LSFT setup, as described in Section 4.2.3, broken down as follows:
  - six (6) TCs on the Target Wall,
  - six (6) TCs on of the front surface of Target BESS 1,
  - six (6) TCs on of the side surface of Target BESS 2,
  - six (6) TCs on of the front surface of Target BESS 3, and
  - two (2) TCs total spread across the two (2) egress HFG locations;
- twenty-four (24) TCs instrumented in linear array formation on the Target Wall (including 2 TCs placed near HFGs),
- seventy-eight (78) TCs instrumented in linear array formation on the exterior surfaces of the Target BESS Pods, broken down as follows:
  - twenty-six (26) on Target BESSs 1 front face,
  - twenty-six (26) on Target BESSs 2 side face, and
  - twenty-six (26) on Target BESSs 3 front face;
- one-hundred thirty-seven (137) TCs instrumented inside the Pods of the Initiating BESS, broken down as follows:
  - 72 TCs on module external surfaces and
  - 65 TCs internal to modules;
- sixty (60) TCs instrumented inside the Pods of Target BESS 1, broken down as follows:
  - 36 TCs on module external surfaces and
  - 24 TCs internal to modules;
- four (4) TCs instrumented inside the Pods of Target BESS 2, broken down as follows:
  - 2 TCs on module external surfaces and
  - 4 TCs internal to modules); and
- sixty (60) TCs instrumented inside the Pods of Target BESS 3, broken down as follows:
  - 36 TCs on module external surfaces and
  - 24 TCs internal to modules.

Detailed descriptions of each of the TCs locations are subsequently described.

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Starting with the TCs located near the HFGs, Figure 17 shows the detailed location measurements and naming conventions of the two (2) TCs instrumented in the egresses, with TC HF19 located near the HFG placed in the egress between the Initiating BESS and Target Wall and TC HF20 located near the HFG placed in the egress between the Initiating BESS and Target BESS 3.

Figure 18 shows the detailed location measurements and naming conventions of of the six (6) TCs placed near the HFGs located on the Target Wall. As two of the TCs located near the HFGs were located within the array of TCs also instrumented on the Target Wall, these two TCs are not illustrated explicitly in this figure; however, Figure 16 can be referenced for their exact locations, since they align with the locations of the HFGs mounted on the Target Wall.

Figures 19, 20, and 21 can be referenced for the locations and naming conventions of the six (6) TCs each instrumented near the HFG installed on the surfaces of Target BESSs 1, 2, and 3, respectively. More detailed location measurements are provided in Section 4.2.3 when describing the locations of the HFGs, as these TCs align with those locations.

As mentioned, a series of twenty-four (24) TCs organized into a linear array TCs were additionally placed on the Target Wall, as shown in Figure 18. As indicated, these TCs were spaced 0.5 ft apart from one another and centered along the width of the Initiating BESS. The naming convention of these TCs is provided in the figure as well.

Similarly, in addition to the TCs placed near the HFGs on the surfaces of the target BESS, linear arrays of twenty-six (26) TCs were each placed on the exterior surface of Target BESSs 1, 2, and 3. Figures 19, 20, and 21 show the location and naming conventions of these TCs. As seen in the figures, these TCs were spaced 0.5 ft appart in arrays that spanned the entire heights of the target BESSs. As shown in Figures 19 and 21, the arrays of TCs on Target BESSs 1 and 3, respectively, were centered along the left column of modules located within each BESS' corresponding Pod B. For Target BESS 2, Figure 20 shows that its array of TCs is centered along the width of its side facing the Initiating BESS.

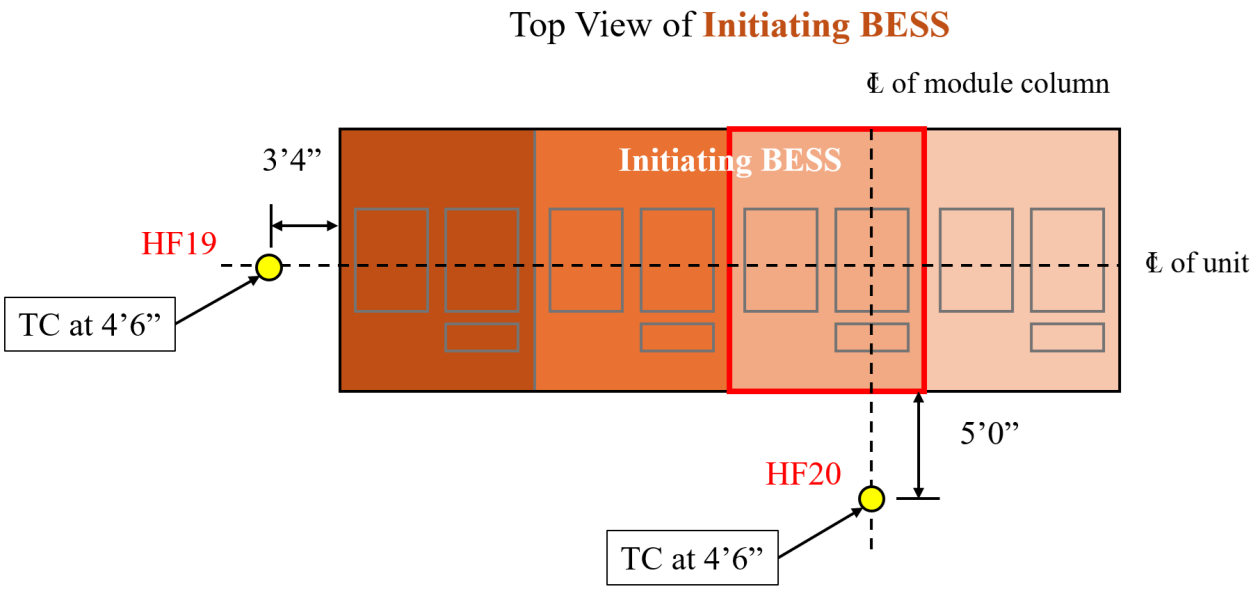

Figure 17: HFG egress TCs placement.

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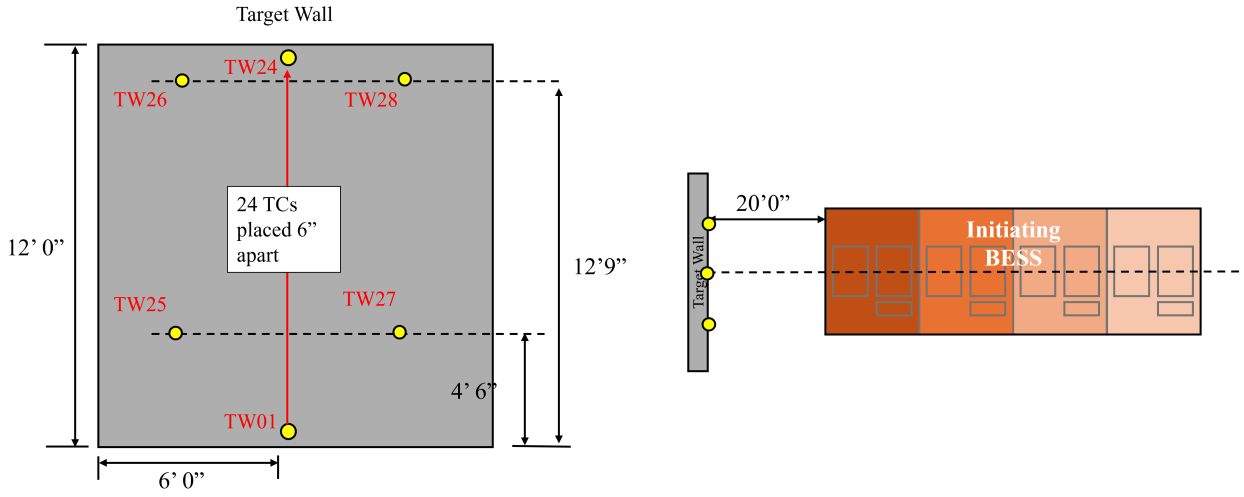

Figure 18: TC array and HFG TCs placement on Target Wall.

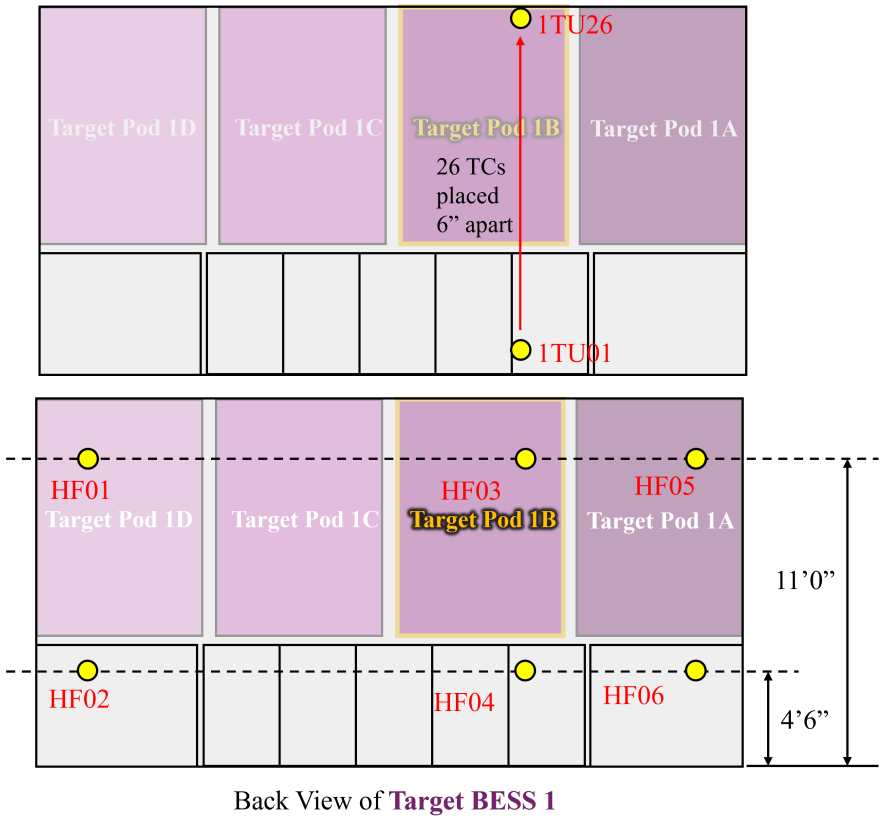

Figure 19: TC array and HFG TCs placement on Target BESS 1 external surface.

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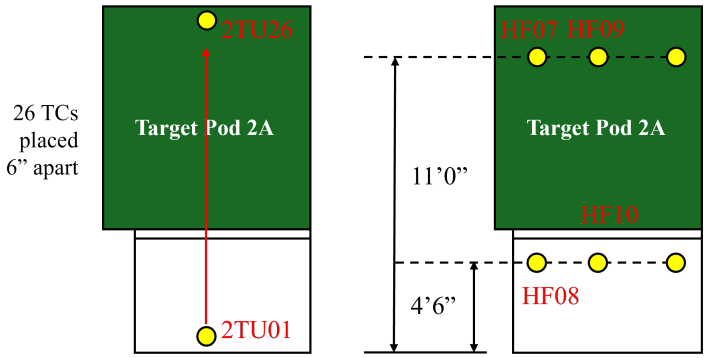
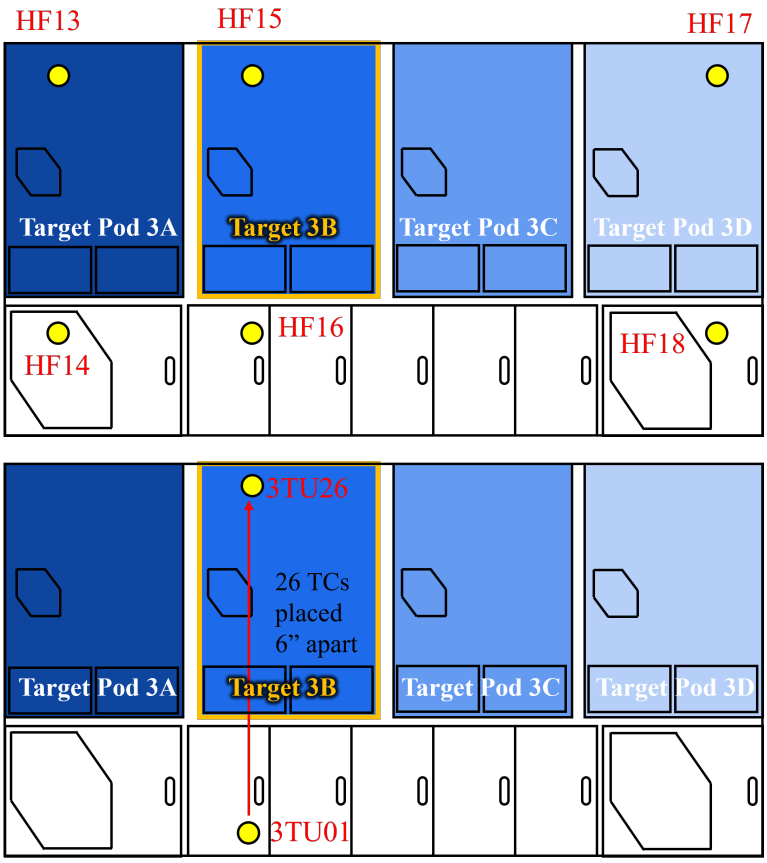


Side View of **Target BESS 2**

Figure 20: TC array and HFG TCs placement on Target BESS 2 external surface.



Front View of **Target Unit 3**

Figure 21: TC array and HFG TCs placement on Target BESS 3 external surface.

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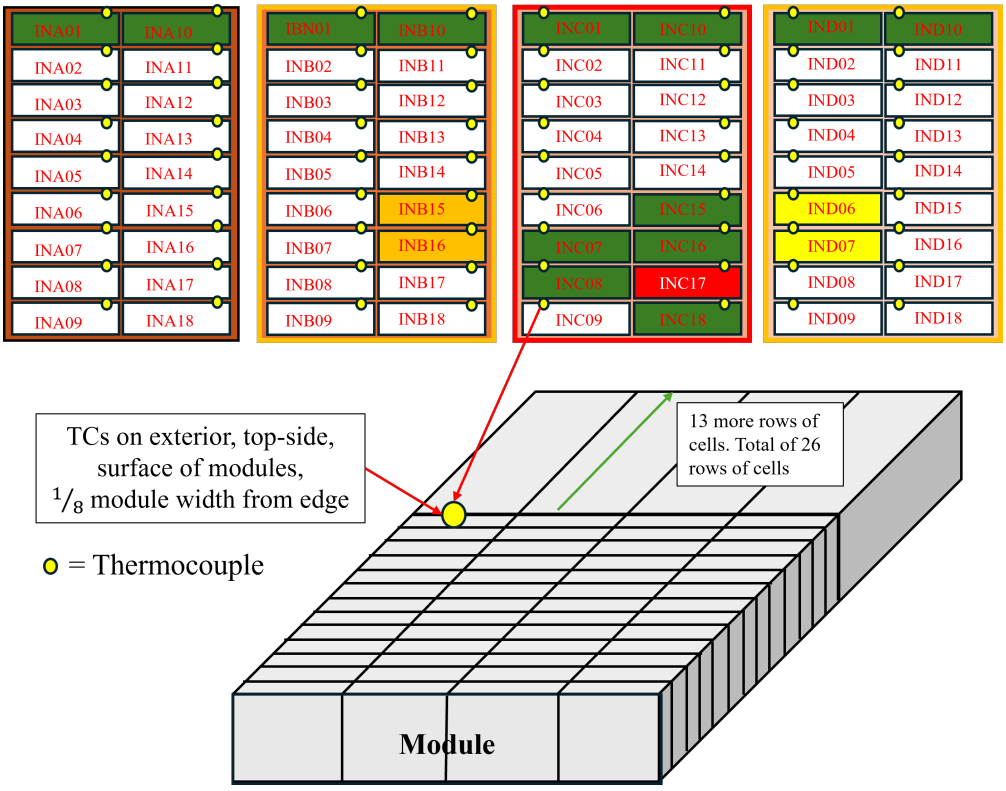
Moving inward to the modules contained within the Pods of the BESSs, all modules present in the LSFT setup were instrumented with one (1) TC on their top external surfaces. Figure 22 shows the location and naming conventions of these TCs on the modules within the Initiating BESS and each of the three (3) target BESSs. For the Initiating BESS modules, the TCs were located one eighth (1/8) of the module width from the module's edge. As shown in Figure 22a, the TCs on the module external surfaces within the Initiating BESS were located either near the left edge of their respective module, as was the case for the modules in Pods INA and INB along with modules INC 10 to INC 18, or the right edge of their respective module, as was the case for modules INC 01 to INC 09 and the modules in Pod IND. The reasoning behind these TC locations was to place them as close to the presumed flame location as as possible.

For the target BESSs, the TCs were located uniformly on the module exterior surfaces. As shown in Figure 22b, the locations for the external module TCs in Target BESS 1 were centered on the back surfaces of the modules. Figure 22c shows the locations for the external module TCs in Target BESS 2 were such that they were centered on the top surfaces of the modules, and Figure 22d shows the locations for the external module TCs in Target BESS 3 were centered along the modules' widths on their top surfaces and placed as close to their front faces as possible.



(a) TC placements on module external surfaces within Initiating BESS.

Figure 22: TC placements on external module surfaces within Initiating and target BESSs.

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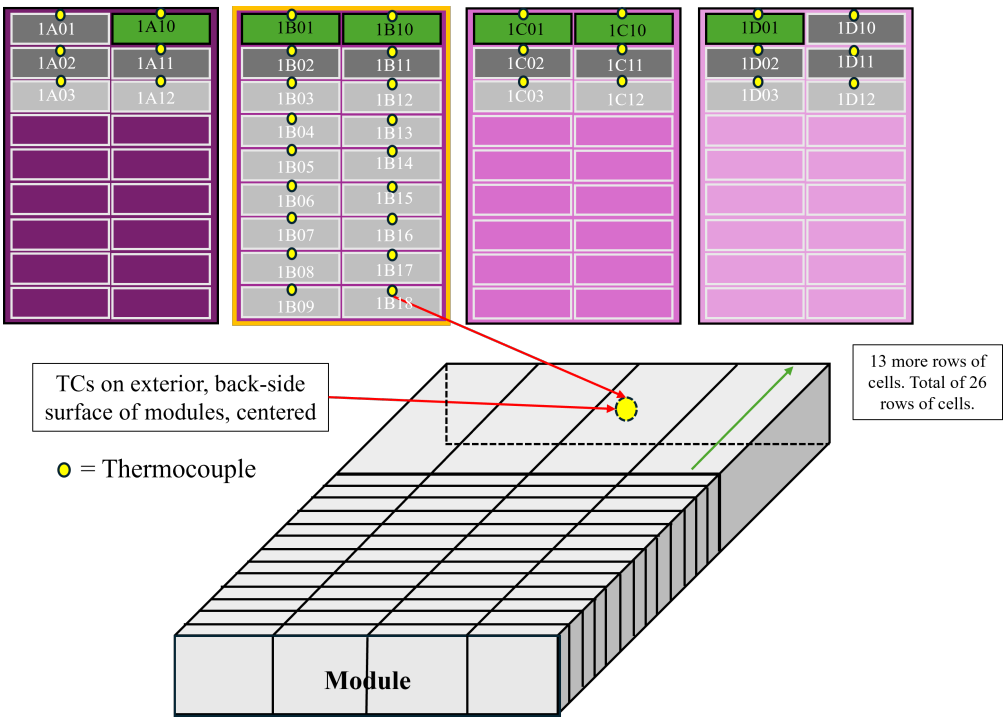
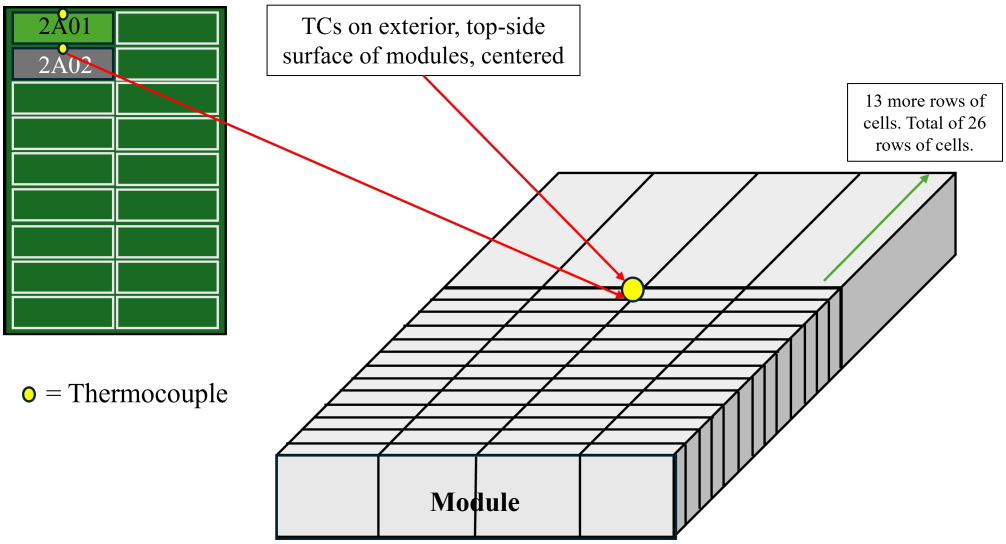


(b) TC placements on module external surfaces within Target BESS 1.



(c) TC placements on module external surfaces within Target BESS 2.

Figure 22: TC placements on external module surfaces within Initiating and target BESSs (continued).

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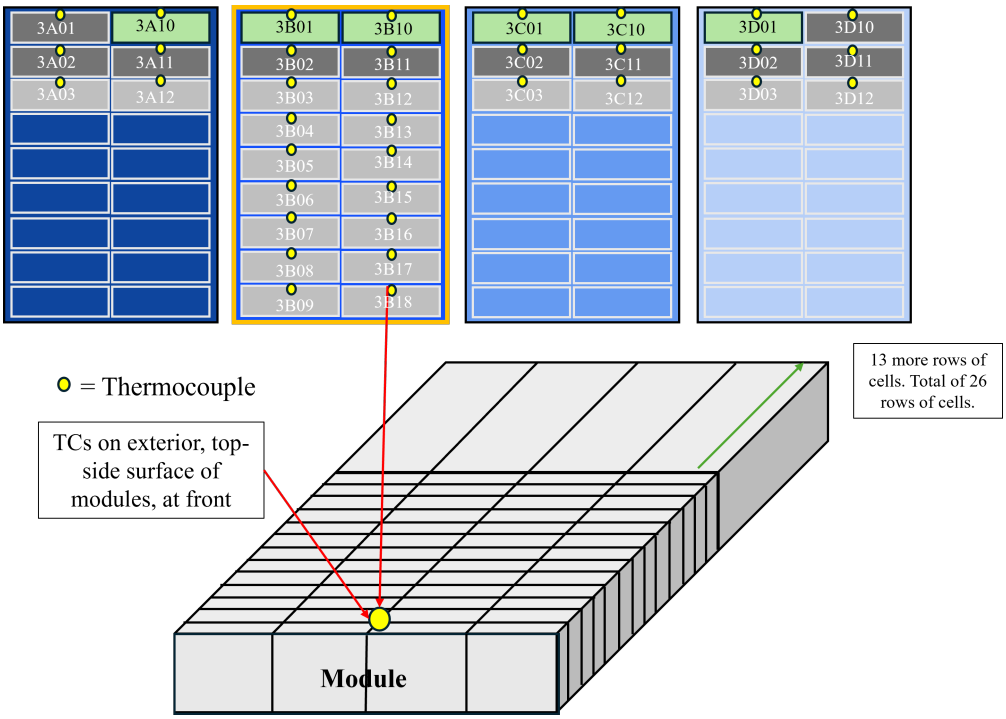

(d) TC placements on module external surfaces within Target BESS 3.

Figure 22: TC placements on external module surfaces within Initiating and target BESSs (continued).

Within the the modules of Initiating BESS and target BESSs, TCs were installed by the manufacturer using heat-resistant Kapton tape prior to their delivery to the test facility. Overall, there were nine (9) different module variations, six (6) of which had TCs instrumented in various different configurations within those modules. Figure 23 shows a legend with the nine (9) different modules (and a tenth item representing no module present) that correspond with each module variation that was utilized during the Smartstack LSFT. The six (6) module configurations in Figure 23 which included TC instrumentation are the red, dark green, green, light green, dark yellow, and yellow modules.

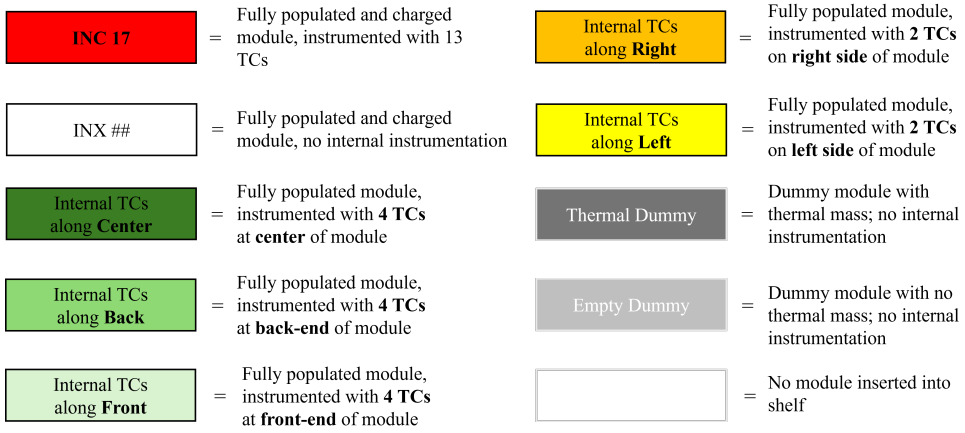

Figure 23: TC module legend indicating internal TC instrumentation layouts.

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Going through each of the module configurations with instrumentation described in Figure 23 and starting with the red module, Figure 24 shows the location of the thirteen (13) TCs located in this color of module. Only one module across all BESS in the LSFT setup, module INC 17 contained this configuration of internal TCs, with the reasoning behind the comparatively large number of TCs in this module being that it was originally intended to be used as the initiating module in a UL 9540A unit-level test. Next, the dark-green module TC instrumentation configuration, as shown in Figure 25 refers to modules that had four (4) internal TCs with each one centered on the front-face of a cell in Row 13 of cells in the module. The green module TC instrumentation configuration, as shown in Figure 26 refers to modules that had four (4) internal TCs with each one centered on the front-face of a cell in Row 26, the final row, of cells in the module. The light-green module TC instrumentation configuration, as shown in Figure 27 refers to modules that had four (4) internal TCs with each one centered on the back-face of a cell in the first row of cells in the module. Finally, the dark-yellow and yellow module TC instrumentation configuration, as shown in Figure 28 refer to modules that had only two (2) internal TCs with each one centered on the front-face of a cell in either Row 7 or Row 20 of cells in the module. For the dark-yellow module TC instrumentation configuration, the cells on which the TCs were located were on the right-most side of the module, and for the yellow module TC instrumentation configuration, the cells on which the TCs were located were on the left-most side of the module.

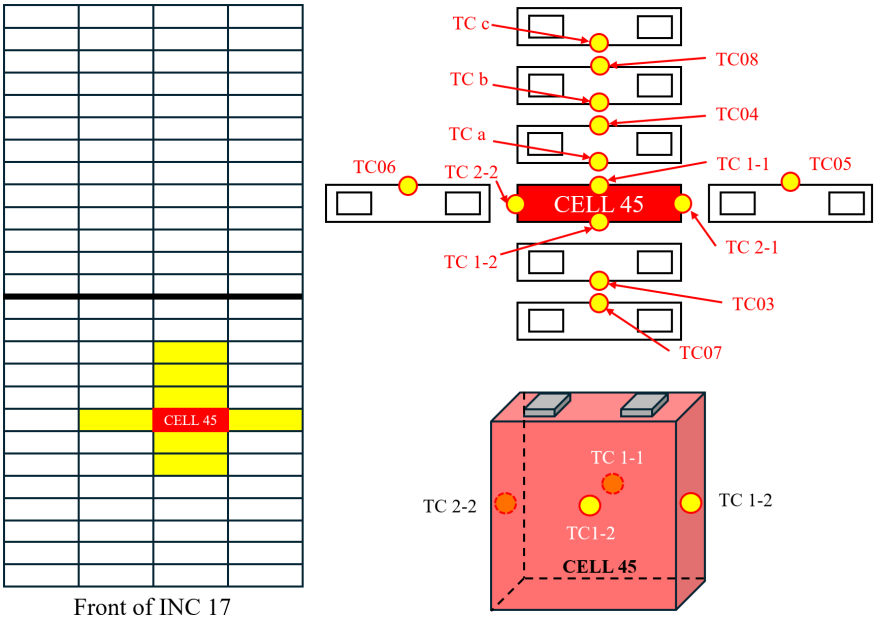

Figure 24: Location and nomenclature of TCs within Module 17.

As shown in Figure 29, there were a total of seventeen (17) modules that were instrumented with TCs within the Initiating BESS, with each of these modules corresponding to one of the described module TC instrumentation configurations. One (1) module, INC 17, was instrumented following the red-coded module TC configuration. Twelve (12) modules, INA 01, INA 10, INB 01, INB 10, INC 01, INC 07, INC 08, INC 10, INC 16, and INC 18, were instrumented following the dark-green-coded module TC configuration. Two (2) modules, INB 15 and INB 16, were instrumented following the dark-yellow-coded module TC configuration, and a final two (2) modules, IND 06 and IND 07, were instrumented following the yellow-coded module TC configuration. Figure 30 shows that there were a total of six (6) modules, 1A 10, 1B 01, 1B 10, 1C 01, 1C 10, and 1D 01, that were instrumented with TCs within Target BESS 1, all of which followed the green-coded module TC configuration. For Target BESS 2, Figure 31 shows that only one (1) module was instrumented with TCs, also following the green-coded module TC configuration. Finally, Figure 32 shows that there were a total of six (6) modules, 3A 10, 3B 01, 3B 10, 3C 01, 3C 10, and 3D 01, that were instrumented with TCs within Target BESS 3, all of which followed the light-green-coded module TC instrumentation configuration.

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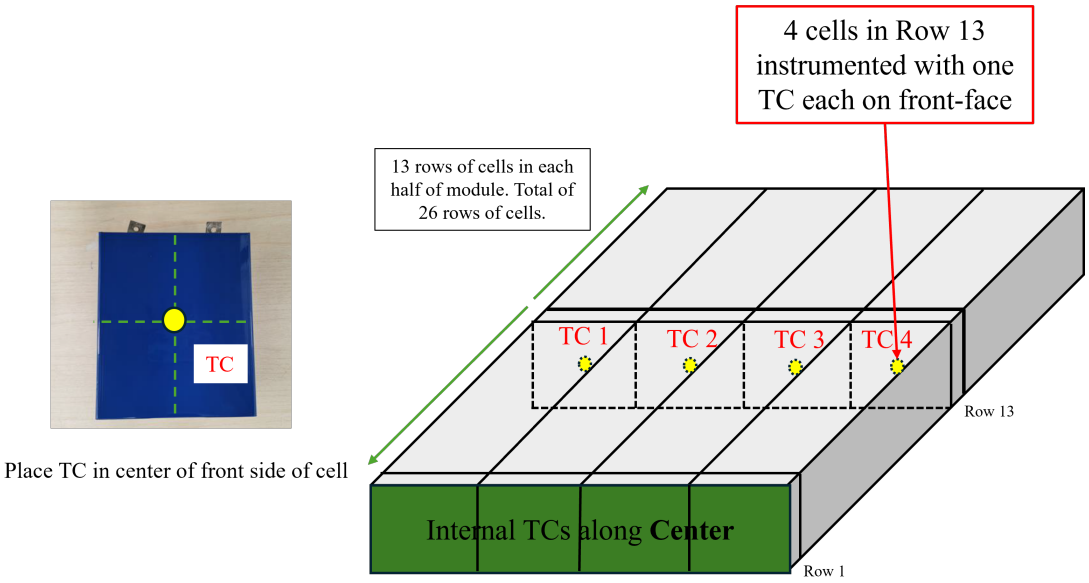

Figure 25: Location of internal TCs along center instrumented in module.

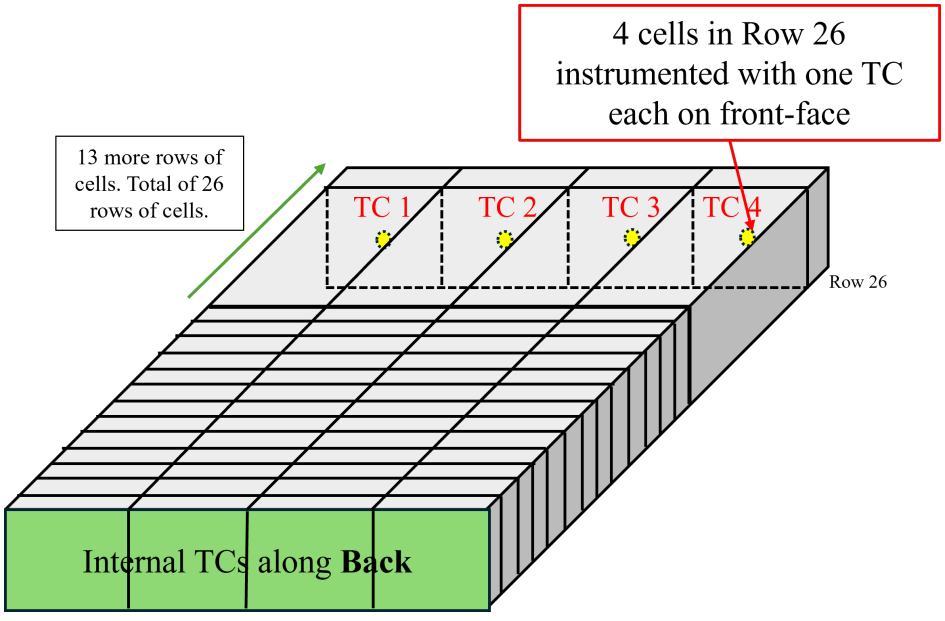

Figure 26: Location of internal TCs along back instrumented in module.

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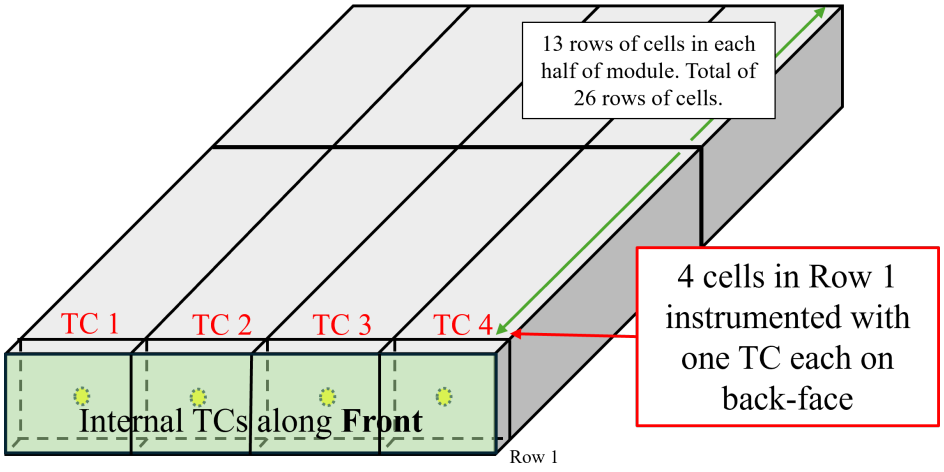

Figure 27: Location of internal TCs along front instrumented in module.

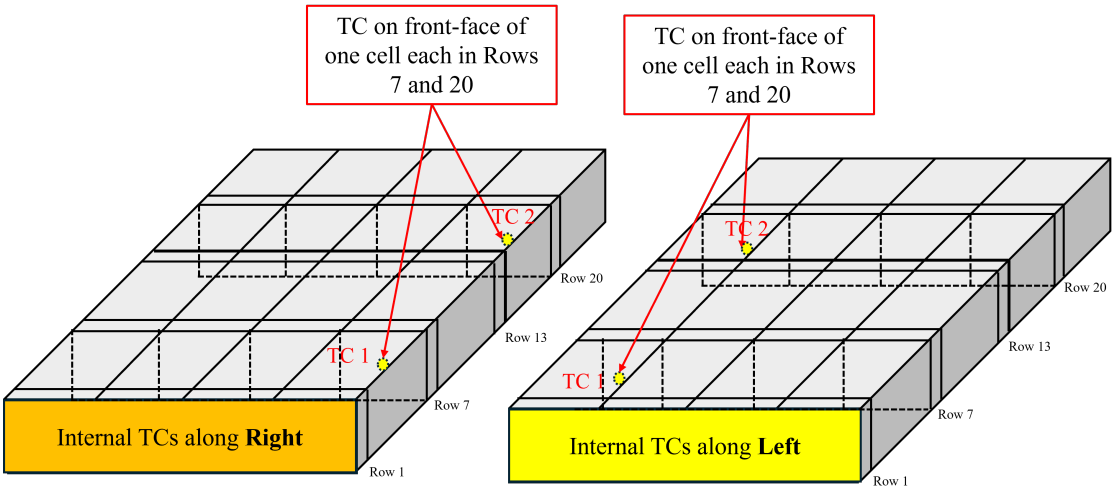

Figure 28: Location of internal TCs along right and left instrumented in module.

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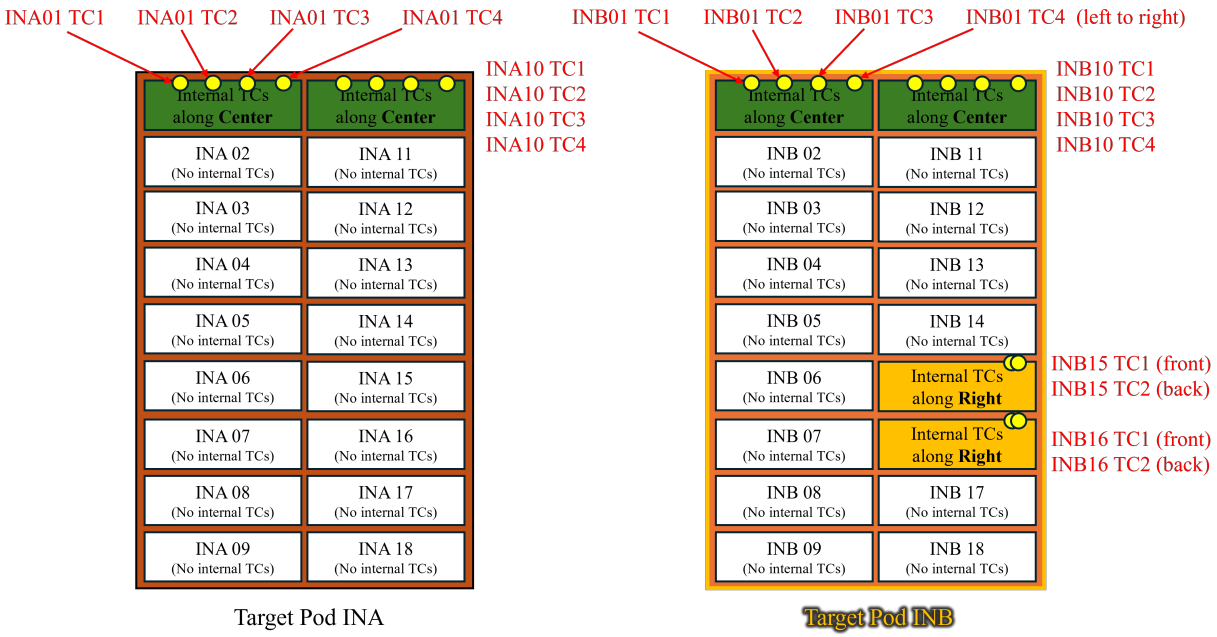
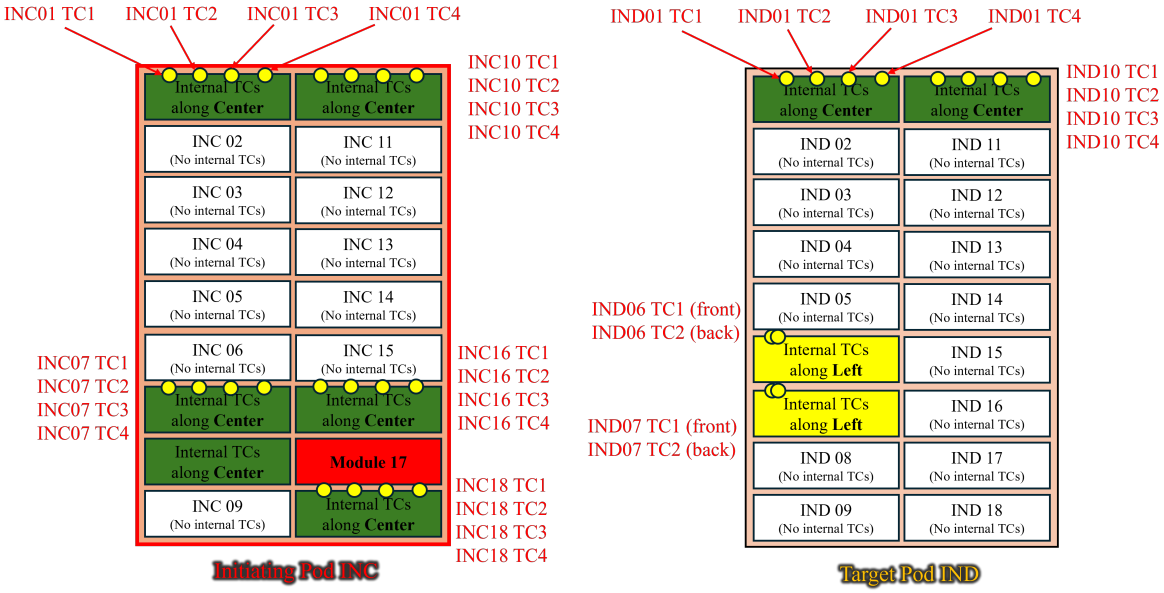


(a) Internal module TCs in Pods INA and INB.



(b) Internal module TCs in Pods INC and IND.

Figure 29: Locations of modules with internal TCs within Initiating BESS and associated naming conventions.

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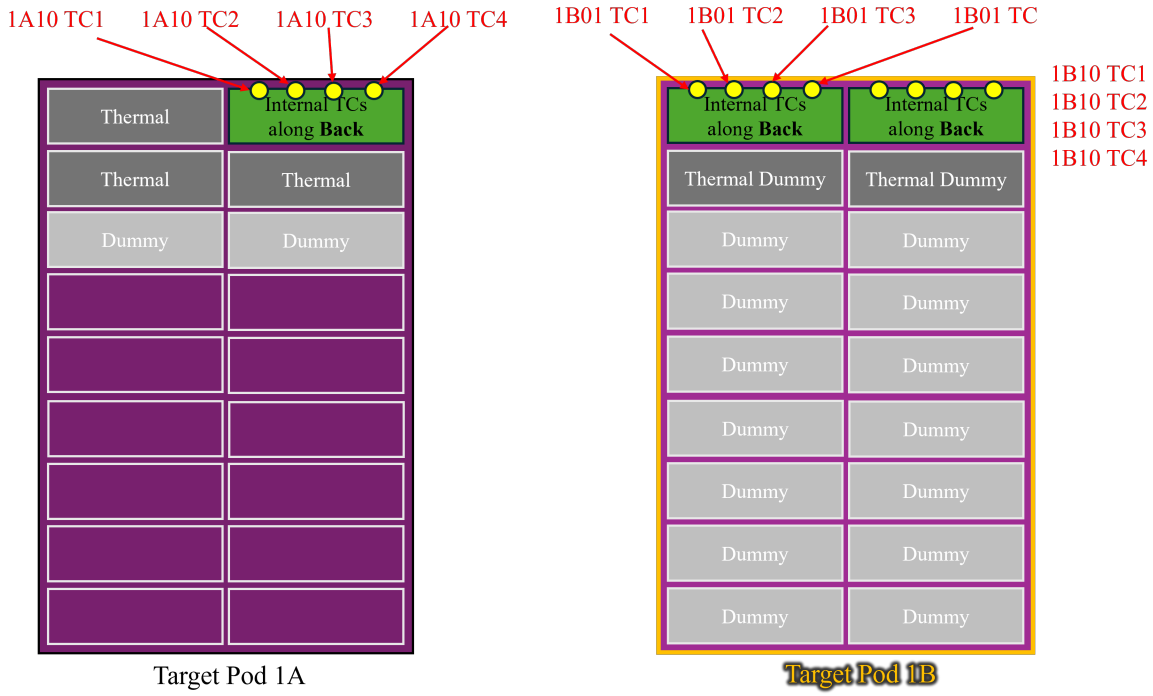
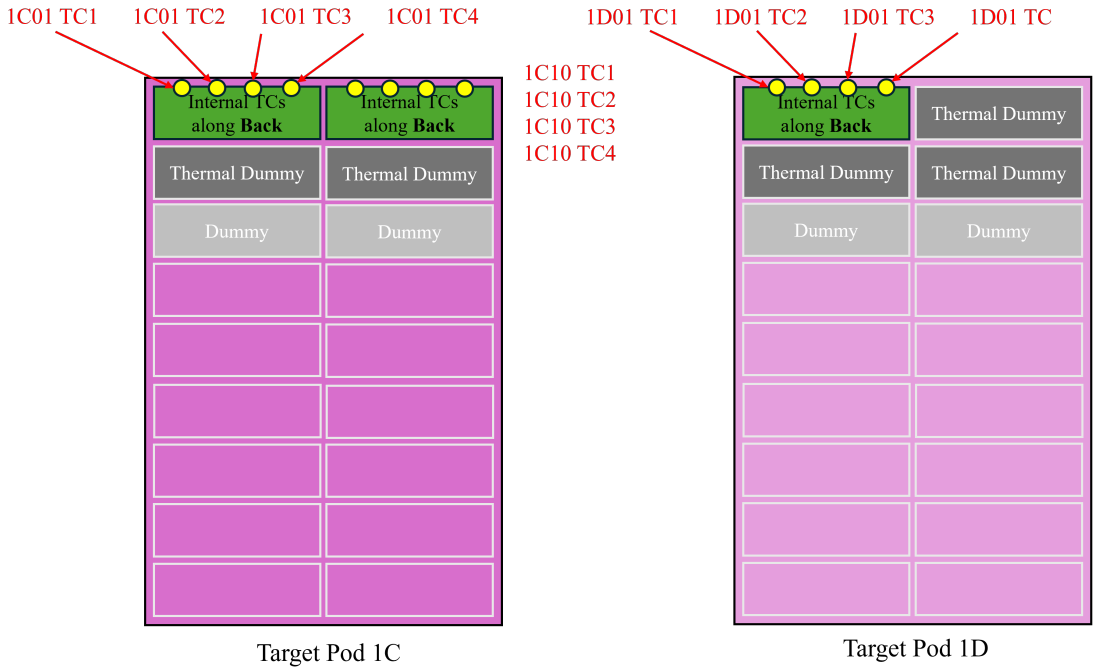


(a) Internal module TCs in Pods 1A and 1B.



(b) Internal module TCs in Pods 1C and 1D.

Figure 30: Locations of modules with internal TCs within Target BESS 1 and associated naming conventions.

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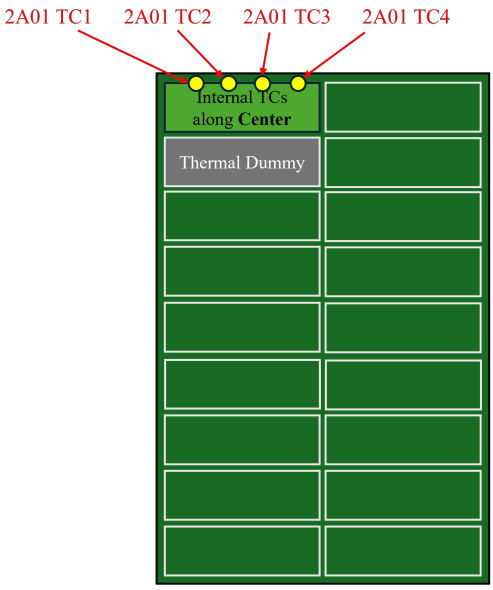
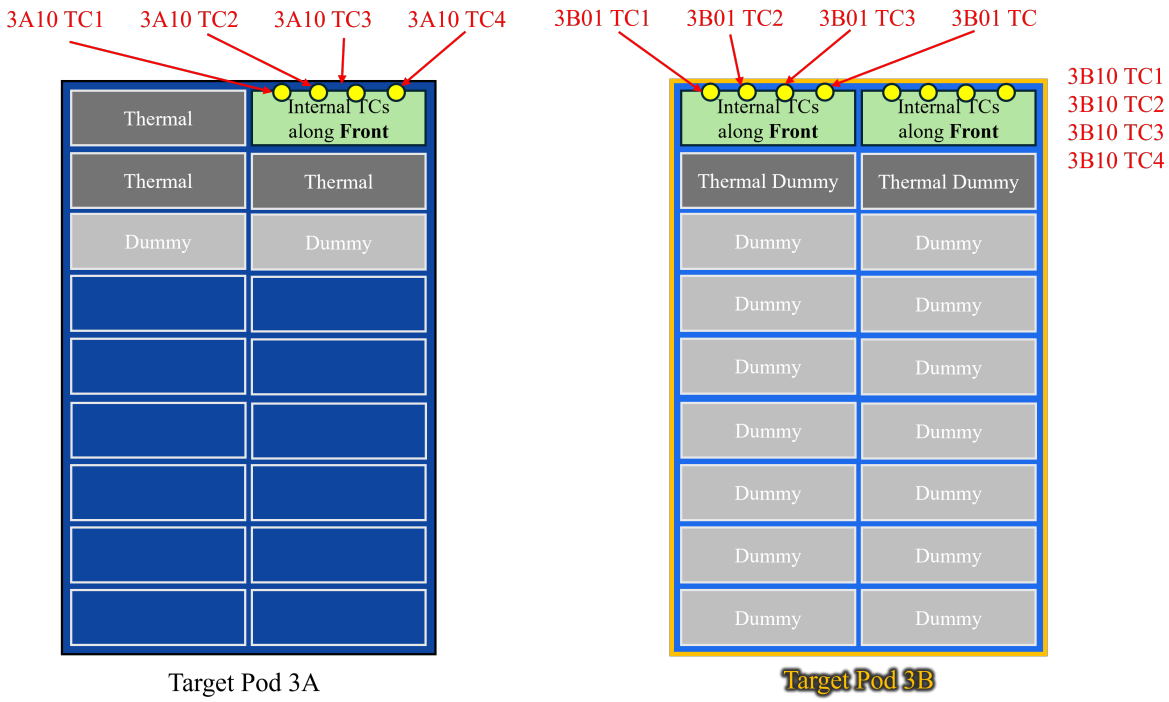


Figure 31: Locations of modules with internal TCs within Target BESS 2 and associated naming conventions.



(a) Internal module TCs in Pods 3A and 3B.

Figure 32: Locations of modules with internal TCs within Target BESS 3 and associated naming conventions.

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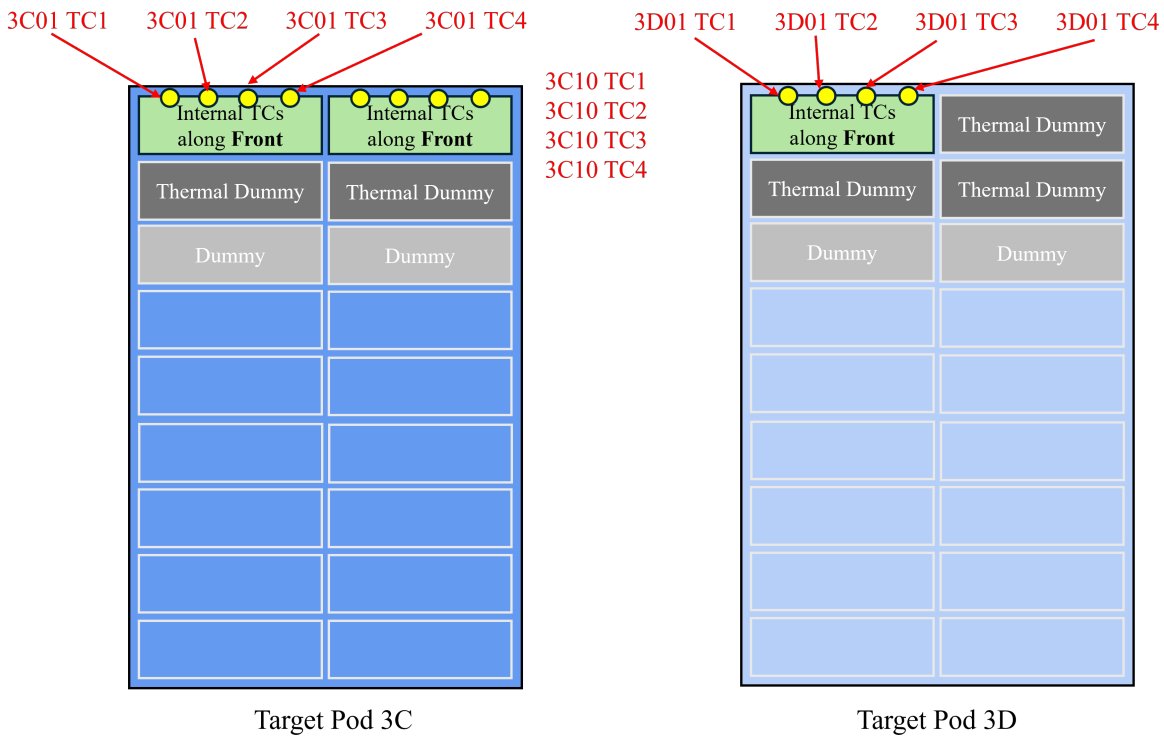

(b) Internal module TCs in Pods 3C and 3D.

Figure 32: Locations of modules with internal TCs within Target BESS 3 and associated naming conventions (continued).

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5 Test Results

The following subsections contain details pertaining to pre-test charging, observations made during testing, collected data, calculated values, and damage evaluation for the documented LSFT.

5.1 Charging Summary

Prior to testing, the 72 complete modules within the Initiating BESS were charged according to the manufacturer's specifications and were tested for verification of the 100% SOC requirement just before the initiation of the test. Table 7 shows the charge voltage of each module in the Initiating BESS prior to test start.

Table 7: Pre-test module voltages in Initiating BESS.

Pod INA			
Mod	Voltage	Voltage	Mod
1	355.53 V	351.48 V	10
2	351.98 V	349.13 V	11
3	352.65 V	349.62 V	12
4	351.44 V	352.64 V	13
5	349.38 V	353.85 V	14
6	357.35 V	355.63 V	15
7	353.34 V	349.86 V	16
8	351.51 V	350.62 V	17
9	352.32 V	353.63 V	18

Pod INB			
Mod	Voltage	Voltage	Mod
1	356.77 V	357.76 V	10
2	355.79 V	351.45 V	11
3	352.53 V	355.10 V	12
4	356.59 V	353.92 V	13
5	349.80 V	348.38 V	14
6	350.05 V	349.76 V	15
7	354.11 V	348.94 V	16
8	349.47 V	352.59 V	17
9	353.27 V	351.29 V	18

Pod INB			
Mod	Voltage	Voltage	Mod
1	351.31 V	357.06 V	10
2	353.62 V	353.50 V	11
3	357.44 V	354.14 V	12
4	353.47 V	351.11 V	13
5	353.17 V	351.16 V	14
6	352.13 V	353.78 V	15
7	355.47 V	351.69 V	16
8	354.28 V	354.86 V	17
9	359.34 V	351.88 V	18

Pod IND			
Mod	Voltage	Voltage	Mod
1	354.27 V	353.87 V	10
2	350.36 V	354,48 V	11
3	348.48 V	354.03 V	12
4	348.87 V	351.22 V	13
5	351.16 V	350.66 V	14
6	354.25 V	354.44 V	15
7	352.50 V	351.25 V	16
8	352.76 V	353.00 V	17
9	350.42 V	351.62 V	18

5.2 Test Overview

The LSFT for the Smartstack BESS was initiated at 14:23:51 MST on December 10, 2025. Being the start of the test, this time is considered to be relative time 00:00:00. At a relative time of 00:01:26 (86 s), a sustained, air-propane mix flame composed of 30 SLPM of air and 2 SLPM of propane, providing an air-to-fuel ratio of 15:1 by mass, was applied to Module 06 in Pod INC of the Initiating BESS; the flame mixture was later increased to 60 SLPM air and 4 SLPM propane at 00:28:26 (1,713 s) to increase the heating rate. As a result of the external flame heating on the module, gases from inside Pod INC were visible at just 00:02:12 (132 s) relative time, and thermal runaway (TR) was later triggered at 00:40:36 (2,436 s) relative time, at which point, the external flame application was ceased. TR was observed to begin quickly propagating, with another instance of TR visible at 00:47:05 (2,825 s) relative time. Shortly after, at 00:52:34 (3,154 s) relative time, a third instance of TR was apparent, and the gases exuding from Pod INC began to darken in color. By 01:05:04 (3,904 s) relative time, the gases released from Pod INC had significantly darkened and external flames were visible.

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TR continued to propagate, and the external flames continued to grow until a peak heat flux of 14.6 kW/m^2 was achieved at 02:10:32 (7,832 s), as measured by HFG 20 located in the egress in front of the Initiating BESS. The external flames continued burning steadily due to subsequent TR propagation until 04:16:15 (15,375 s) relative time, at which point, the external flames were significantly reduced in size. TR propagation progressed slowly from this time, with larger external flames likely indicating another instance of TR and reductions in the size of the external flames likely indicating the times between TR events. At 06:03:21 (21,801 s) relative time, the external flames began dying out without subsequent resurgences, and by 08:18:26 (29,906 s) relative time, external flames were no longer present. Testing was terminated at 16:40:00 (60,000 s) after the start of the test.

A detailed recording of the summarized events are included in Table 8. Images of significant test events are included in Figure 33.

Table 8: Overview of test timeline and key events for LSFT.

Relative Time in h:mm:ss (and in s)	**Event**	**Description**
00:00:00 (0 s)	Test start	Official test start; data acquisition begins
00:01:26 (86 s)	Burner applied	Burner initiated at 30 standard liters per minute (SLPM) air and 2 SLPM propane mixture; applied to module INC 06 (Figure 33a)
00:02:12 (132 s)	External gases visible	Gases external to Pod INC are visible for the first time (Figure 33b)
00:28:26 (1,706 s)	Increased fuel	Increase burner fuel to 60 SLPM air and 4 SLPM propane (Figure 33c)
00:28:33 (1,713 s)	Visible flaming	Ignition of flaming outside burner in Pod INC (Figure 33d)
00:35:34 (2,134 s)	Accumulation of gas	Visible gas noticeably accumulating in Pod INC (Figure 33e)
00:40:35 (2,435 s)	Thermal runaway	Initial occurrence of thermal runaway resulting in large release of energy in Pod INC (Figure 33f)
00:40:36 (2,436 s)	Burner turned off	Fuel flow from burner reduced to zero; flame present in Pod INC is now self sustaining (Figure 33g)
00:40:39 (2,439 s)	Increase in exterior gases	Increase in gases released from Pod INC (Figure 33h)
00:46:25 (2,785 s)	Thermal runaway	Secondary thermal runaway event in Pod INC (Figure 33i)
00:47:05 (2,825 s)	Thermal runaway	Third thermal runaway event in Pod INC; internal camera damaged, cutting video feed (Figure 33j)
00:51:21 (3,081 s)	Gas sample probe repositioned	Gas sampling probe relocated to follow smoke plume; approximate new location is 4 ft above Pod INC (Figure 33k)
00:52:34 (3,154 s)	Thermal runaway; off-gases darken	TC measured instance of TR in module INC 07 (Figure 35); gases released to exterior of Pod INC darken in color (Figure 33l)
00:53:28 (3,208 s)	Thermal runaway	TC measured instance of TR in module INC 08 (Figure 36)
00:54:15 (3,255 s)	Thermal runaway	TC measured instance of TR in module INC 01 (Figure 34)

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Table 8 continued

Relative Time in h:mm:ss (and in s)	Event	Description
00:56:13 (3,373 s)	Energy release	Gases and flames escape from Pod INC through the inlet louver opening (Figure 33m)
00:58:27 (3,507 s)	Thermal runaway	TC measured instance of TR in module INC 10 (Figure 37)
01:00:53 (3,653 s)	Energy release	Door on lower left face of pod pops open allowing for flaming exterior to Pod INC (Figure 33n)
01:03:18 (3,798 s)	Thermal runaway	TC measurable instances of thermal runaway that occur in quick succession in modules INC 01 through INC 10 (Figures 42a and 42b)
01:03:20 (3,800 s)	Sparking	Sparks fly from open door and inlet louver opening (Figure 33o)
01:05:04 (3,904 s)	Visible flaming	Flames protrude from various openings on Pod INC, including the open door and inlet louver opening on the front face and the NFPA 69 vent opening on the top face (Figure 33p)
01:05:39 (3,939 s)	Gas sample probe repositioned	Gas sampling probe relocated to follow smoke plume; approximate new location is 15 ft above Pod INC; probe location subsequently continues to follow smoke plume as needed (Figure 33q)
01:19:43 (4,783 s)	Thermal runaway	TC measurable instance of thermal runaway in module INC 12 (Figure 42b)
01:20:27 (4,827 s)	Thermal runaway	TC measurable instance of thermal runaway in module INC 14 (Figure 42b)
01:26:20 (5,180 s)	Thermal runaway	TC measurable instance of thermal runaway in module INC 11 (Figure 42b)
01:33:53 (5,633 s)	Full flaming on Pod INC front face	External flames stemming from Pod INC indicate that TR has significantly propagated and flames have grown (Figure 33r)
01:38:02 (5,882 s)	Thermal runaway	TC measurable instance of TR in module INC 15 (Figure 38)
02:06:01 (7,561 s)	Thermal runaway	TC measurable instance of TR in module INC 16 (Figure 39)
02:10:32 (7,832 s)	Peak heat flux	Overall peak heat flux of 14.6 kW/m^2 measured by HFG 20 (Figures 80 and 33s)
04:16:15 (15,375 s)	External flames reducing	Visual appearance of external flames on Pod INC significantly reduced (Figure 33t)
04:22:23 (15,743 s)	Thermal runaway	TC measurable instance of thermal runaway in module INC 17 (Figures 42b and 33u)
04:32:42 (16,362 s)	External flames reducing	Visual appearance of external flames on Pod INC significantly reduced (Figure 33v)
04:41:50 (16,910 s)	External flames increasing	Likely a TR event causing visual appearance of external flames on Pod INC increase in size; pattern of visible flames reducing in size and TR event causing them to resurge continues until 20:27:12 or 6:03:21 (21,801 s) relative time (Figure 33w)
05:16:40 (19,000 s)	Thermal runaway	TC measurable instance of thermal runaway in module INC 18 (Figure 42b)

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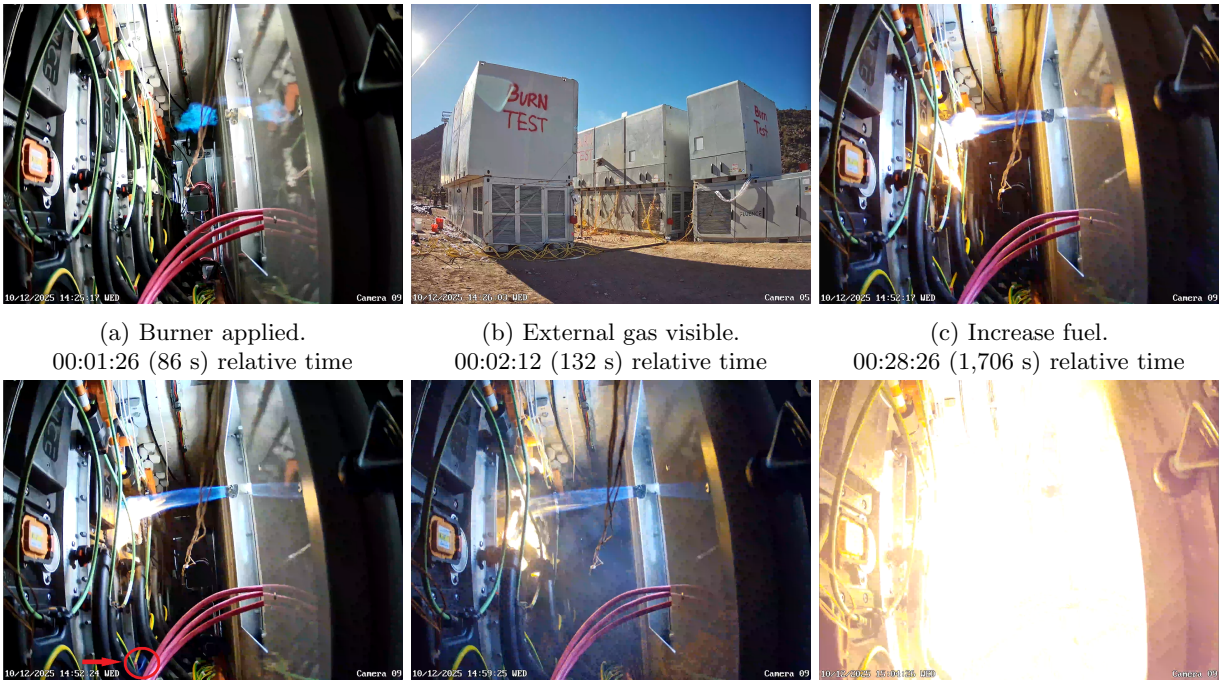
Table 8 continued

Relative Time in h:mm:ss (and in s)	Event	Description
05:18:45 (19,125 s)	Thermal runaway	Last TC measurable instance of TR in module INC 18 (Figure 41)
05:25:23 (19,523 s)	Gas collection end	Gas probe removed from gas plume, and gas collection ended for remainder of test (Figure 33x)
06:03:21 (21,801 s)	External flames start dying	Visual appearance of external flames on Pod INC significantly reduced with no subsequent resurgence for the remainder of the test. (Figure 33y)
08:18:26 (29,906 s)	No visible external flames	Flames no longer visible external to Pod INC (Figure 33z)
16:40:00 (60,000 s)	Test end	Data acquisition stopped; test considered complete
17:03:55 (61,435 s)	Last image	Last image taken of LSFT (Figure 33aa)



(a) Burner applied.
00:01:26 (86 s) relative time

(b) External gas visible.
00:02:12 (132 s) relative time

(c) Increase fuel.
00:28:26 (1,706 s) relative time

(d) Visible flaming.
00:28:33 (1,713 s) relative time

(e) Accumulation of gas.
00:35:34 (2,134 s) relative time

(f) Thermal runaway.
00:40:35 (2,435 s) relative time

Figure 33: Sequential images corresponding to test timeline and key events for LSFT.

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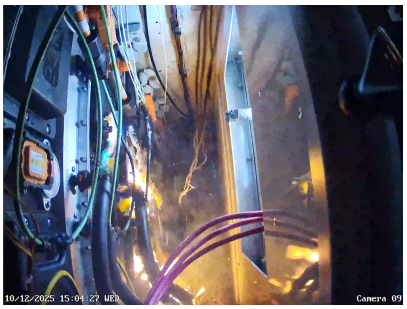
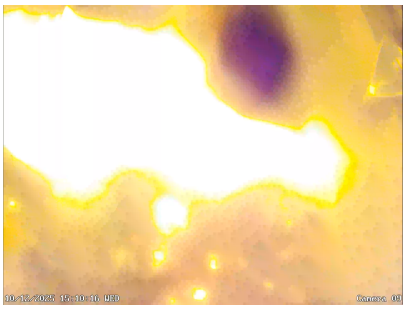


(g) Burner turned off.
00:40:36 (2,436 s) relative time



(h) Increase in off-gassing.
00:40:39 (2,439 s) relative time



(i) Thermal runaway.
00:46:25 (2,785 s) relative time



(j) Thermal runaway.

00:47:05 (2,825 s) relative time



(k) Gas sample probe repositioned.

00:51:21 (3,081 s) relative time



(l) Thermal runaway and off-gases darken.
00:52:34 (3,154 s) relative time



(m) Energy release.
00:56:13 (3,373 s) relative time



(n) Energy release.
01:00:53 (3,653 s) relative time



(o) Sparking.
01:03:20 (3,800 s) relative time



(p) Visible flaming.

01:05:04 (3,904 s) relative time



(q) Gas sample probe repositioned.

1:05:39 (3,939 s) relative time



(r) Full flaming on Pod INC front face.
01:33:53 (5,633 s) relative time

Figure 33: Sequential images corresponding to test timeline and key events for LSFT (continued).

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(s) Peak heat flux.
02:10:53 (7,853 s) relative time

(t) External flames reducing.
04:16:15 (15,375 s) relative time

(u) Thermal runaway.
04:22:23 (15,743 s) relative time

(v) External flames reducing.
04:32:42 (16,362 s) relative time

(w) External flames increasing.
04:41:50 (16,910 s) relative time

(x) Gas collection end.
05:25:23 (19,523 s) relative time

(y) External flames start dying.
06:03:21 (21,801 s) relative time

(z) External flames no longer visible.
08:18:26 (29,906 s) relative time

(aa) Last image.
17:03:55 (61,435 s) relative time

Figure 33: Sequential images corresponding to test timeline and key events for LSFT (continued).

5.3 Temperature Results

The temperature measurement locations were described in Section 4.2.4, and the resulting plots of temperature data are shown in Figures 34 to 71. The first temperature measurements presented are those in the Initiating BESS, starting with the TC measurements taken internal to the modules in Pod INC followed by the TC measurements taken on the external surfaces of the modules in Pod INC. The internal and external module temperatures each of Pods IND, INB, and INA are presented next, completing the presentation of all temperature measurements in the Initiating BESS. Temperatures measured in and on Target BESS 1 are next, with temperature measurements progressing from internal (*i.e.* on the interior and exterior surfaces of the modules within the Pods) for Pods 1A through 1D to external (*i.e.* on the exterior of Target BESS 1). The temperature measurements for Target BESS 2 and Target BESS 3 are presented in the same order. Finally, the temperature measurements on the Target Wall and at the egresses are presented.

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5.3.1 Initiating BESS

Within Pod INC of the Initiating BESS, various instances of TR were measured throughout the LSFT, as previously summarized in Table 8. The first TC measurable instance of TR occurred at 00:52:34 (3,154 s) relative time in module INC 07, as shown in Figure 35 followed shortly by TC measurable instances of TR in modules INC 08, 01, and 10 at relative times of 00:53:28 (3,208 s), 00:54:15 (3,255 s), and 00:58:27 (3,507 s), respectively, as shown in Figures 36, 34, and 37, respectively.

The distinction of "TC measurable instance of TR" is made here due to the fact that the first three instances of TR that were noted based on the video footage, as documented in Table 8 and Figures 33f, 33i,and 33j at relative times 00:40:35 (2,435 s), 00:46:25 (2,785 s), and 00:47:05 (2,825 s), respectively, did not have corresponding temperature spikes. This outcome is likely owed to there being a limited number of TCs in and on the modules, with the majority of modules having only one TC each on their exterior surfaces, as was the case for Module 06, where the burner flame was applied. Likely, the first several instances of TR occurred in this module or in neighboring Module 05, but were not picked up by either of their singular TCs.

At 01:03:18 (3,798 s) relative time, there appeared to be multiple instances of TR, as temperature spikes were observed across modules INC 01 through INC 10, as shown in Figure 42. Further instances of TR were measured at relative times of 01:19:43 (4,783 s), 01:20:27 (4,827 s), and 01:26:20 (5,180 s) based on external module temperatures in Pod INC, as shown in Figure 42b, and two more instances of TR at relatives times of 01:38:02 (5,882 s), and 02:06:01 (7,561 s) based on internal module temperatures in Pod INC, as shown in Figures 38 and 39, respectively.

From this point, there are no clear TC measurable instances of TR for several hours, with last TC measurable instances in Pod INC occurring at relative times of 04:22:23 (15,743 s) and 05:16:40 (19,000), as shown in Figure 42b, and 05:18:45 (19,125 s), as shown in Figure 41. As such, TR propagation occurred throughout Pod INC for a minimum of 4.6 hours, with it being possible that further non-TC measurable instances of TC occurred beyond this time. During this time of TR propagation, the maximum temperatures measured both internal and external to the modules within Pod INC were 1,260°C or above, reaching the accuracy limit of the type-K TCs that were utilized for the LSFT.

Based on both the video footage and temperature measurements, TR did not propagate beyond Pod INC in the Initiating BESS. Evidence for this lack of Pod-to-Pod propagation is provided by the maximum temperature achieved outside of Pod INC, but still within the Initiating BESS, which was measured at 200.°C on the exterior surface of module IND 01, as shown in Figure 45b. This temperature was the only one measured on a module's exterior surface outside of Pod INC that exceeded the temperature threshold of 168.5°C, which was measured in previous UL 9540A cell-level testing [1] to be the temperature at which TR would occur for the cells utilized in the Smartstack. However, as shown in Figure 43, the maximum temperature achieved as measured by a TC located inside this module was only 64.8°C, which was over 100°C below this threshold.

The maximum temperatures measured inside Pods INA and INB were even lower, with the maximum exterior module temperatures in these Pods being 99.1°C (INA 02, Figure 47a) and 111.°C (INB 10, Figure 50b), respectively, and the maximum interior modules temperatures in these Pods being only 24.4°C (INA 01, Figure 46) and 60.1°C (INB 10, Figure 48), respectively.

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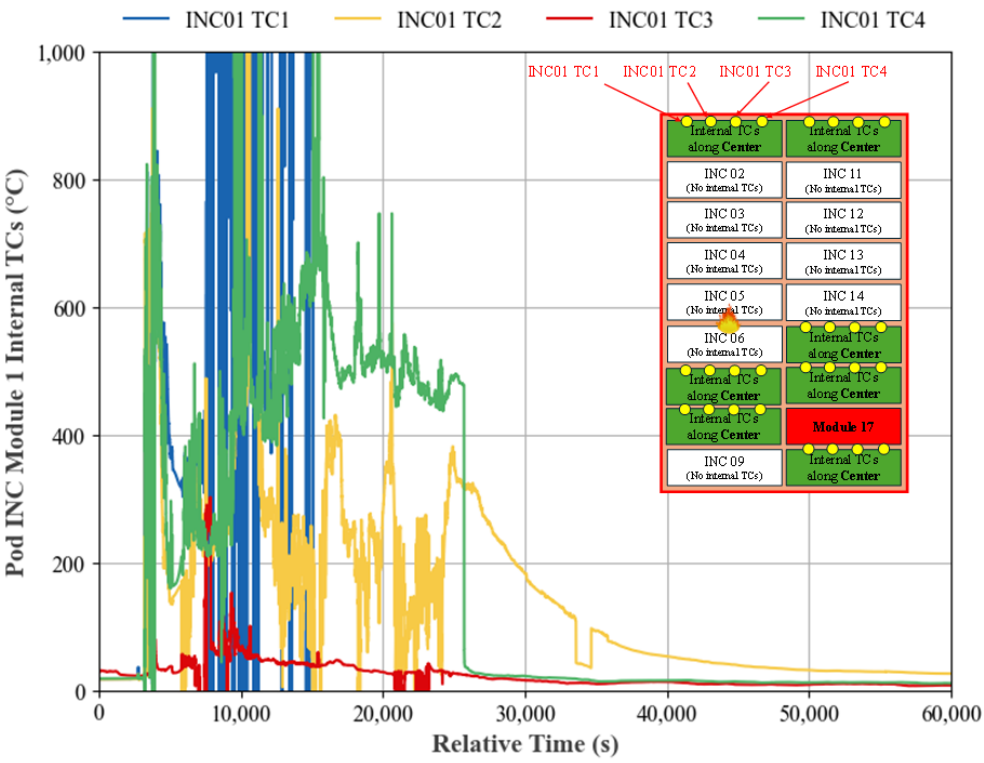

Figure 34: Module INC 01 internal temperature measurements.

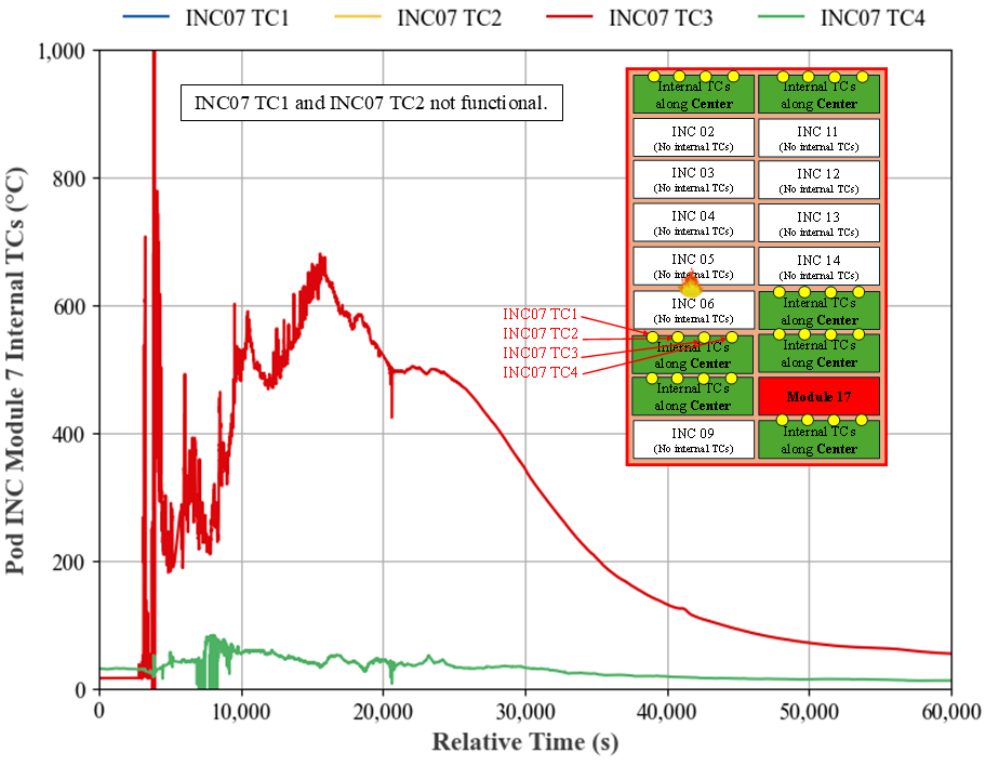

Figure 35: Module INC 07 internal temperature measurements.

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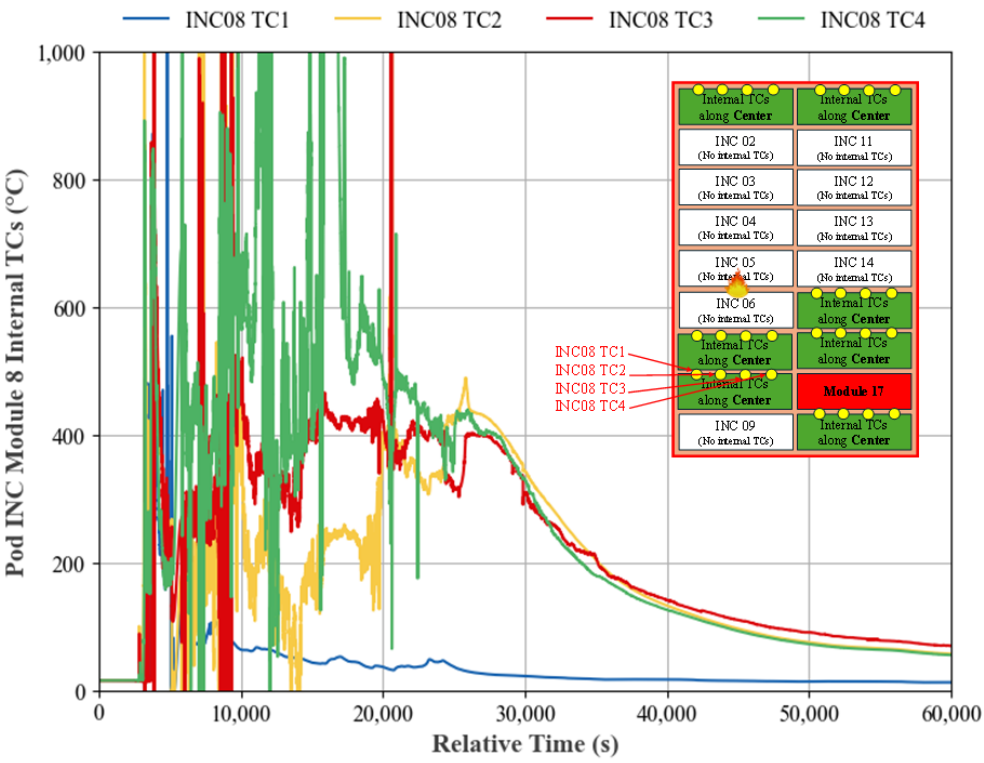

Figure 36: Module INC 08 internal temperature measurements.

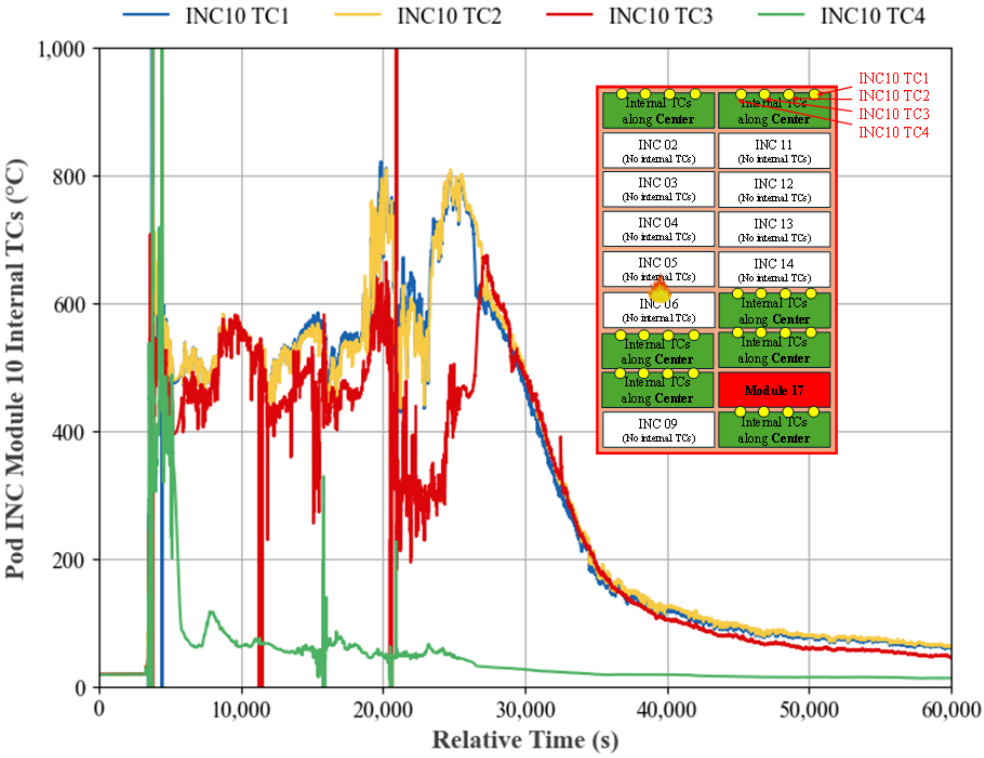

Figure 37: Module INC 10 internal temperature measurements.

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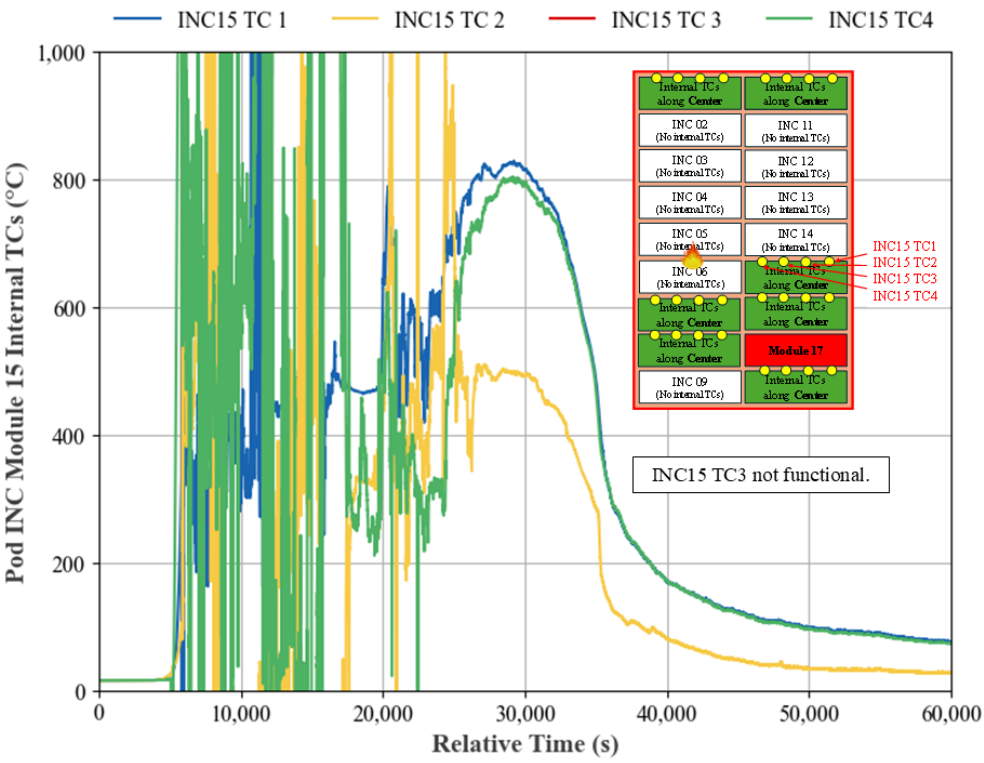

Figure 38: Module INC 15 internal temperature measurements.

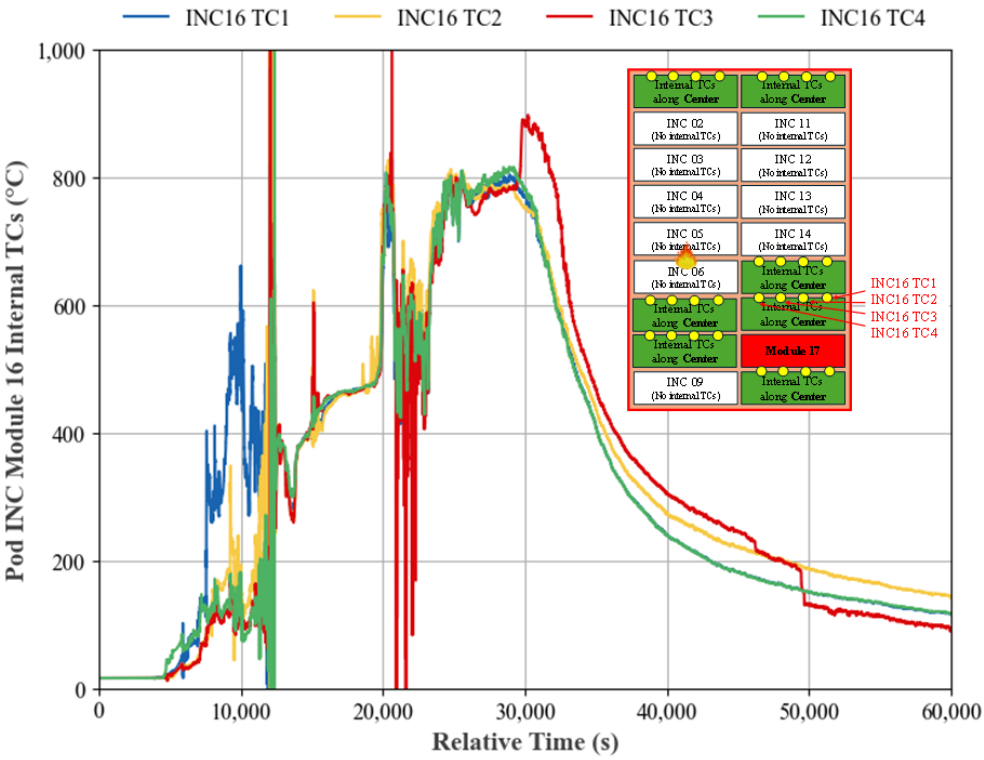

Figure 39: Module INC 16 internal temperature measurements.

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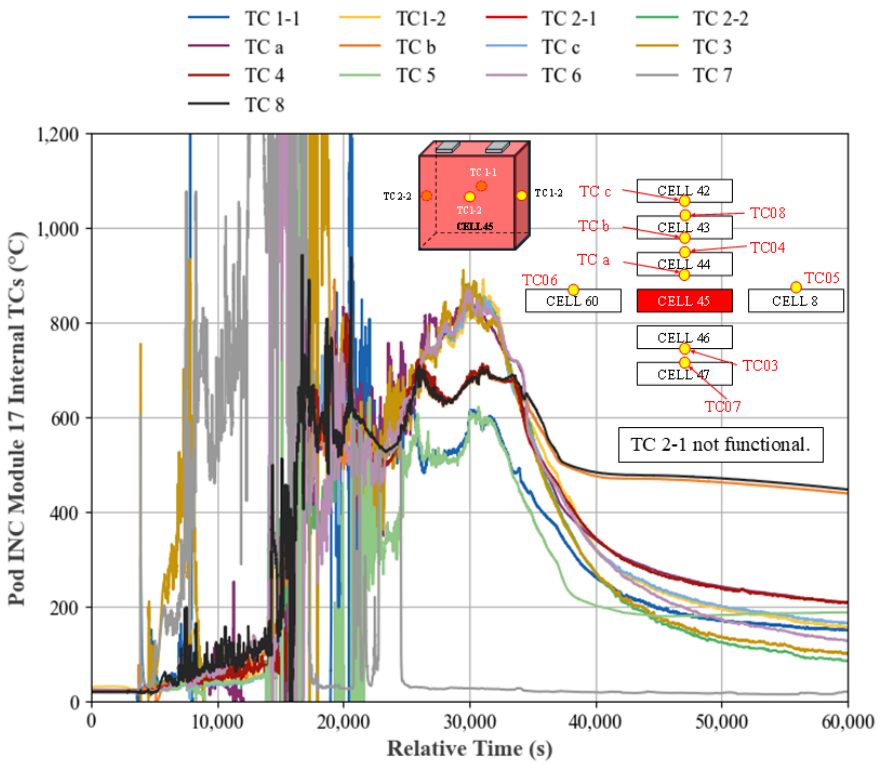

Figure 40: Module INC 17 internal temperature measurements.

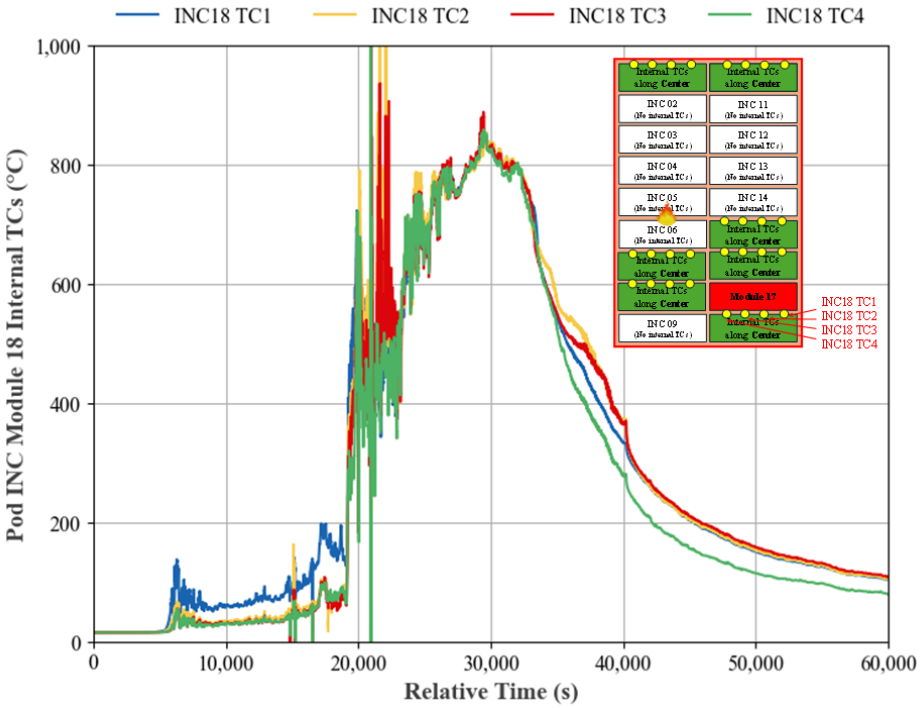

Figure 41: Module INC 18 internal temperature measurements.

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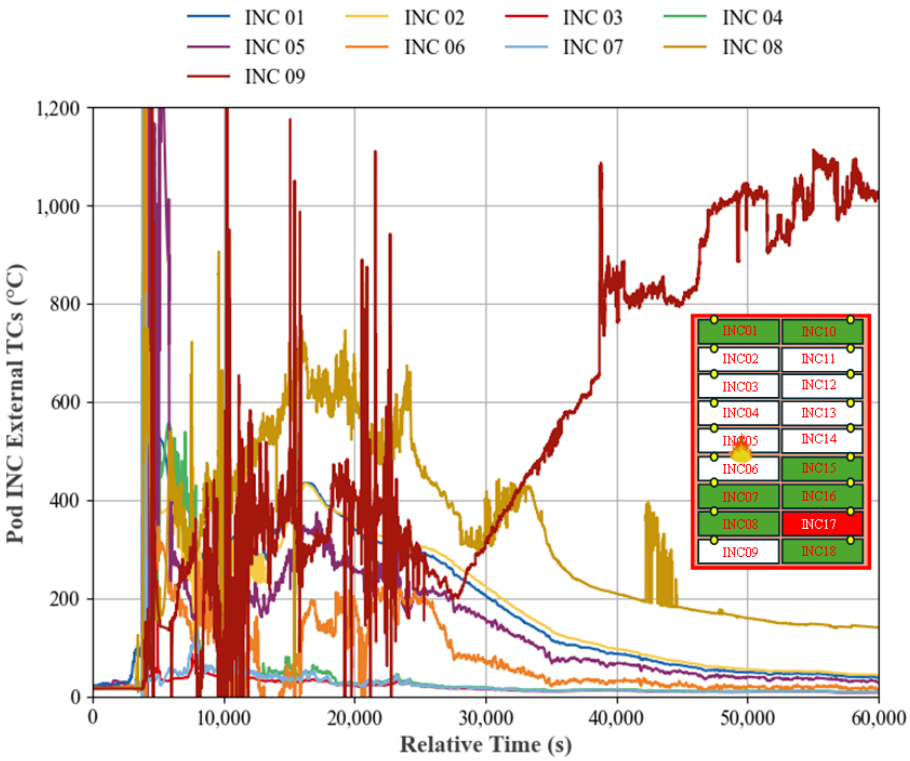
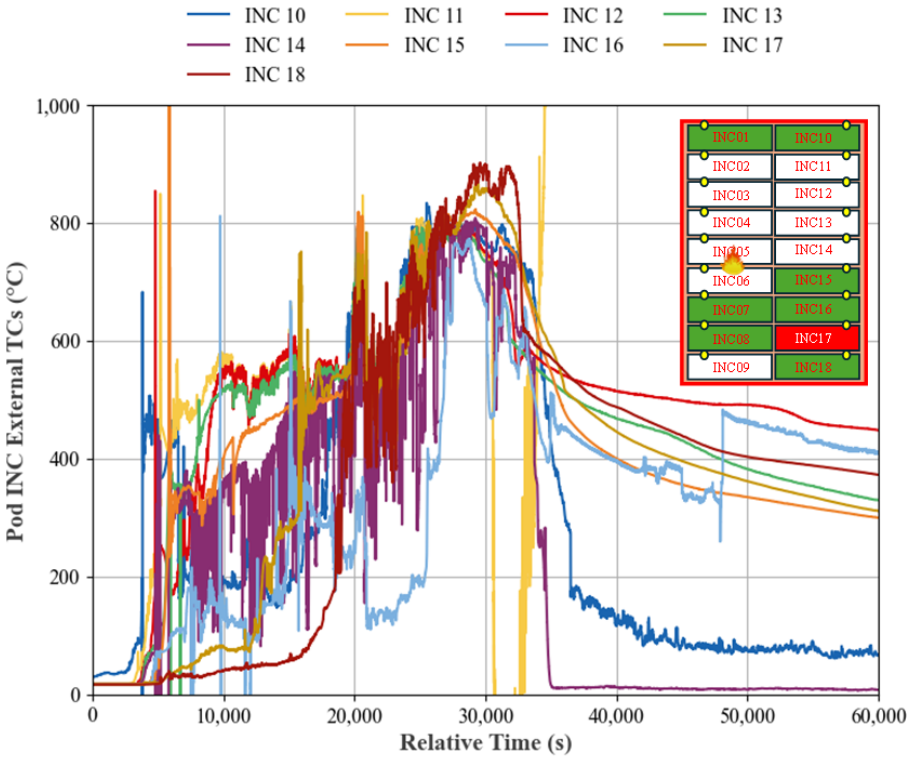


(a) Modules INC 01 to 09 external temperature measurements.



(b) Modules INC 10 to 18 external temperature measurements.

Figure 42: Pod INC temperature measurements on module external surfaces.

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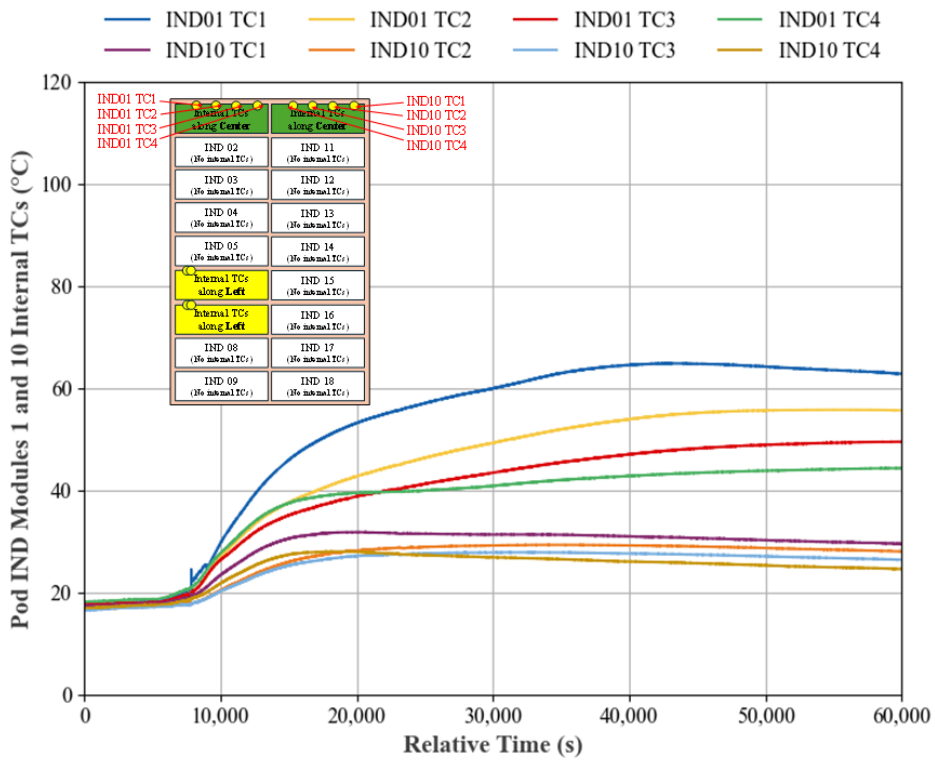

Figure 43: Modules IND 01 and 10 internal temperature measurements.

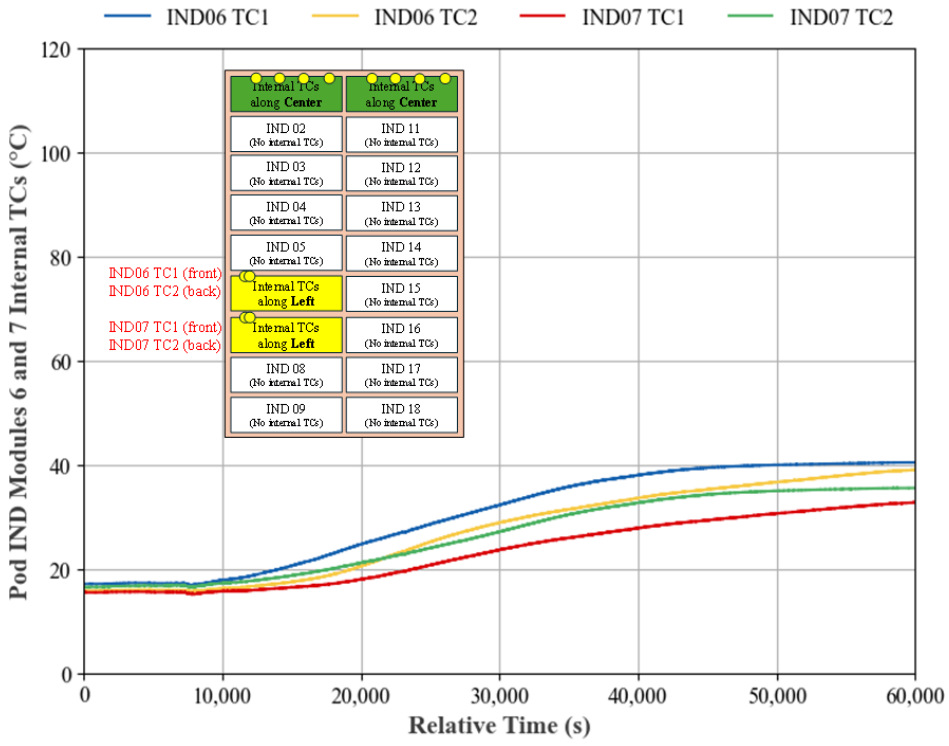

Figure 44: Modules IND 06 and 07 internal temperature measurements.

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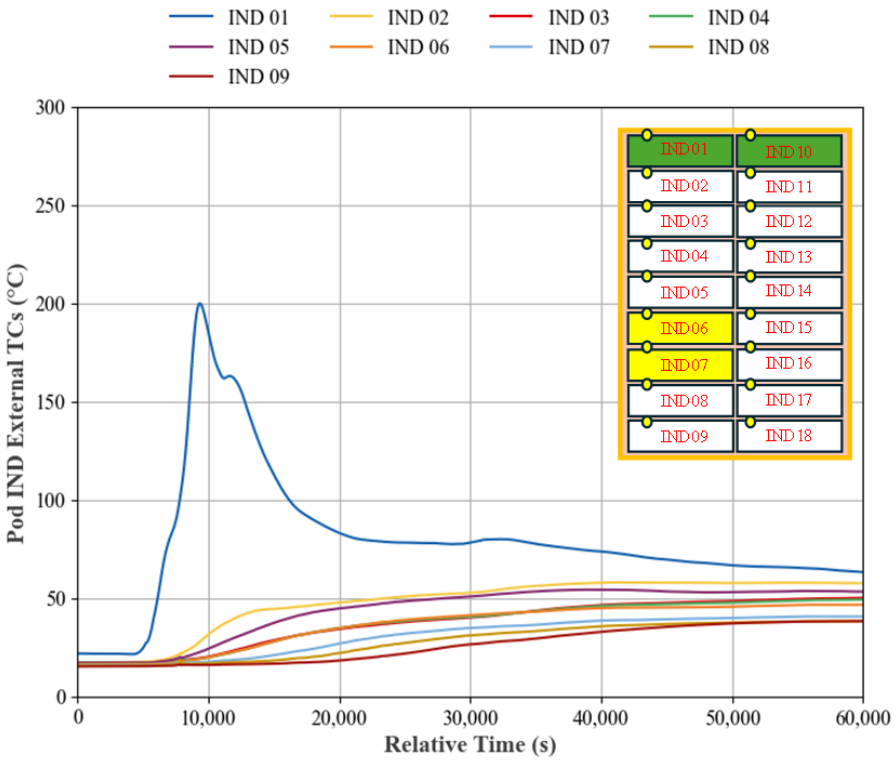
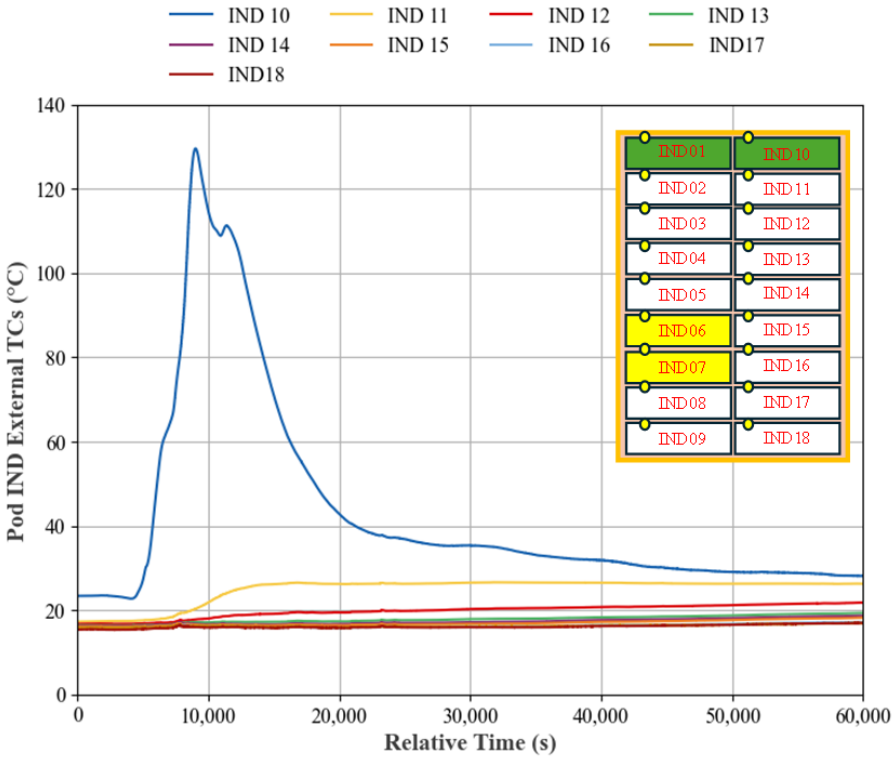


(a) Modules IND 01 to 09 external temperature measurements.



(b) Modules IND 10 to 18 external temperature measurements.

Figure 45: Pod IND temperature measurements on module external surfaces.

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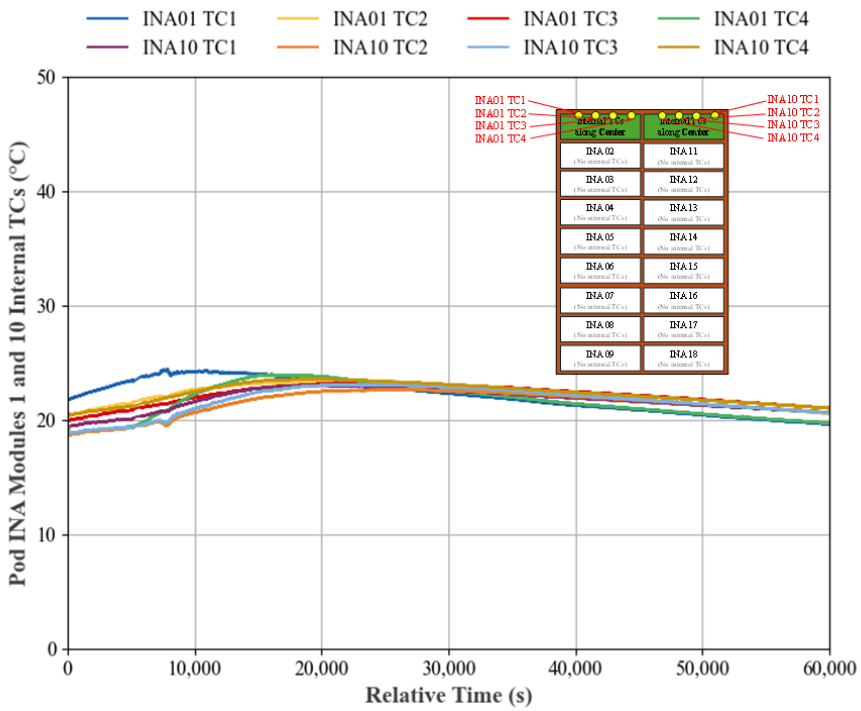
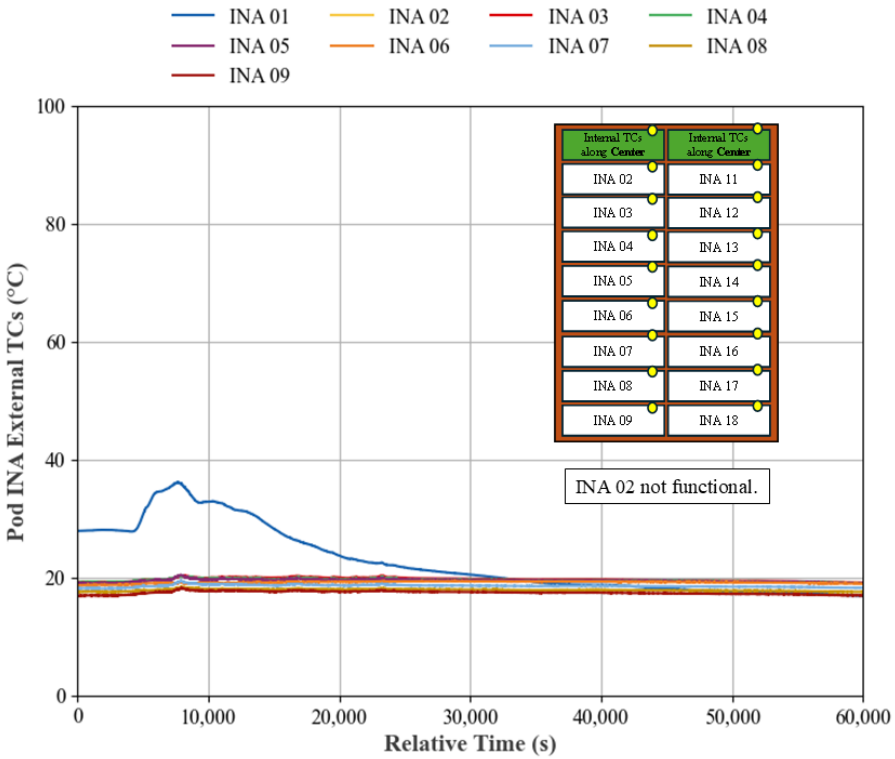


Figure 46: Modules INA 01 and 10 internal temperature measurements.



(a) Modules INA 01 to 09 external temperature measurements.

Figure 47: Pod INA temperature measurements on module external surfaces.

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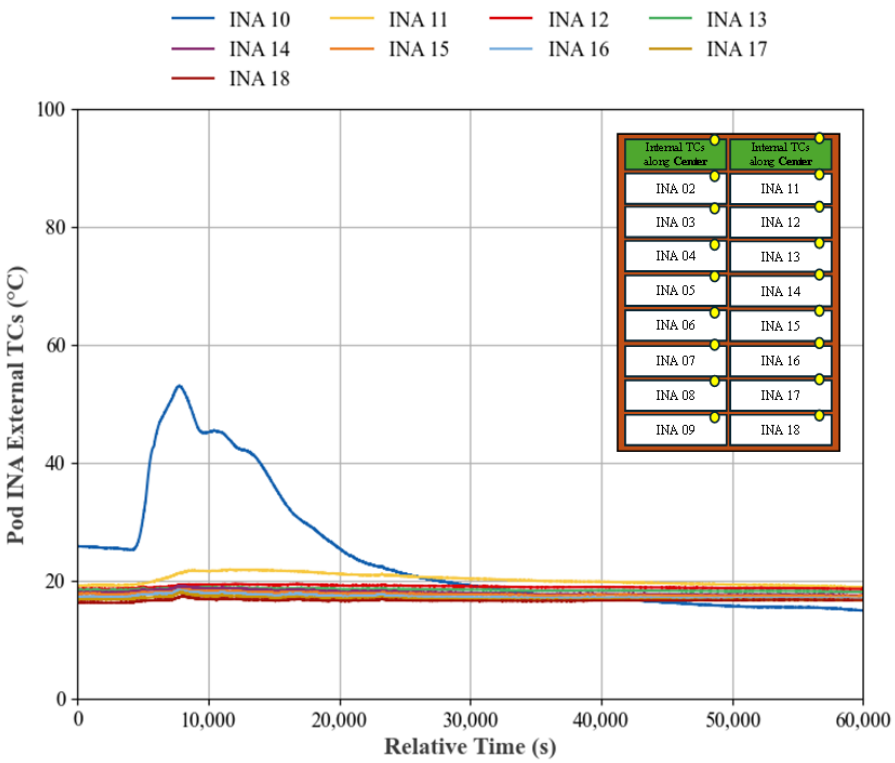

(b) Modules INA 10 to 18 external temperature measurements.

Figure 47: Pod INA temperature measurements on module external surfaces (continued).

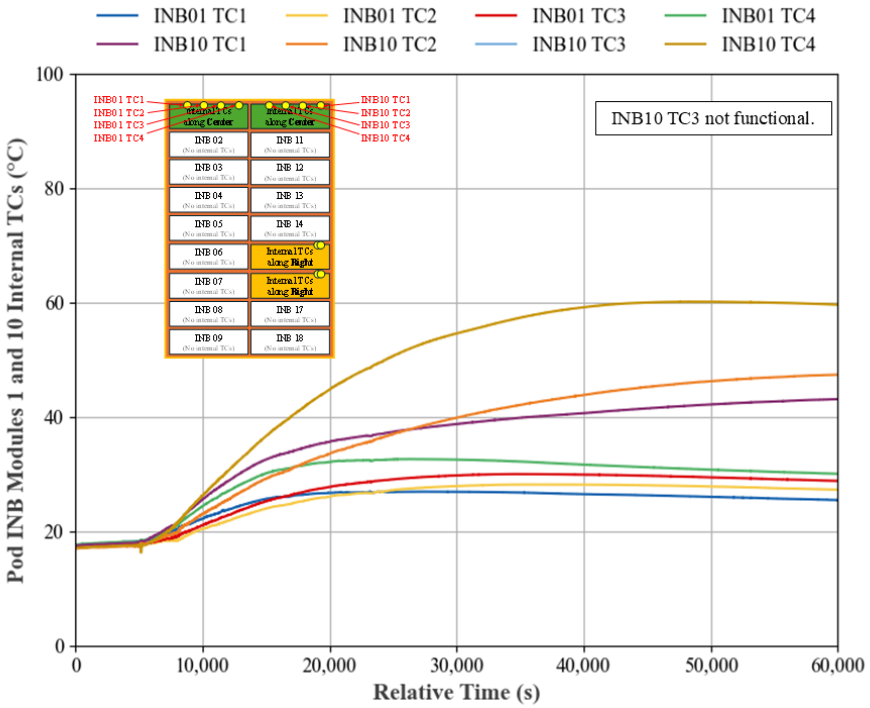

Figure 48: Modules INB 01 and 10 internal temperature measurements.

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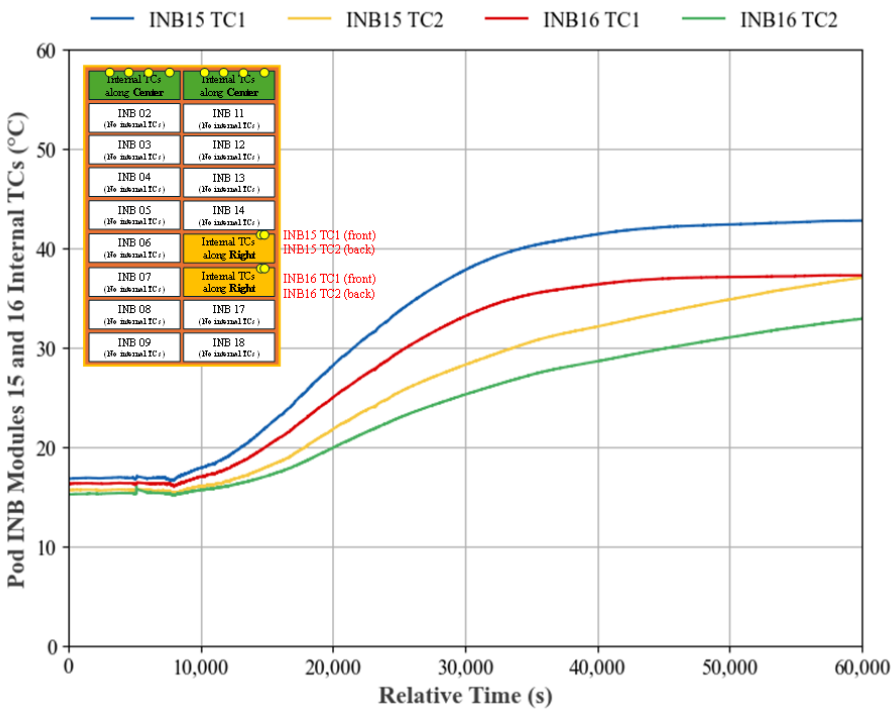
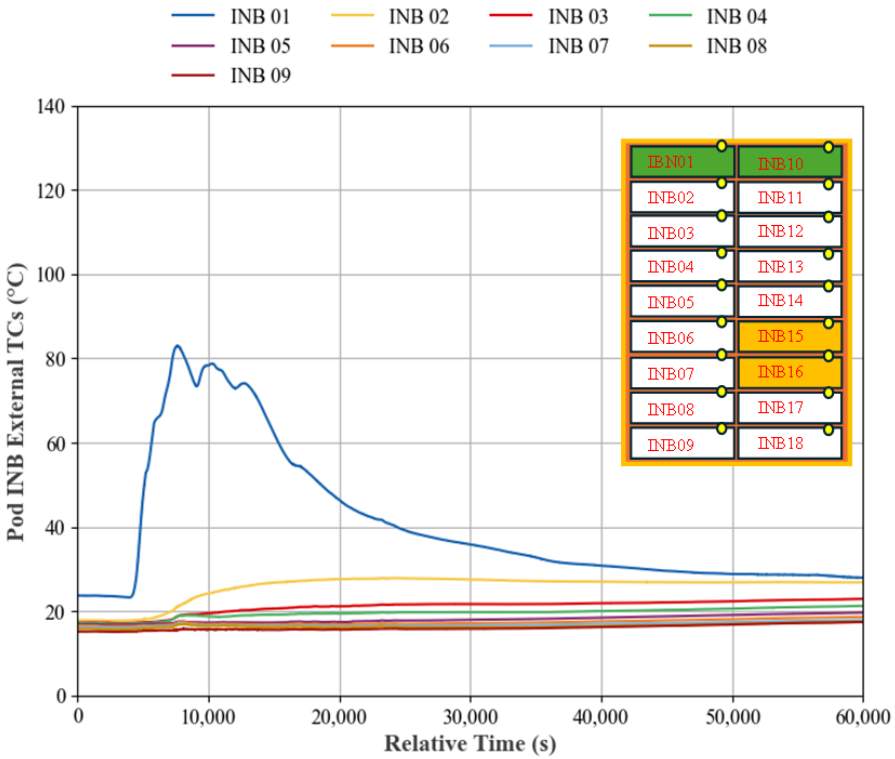


Figure 49: Modules INB 15 and 16 internal temperature measurements.



(a) Modules INB 01 to 09 external temperature measurements.

Figure 50: Pod INB temperature measurements on module external surfaces.

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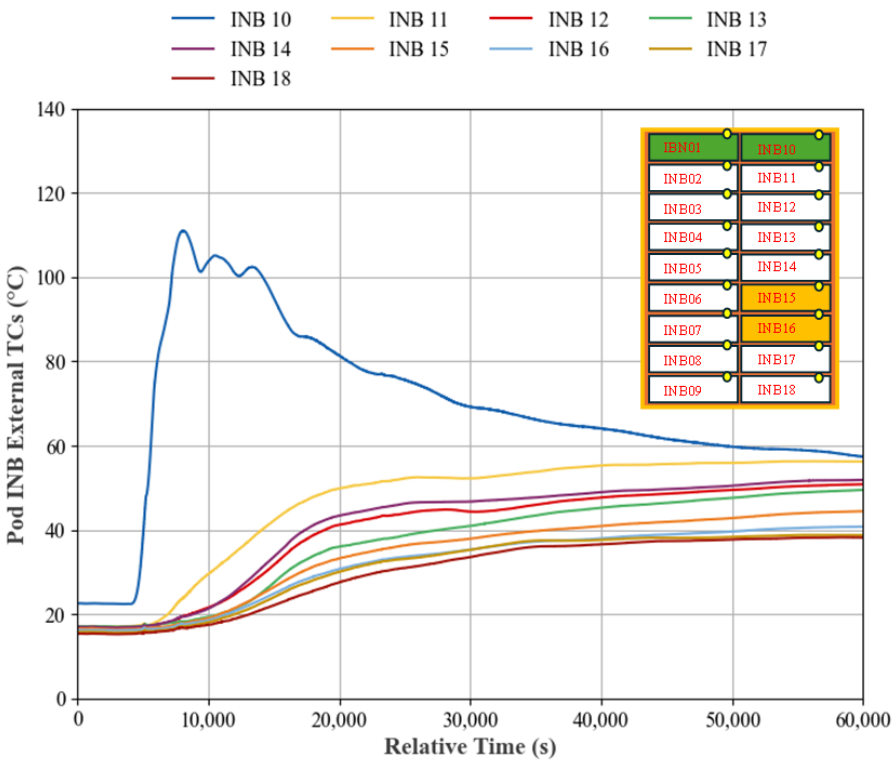

(b) Modules INB 10 to 18 external temperature measurements.

Figure 50: Pod INB temperature measurements on module external surfaces (continued).

5.3.2 Target BESS 1

For Target BESS 1, which was located back-to-back with the Initiating BESS, minor temperatures rises were present in all Pods as a result of the heat produced by TR propagation and the resulting fire in Pod INC on the Initiating BESS. As shown in Figure 51, Modules 01 and 10 in Pod 1A experienced a temperature rise due to heat transfer from Pod INC, but the maximum temperature between these two modules was only 78.1°C, as measured in Module 10, with its internal maximum temperature being even lower at 59.7°C. The other modules in Pod 1A did not exceed temperatures of 30°C.

In Pod 1B, temperatures measured internal to the modules did not exceed 40°C, with the maximum internal module temperature being measured at 34.6°C in Module 01, as shown in Figure 52. A slightly larger spike in temperature was observed on the external module surfaces in this Pod, as shown in Figure 53, with the maximum being measured at 64.0°C in Module 01, as shown in Figure 53a; however, this is even lower than the maximum temperature measured on the exterior module surfaces in Pod 1A.

For Pod 1C, significant temperature increases were only measured internally in Modules 01 and 10, with no elevated temperatures measured on the exterior of the modules. The maximum internal module temperature was measured at 47.8°C in Module 01, as shown in Figure 54, and the maximum exterior module temperature was measured at only 23.8°C in Module 02, as shown in Figure 55. The reason that the greater temperature increase was only apparent in the interior module temperature measurements is because, unfortunately, the TCs that were intended to be placed on the exterior of Modules 01 and 10 in Pod 1C were not provided; thus, no measurements were taken on those modules' exteriors. Presumably, because their internal temperatures were relatively high compared to the external temperatures measured on the other modules in this Pod, there would have been elevated temperatures measured on the exterior surface of Modules 01 and 10 had the

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instrumentation been included. However, from the measured data, it is still obvious that the temperatures measured in Pod 1C are overall low and nowhere near the threshold that might cause TR in these Pods.

The temperature measurements in Pod 1D show a similar story, with more elevated temperatures measured on Modules 01 and 10 compared to the other modules in the Pod. However, the overall temperature rise is the lowest compared to all the other Pods in Target BESS 1, with the maximum external module temperature being measured at just 29.2°, and the maximum internal module temperature measured at 34.7°C, as can be seen in Figure 56

Collectively, these temperature results show that the highest temperatures within the Pods of Target BESS 1 were consistently measured at the top of the Pods in either the Pod's corresponding Module 01 or Module 10. As such, it is clear that the heat transferred from Pod INC is rising to the top of the Pods in the target BESSs, creating the measured hot environment. Notably though, these temperature are not high enough to induce TR in any of the cells located in the target BESSs.

The temperatures measured on the exterior of Target BESS 1 reinforce the result of increased temperatures at higher positions on the modules. As previously described, an array of 26 TCs was installed on the exterior surface of Pod 1C, evenly spaced across its height. Figure 57a shows that the hightest temperature measured on the lower half of these arrays was less than 80°C throughout the test. Meanwhile, Figure 57b shows that the upper half of the TCs in this array reached much higher temperatures, with the maximum temperature measured here being 328°C. The temperature measurements that were taken alongside the HFGs installed on the exterior surface of Target BESS 1 also indicate increased temperatures on the elevated TCs, with the TCs at lower placements not measuring above ambient, and the TCs at the higher placements measuring a maximum temperature of 60.2°C (HF 03), as shown in Figure 58. It should also be noted that the TC which measured this maximum temperature alongside the HFGs was positioned such that it was closest to Pod INC and the fire.

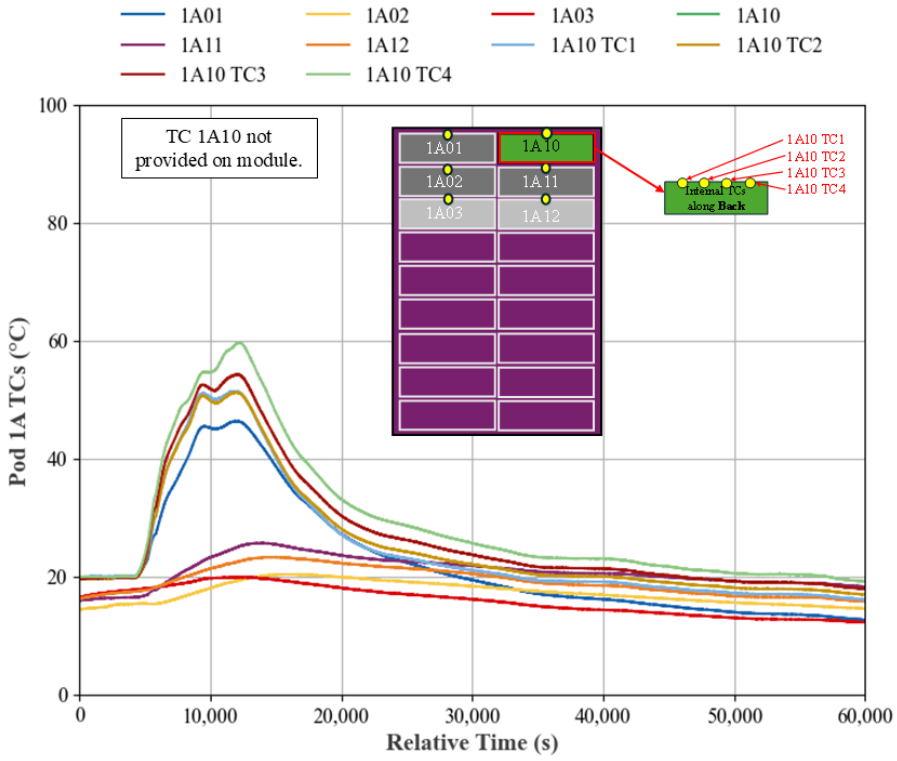

Figure 51: Module of Pod 1A internal and external temperature measurements.

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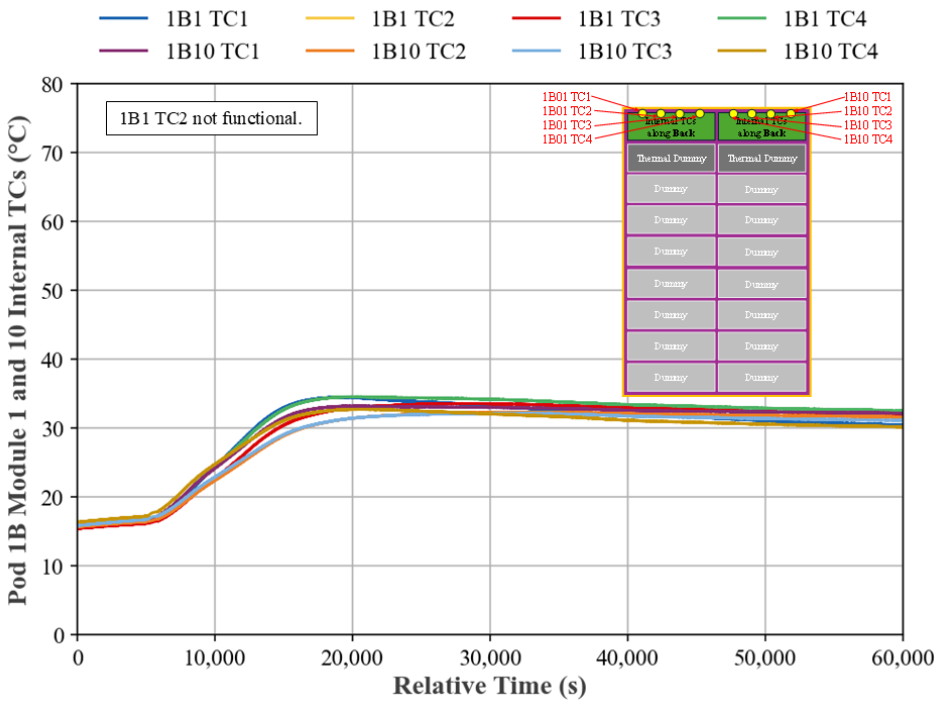
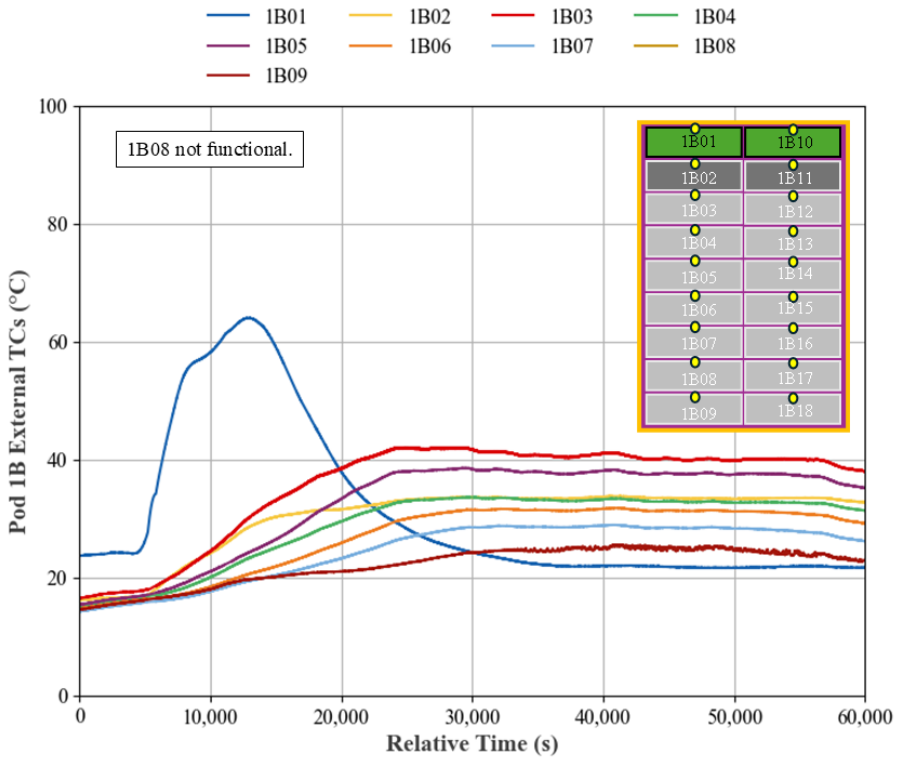


Figure 52: Modules 1B 01 and 10 internal temperature measurements.



(a) Modules 1B 01 to 09 external temperature measurements.

Figure 53: Pod 1B temperature measurements on module external surfaces.

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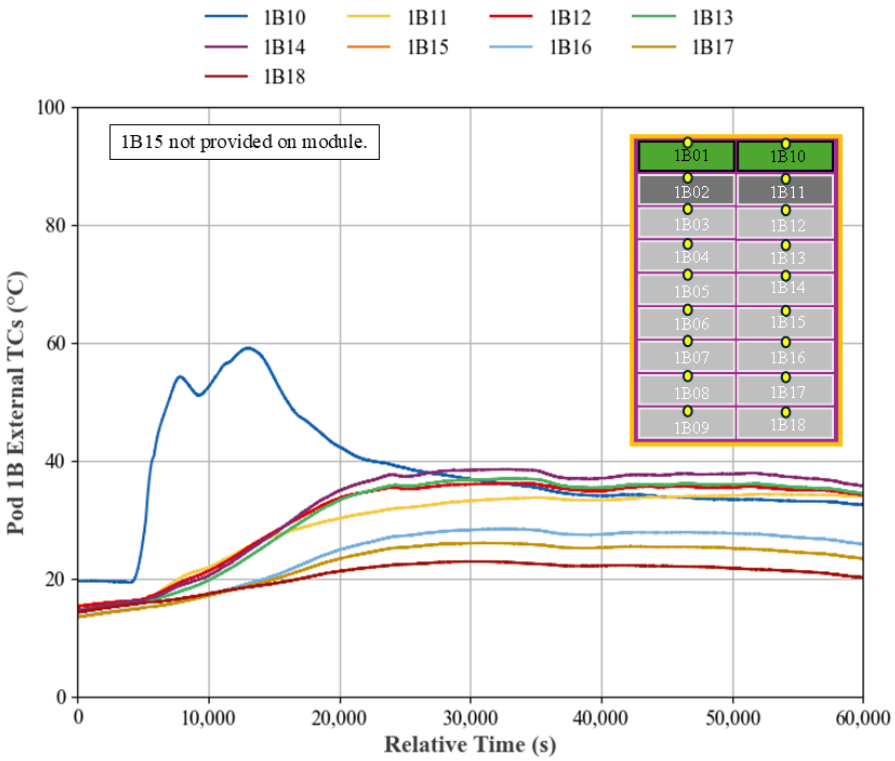

(b) Modules 1B 10 to 18 external temperature measurements.

Figure 53: Pod 1B temperature measurements on module external surfaces (continued).

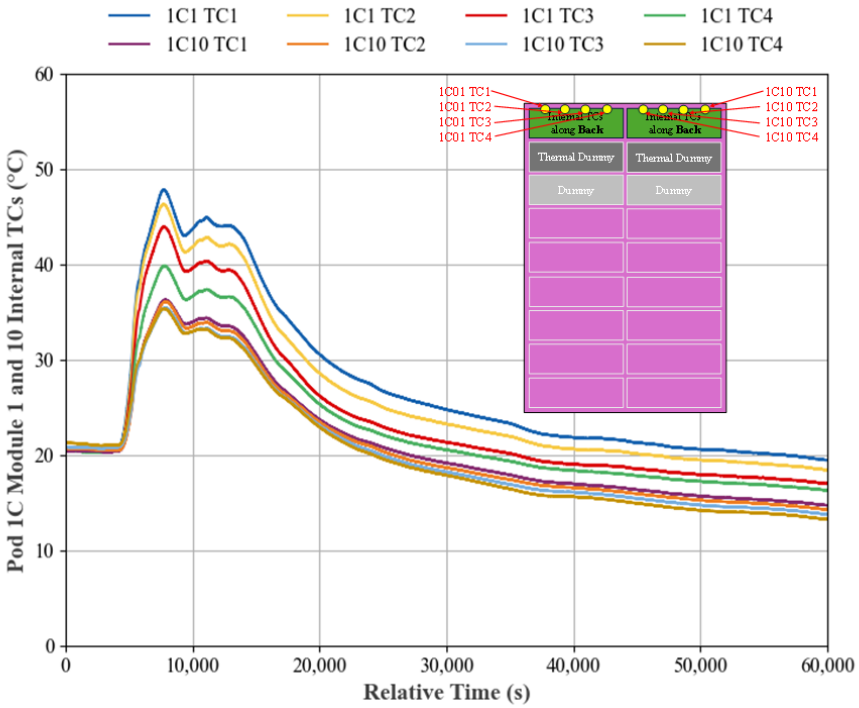

Figure 54: Modules 1C 01 and 010 internal temperature measurements.

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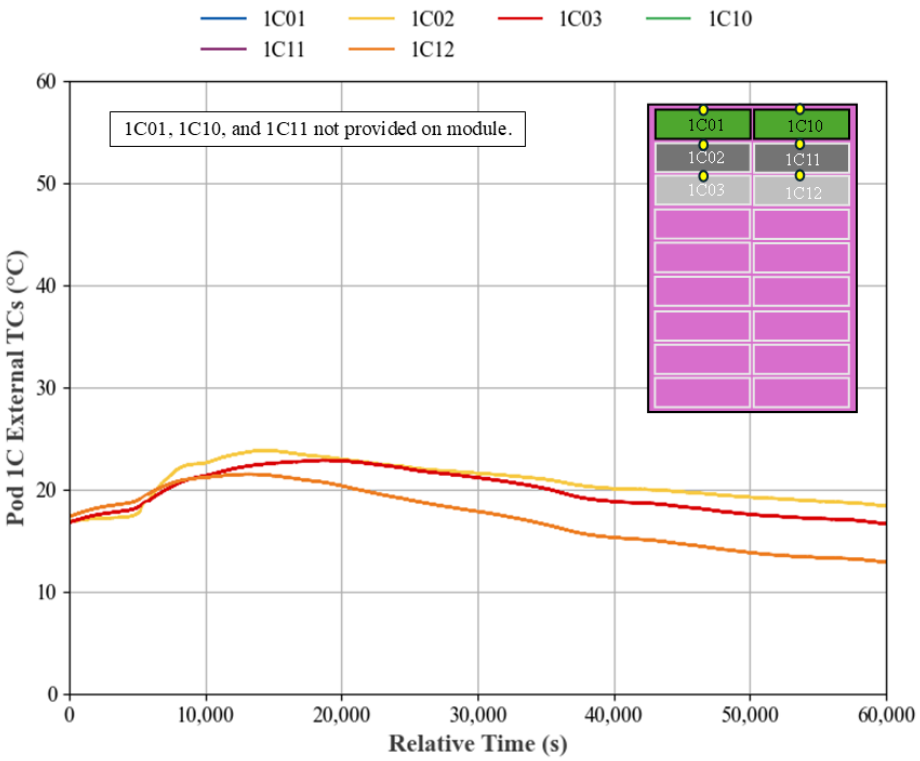

Figure 55: Pod 1C temperature measurements on module external surfaces.

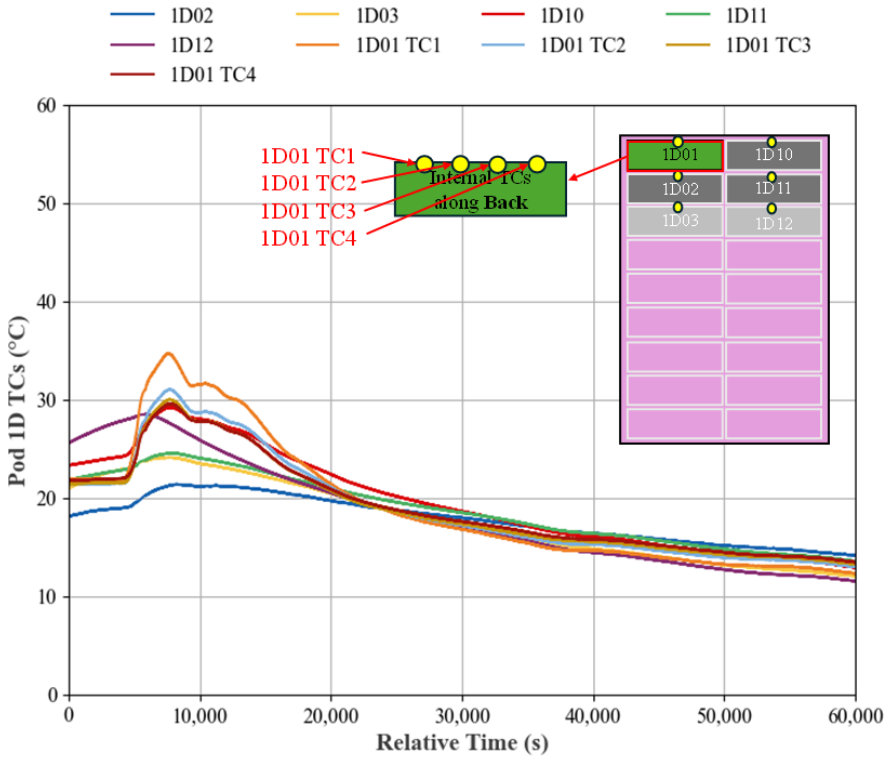

Figure 56: Modules of Pod 1D internal and external temperature measurements.

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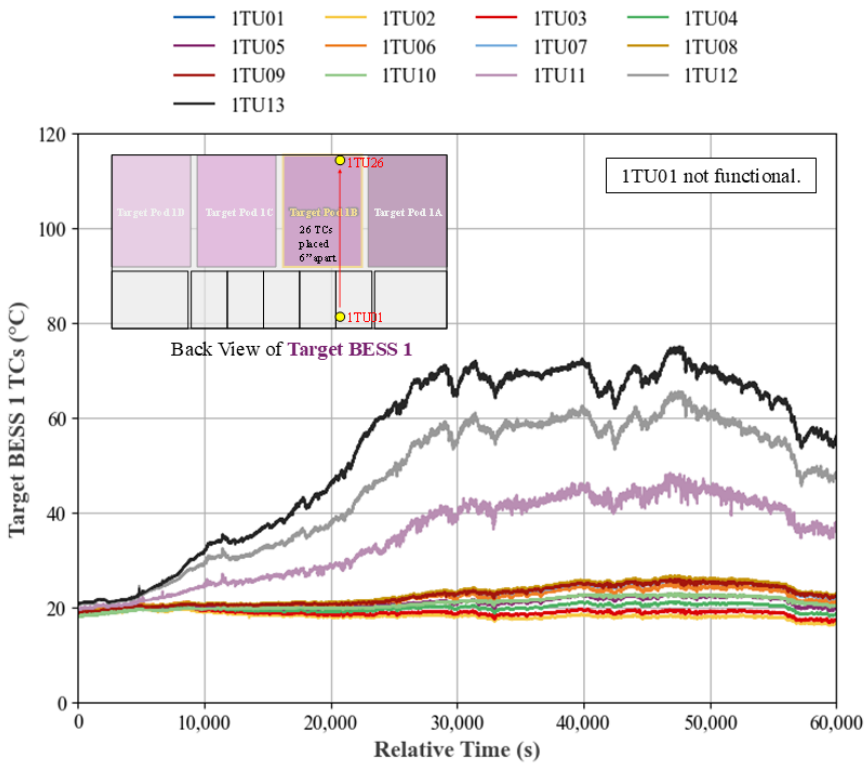
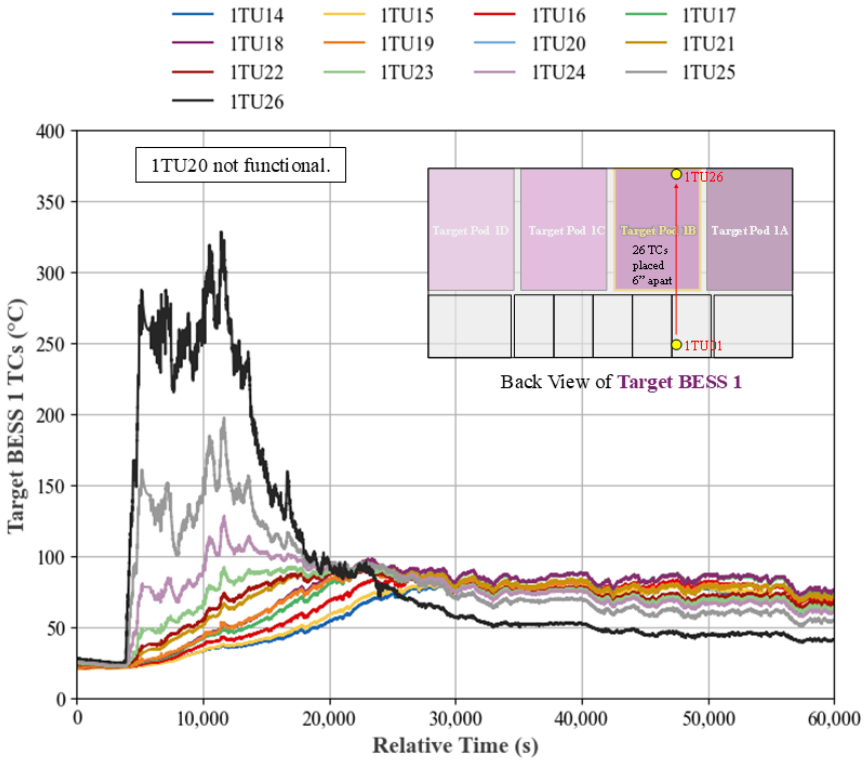


(a) Target BESS 1 TCs 1TU01 to 1TU13 external temperature measurements.



(b) Target BESS 1 TCs 1TU14 to 1TU26 external temperature measurements.

Figure 57: Target BESS 1 external temperature measurements.

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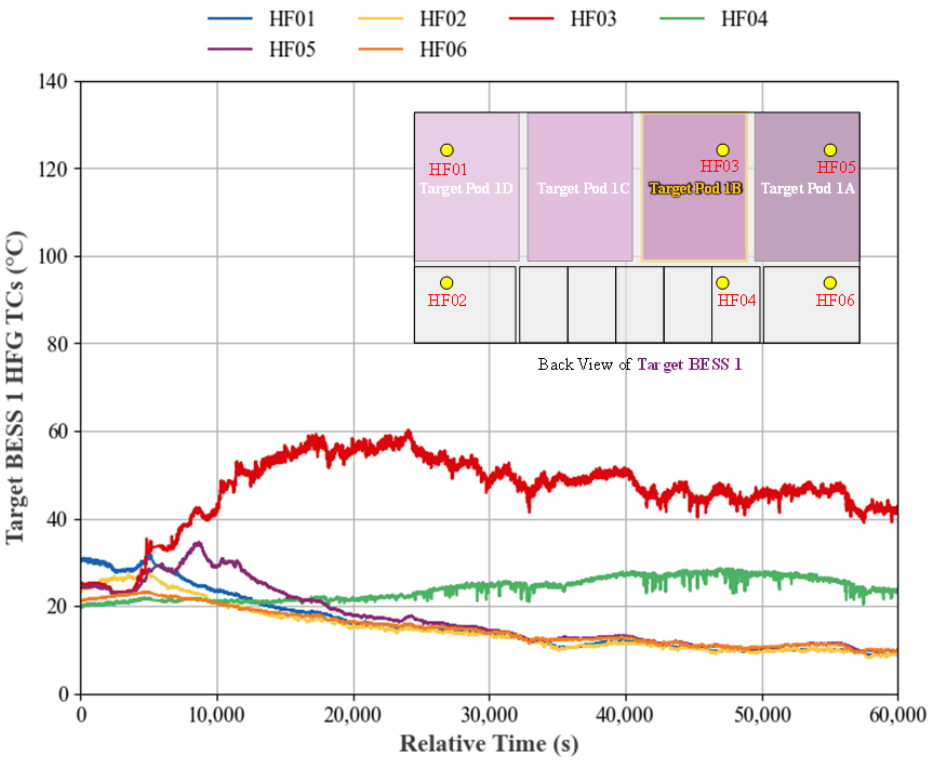

Figure 58: Target BESS 1 HFG TCs temperature measurements.

5.3.3 Target BESS 2

As previously established, Target BESS 2 consisted or only a singular Pod containing two modules. As shown in Figure 59, similar to the Pods in Target BESS 1, there was also an increase in temperature measured in Pod 2A due to heat transfer from the Initiating BESS and its fire. The maximum internal and external module temperature measured in this Pod were 62.3°C and 31.3°C, respectively. Figures 60 and 61 show the temperature measurements on the exterior surface of Target BESS 2. Figure 60 specifically shows the temperatures measured by the array of TCs that were placed along the height on the side of Pod 2A that was closest to the Initiating BESS and its fire. As shown in Figure 60a, once again, the TCs placed at lower elevations on the Pod showed much smaller temperature increases, with no temperature measurements above 40°C, whereas Figure 60b shows that TCs placed near the top of the Pod measured much higher temperatures, with a maximum temperature of 198.3°C being recorded. Similarly, the TCs which were placed near the HFGs installed on the side exterior surface of Pod 2A showed higher temperatures at more elevated TC locations, with the maximum temperature being measured at 72.1°C (HF 07). These locations of where the highest temperature measurements were recorded align with the positioning of the fire stemming from Pod INC.

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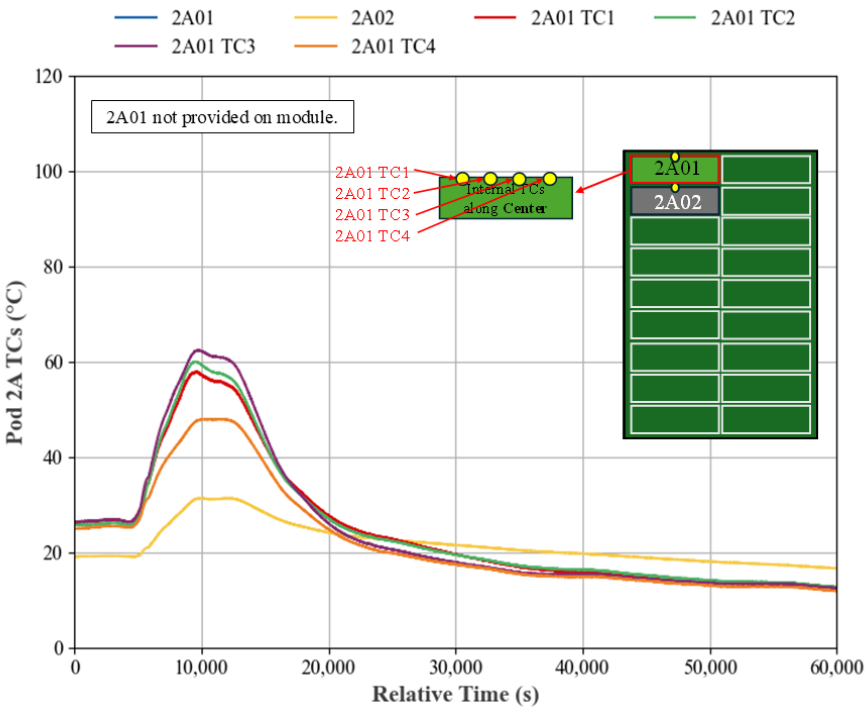
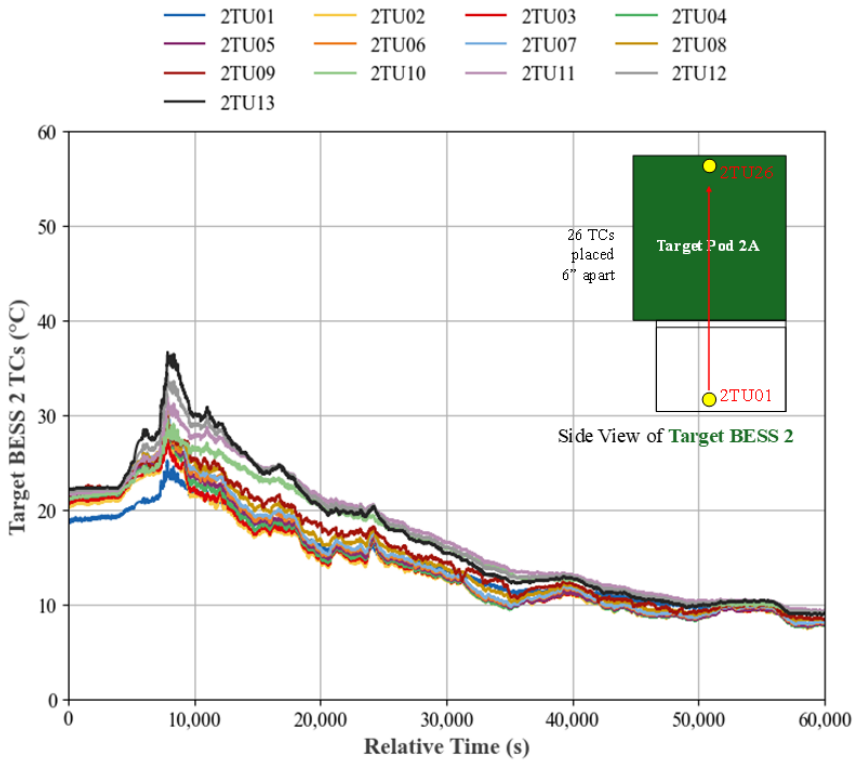


Figure 59: Modules of Pod 2A internal and external temperature measurements.



(a) Target BESS 2 TCs 2TU01 to 2TU13 external temperature measurements.

Figure 60: Target BESS 2 external temperature measurements.

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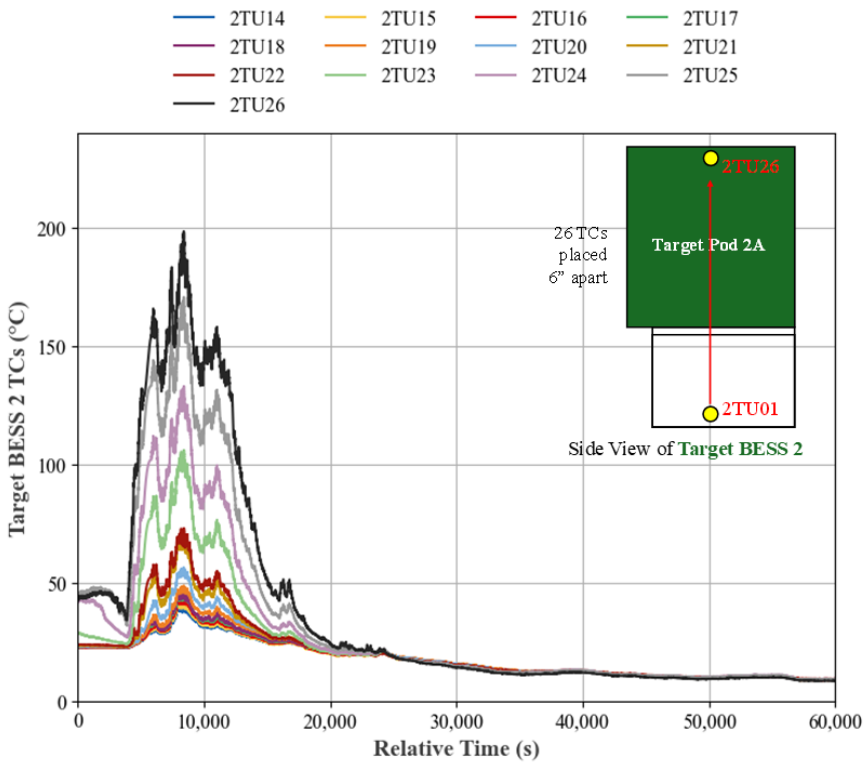

(b) Target BESS 2 TCs 2TU14 to 2TU26 external temperature measurements.

Figure 60: Target BESS 2 external temperature measurements (continued).

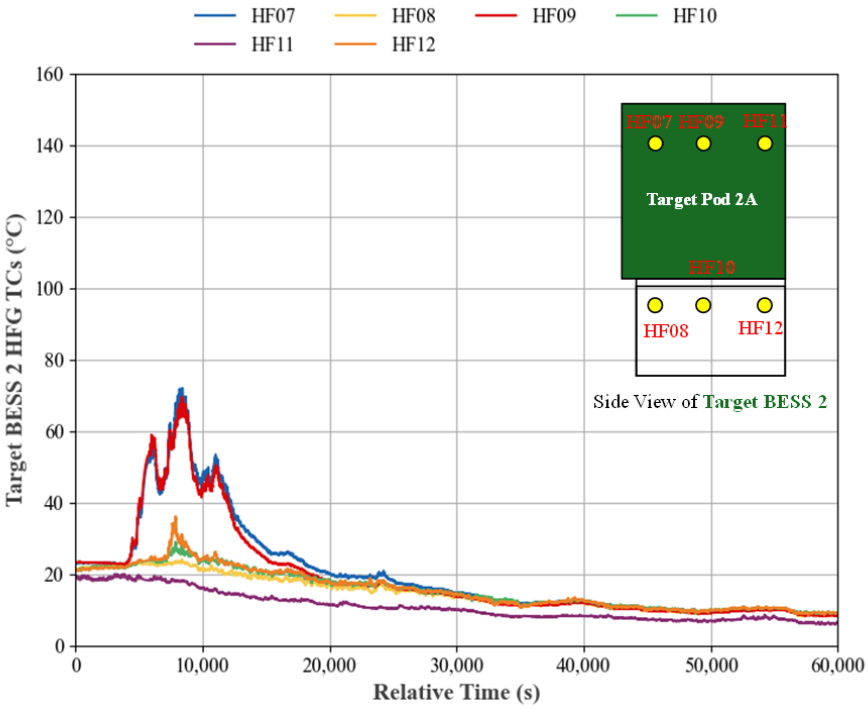

Figure 61: Target BESS 2 HFG TCs temperature measurements.

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5.3.4 Target BESS 3

The Target BESS 3, being located directly across from the Initiating BESS, received the greatest exposure to the fire stemming from Pod INC compared to the other target BESSs, which is especially reflected in the external temperature measurements taken on Target BESS 3. Interestingly, however, the temperature measurements taken within its Pods, internal and external to the modules within, do not necessarily reflect this greater fire exposure, indicating that cells within the Pods are seemingly well-insulated.

Starting with Pod 3A, the maximum internal and external module temperatures were recorded as 70.0°C and 46.9°C in Modules 10 and 01, respectively, as shown in Figure 62. For Pod 3B, internal module temperatures did not exceed ambient, with the maximum internal module temperature measurement being just 24.2°C, as shown in Figure 63. The external module temperature in Pod 3B, provided in Figure 64, were more elevated due to heat transfer from Pod INC and its fire, but the maximum external module temperature was still only measured to be 57.6°C in Module 10, as shown in Figure 64b. Pod 3C did show slightly elevated temperatures internal to its modules, as shown in Figure 65. However, the maximum internal module temperature measured was 53.2°C in Module 01, which is comparable to the internal modules temperatures measured in the Pods of Target BESS 1. The maximum external module temperature for this Pod was slightly lower at 50.0°C, measured on Module 01, as shown in Figure 66. Finally, the maximum internal and external module temperatures measured for Pod 3D were found to be 40.5°in Module 01 and 36.6°C on Module 10, respectively, as shown in Figure 67. Just as with Target BESSs 1 and 2, the highest temperatures within the Pods of Target BESS 3 were measured in and on the modules located near the tops of the Pods, which again, experienced the greatest amount of heat transfer due to the location of the fire on Pod INC.

The temperatures on the exteriors of the Pods in Target BESS 3 confirm that the fire exposure was more intense at the tops of the Pods; however, elevated temperatures were measured towards the bottom of the Pods for this target BESS, due to its proximity to the fire. For example, the array of TCs which was placed across the height of Pod 3B does show higher temperatures corresponding to the TCs located in the upper half of this array, with the maximum temperature there being measured at 404.2°C, as shown in Figure 68b – the highest temperature measured anywhere in the test setup throughout the duration of the test. However, for the TCs placed in the lower half of the array, temperatures still ranged between 100 and 400°C, as shown in Figure 68a, much higher than in similar locations on the other target BESSs. Similarly, the TCs which were located near the HFGs placed on the exterior front surface of Target BESS 3 also showed comparatively elevated temperatures even at lower elevations. As shown in Figure 69, the temperatures for these TC generally ranged between 50 and 200°C, but the maximum temperature measurement from these TCs was recorded at 374°C (HF 15), which did correspond to a TC located at a higher elevation.

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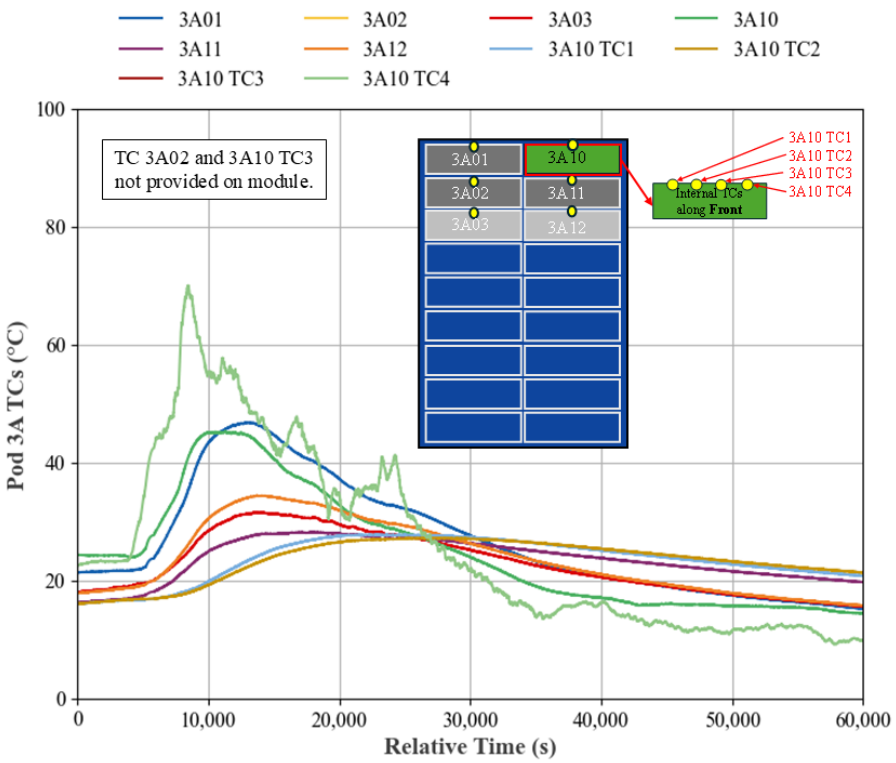

Figure 62: Modules of Pod 3A internal and external temperature measurements.

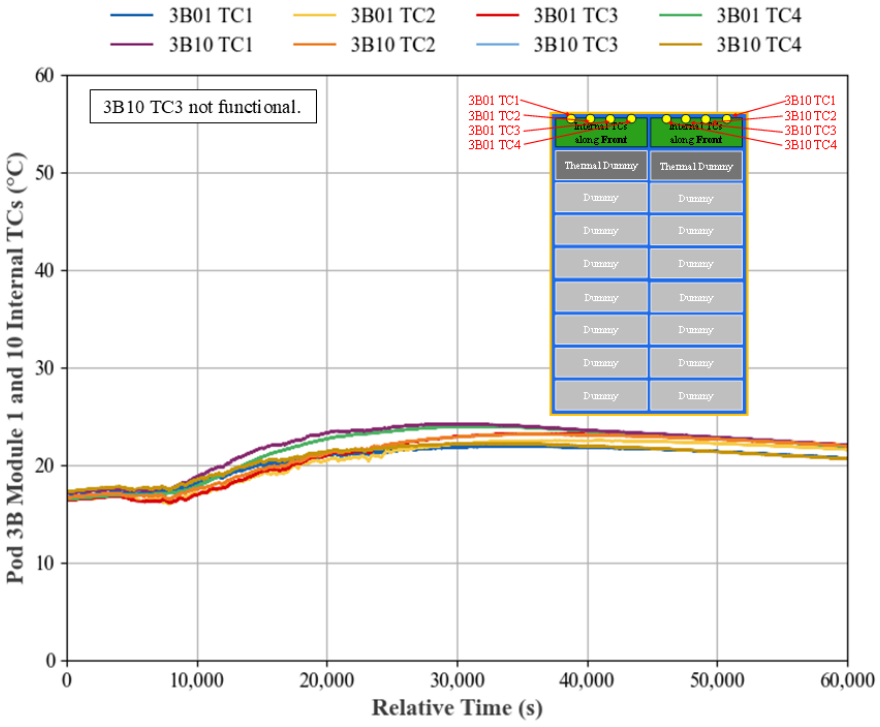

Figure 63: Modules 3B 01 and 10 internal temperature measurements.

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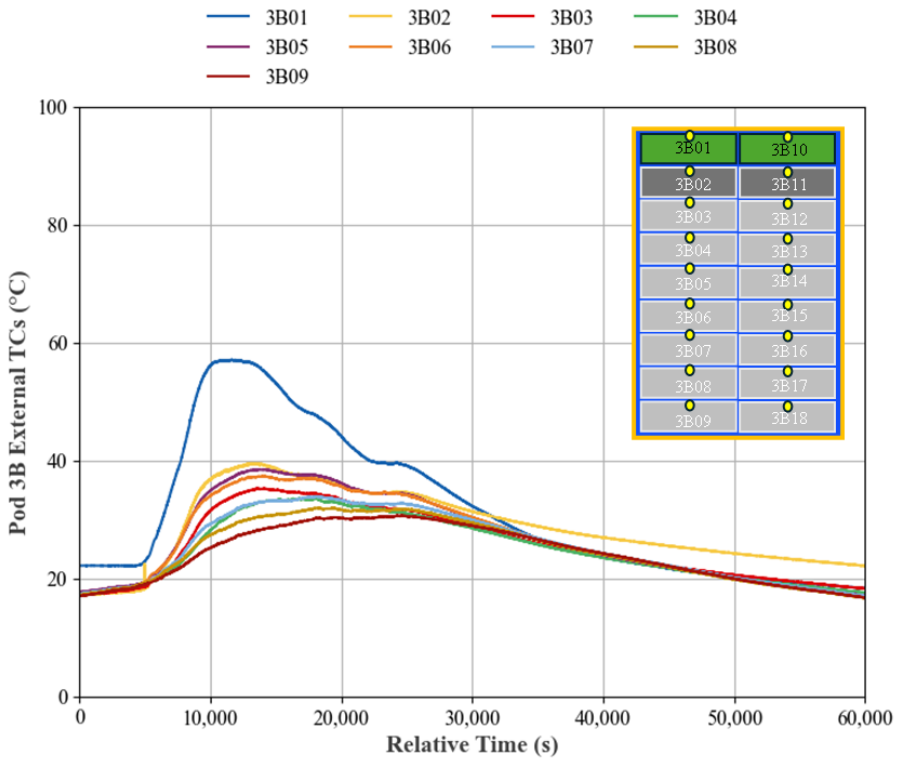
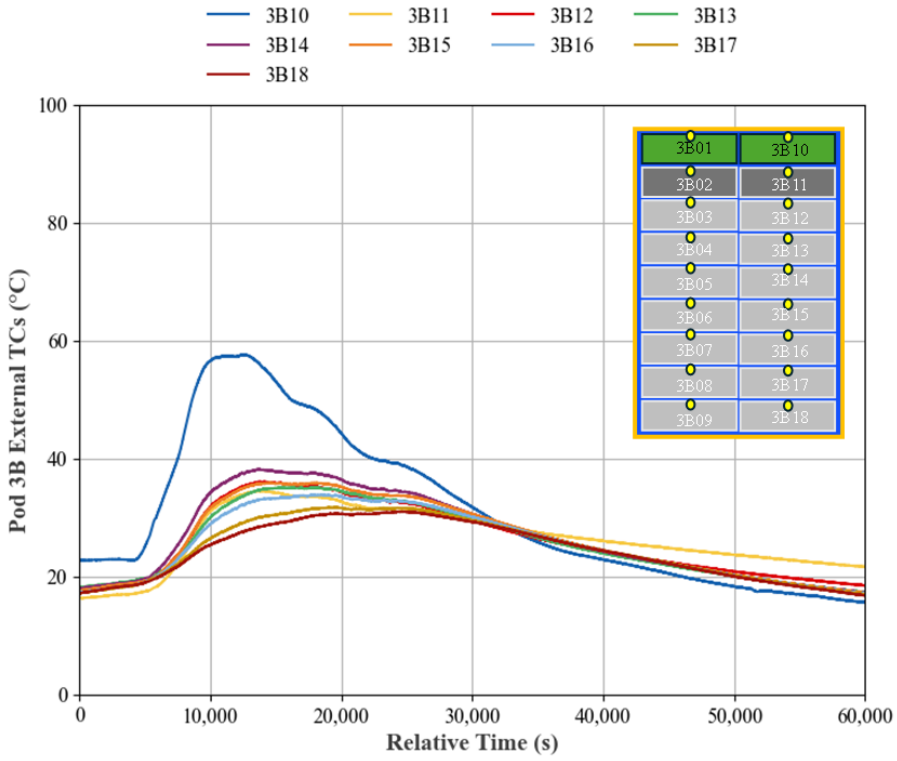


(a) Modules 3B 01 to 09 external temperature measurements.



(b) Modules 3B 10 to 18 external temperature measurements.

Figure 64: Pod 3B temperature measurements on module external surfaces.

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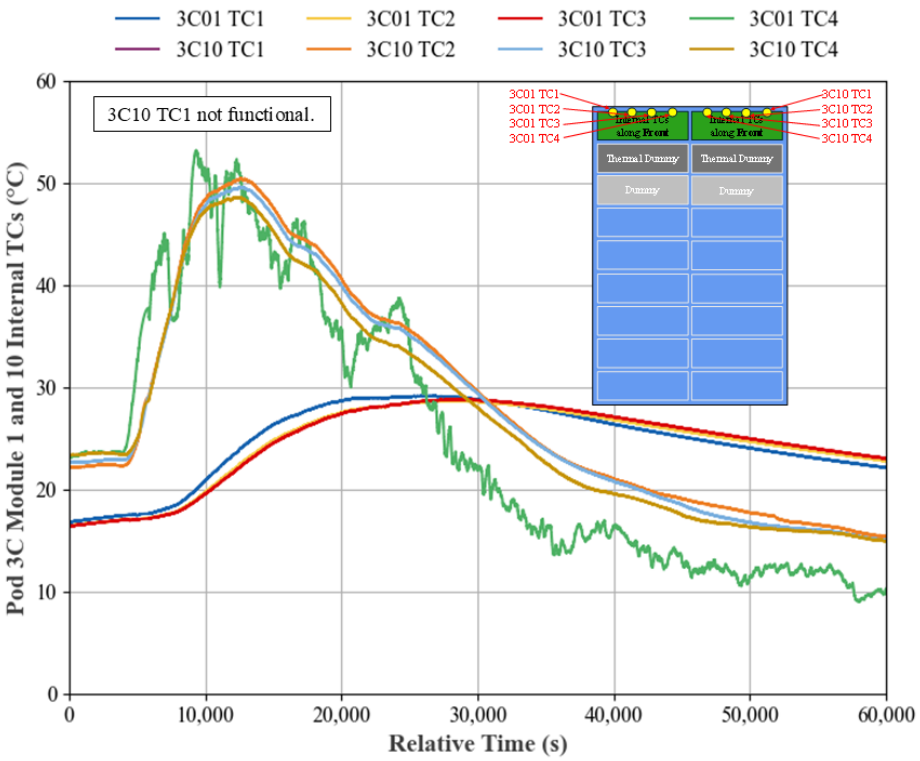

Figure 65: Modules 3C 01 and 10 internal temperature measurements.

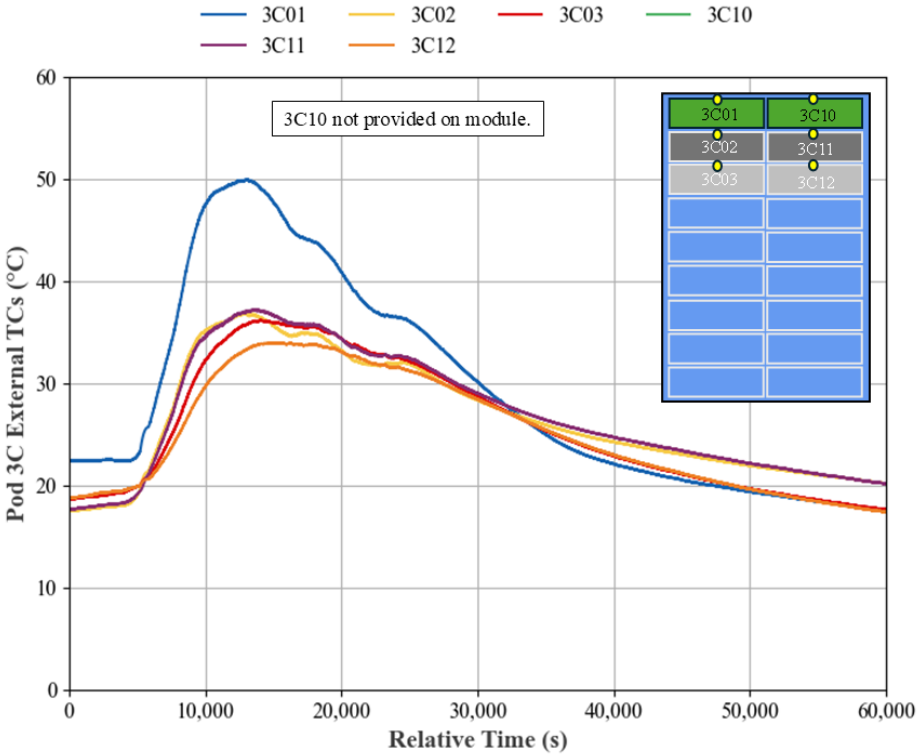

Figure 66: Pod 3C temperature measurements on module external surfaces.

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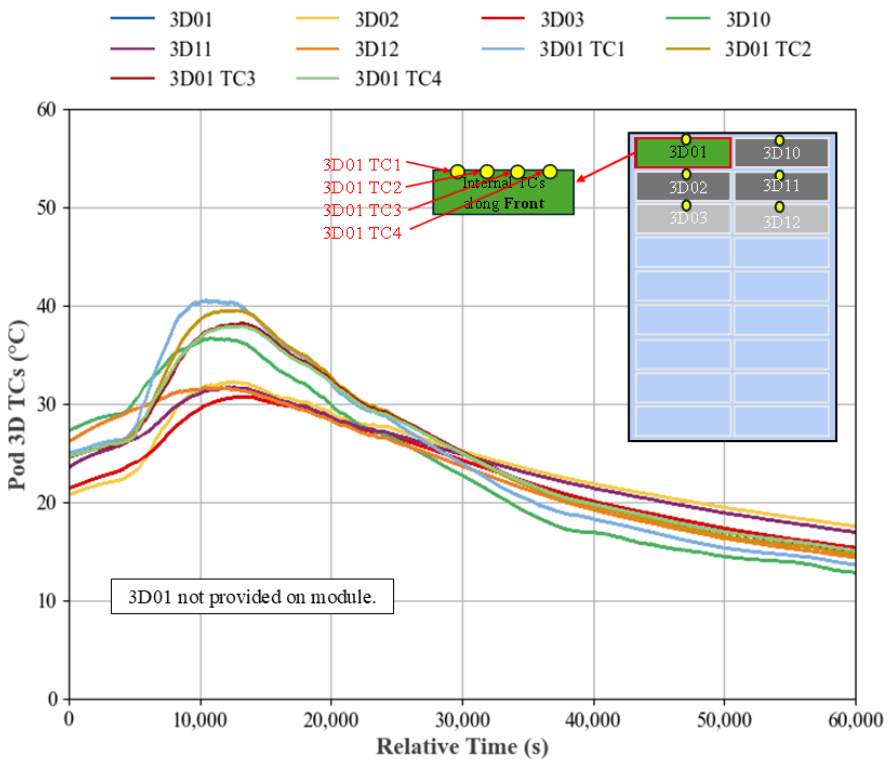
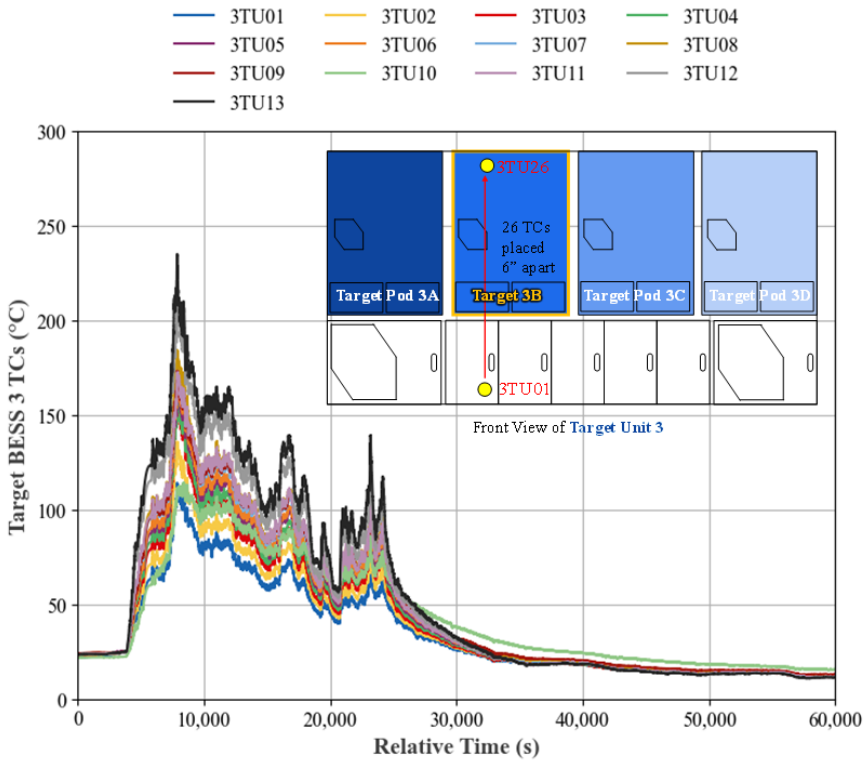


Figure 67: Modules of Pod 3D internal and external temperature measurements.



(a) Target BESS 3 TCs 3TU01 to 3TU13 external temperature measurements.

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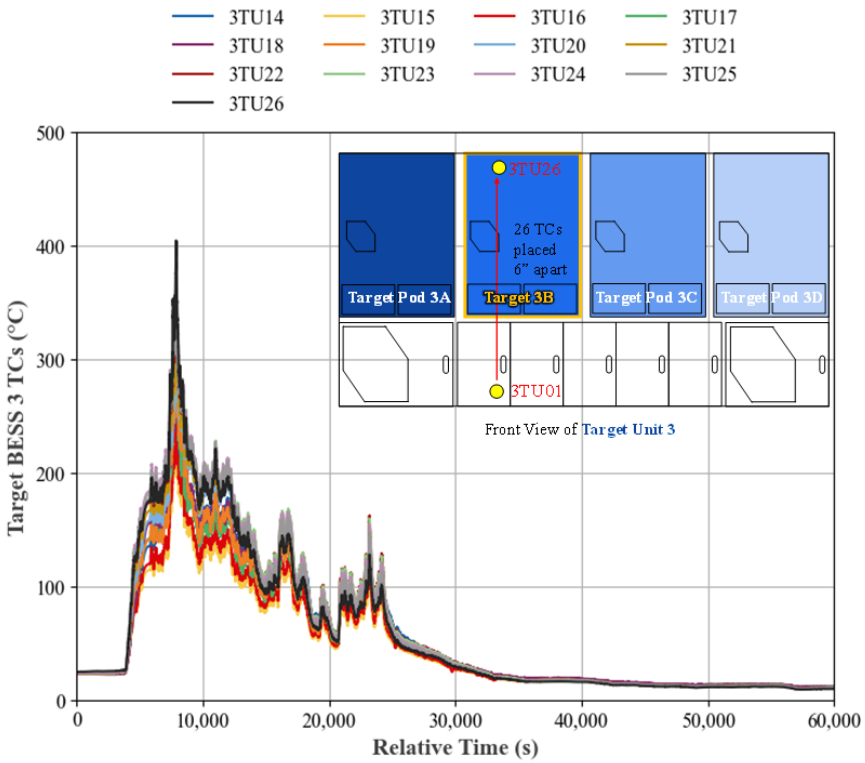

(b) Target BESS 3 TCs 3TU14 to 3TU26 external temperature measurements.

Figure 68: Target BESS 3 external temperature measurements.

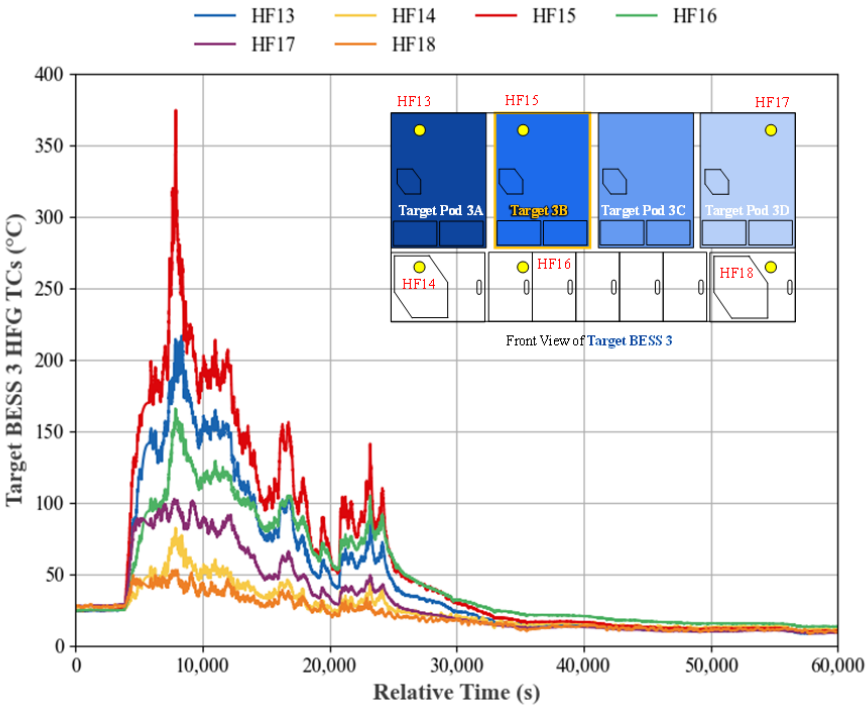

Figure 69: Target BESS 3 HFG TCs temperature measurements.

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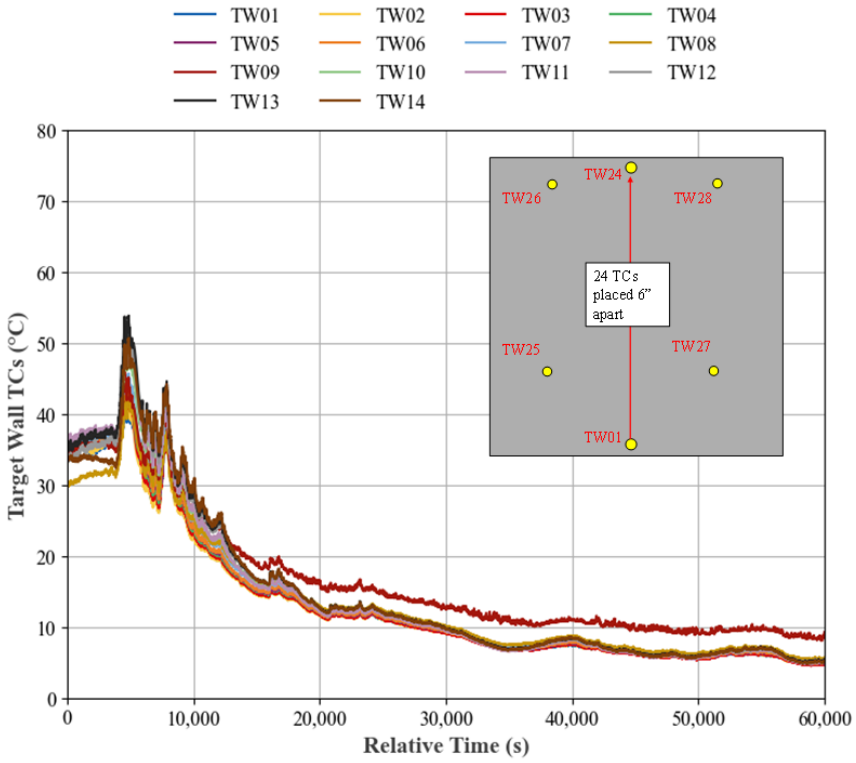
5.3.5 Target Wall and Egresses

Other locations across the test setup where temperatures were measured include the Target Wall that was adjacent to the Initiating BESS and TCs located near HFGs that were setup in the egresses between the Initiating BESS and Target BESS 1 and between the Initiating BESS and the Target Wall. Figure 70 shows the temperatures measured on the Target Wall, and Figure 71 shows the temperatures measured near the egress HFGs. Due to the distance between the Target Wall and the fire stemming from Pod INC, the temperatures on the wall typically ranged between 30 and 60°C during the time of the most prolific TR propagation, with the maximum temperature on the Target Wall being measured at 66.3°C, as shown in Figure 70a.

The HFG and corresponding TC between the Initiating BESS and Target were located such that they were somewhat shielded from the fire, so the temperatures measured there were consistent with the ambient temperature. Meanwhile, the HFG and corresponding TC located in the egress between the Initiating BESS and Target BESS 1 were much more exposed to the fire, with elevated temperatures measured well beyond 20,000 s into the test and a maximum temperature measured to be 103.5°C.



(a) Target Wall TCs TW01 to TW14 external temperature measurements.

Figure 70: Target Wall external temperature measurements.

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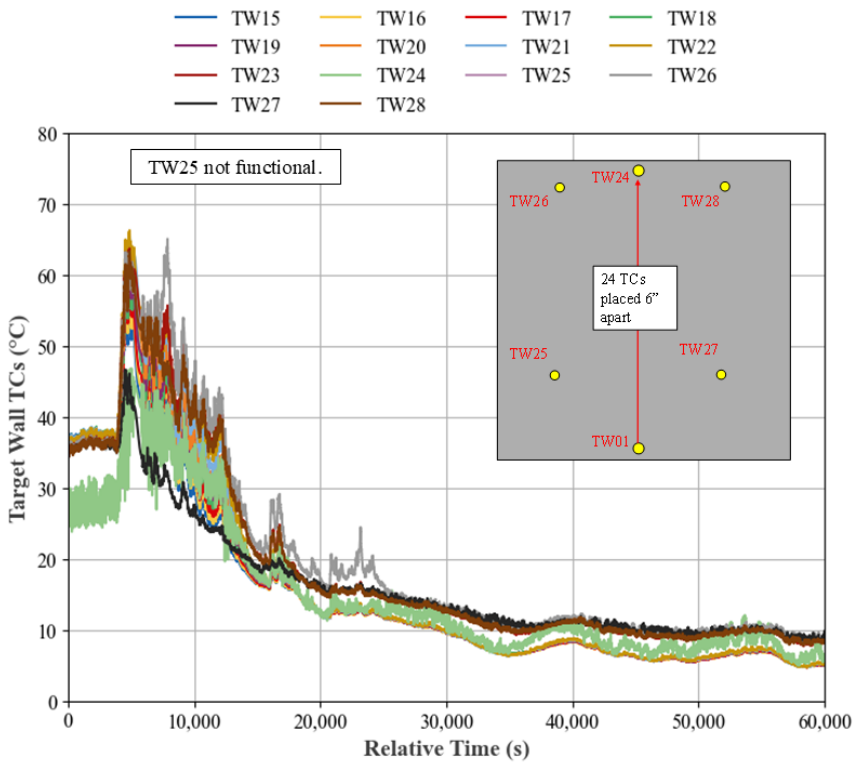

(b) Target Wall TCs TW15 to TW28 external temperature measurements.

Figure 70: Target Wall external temperature measurements (continued).

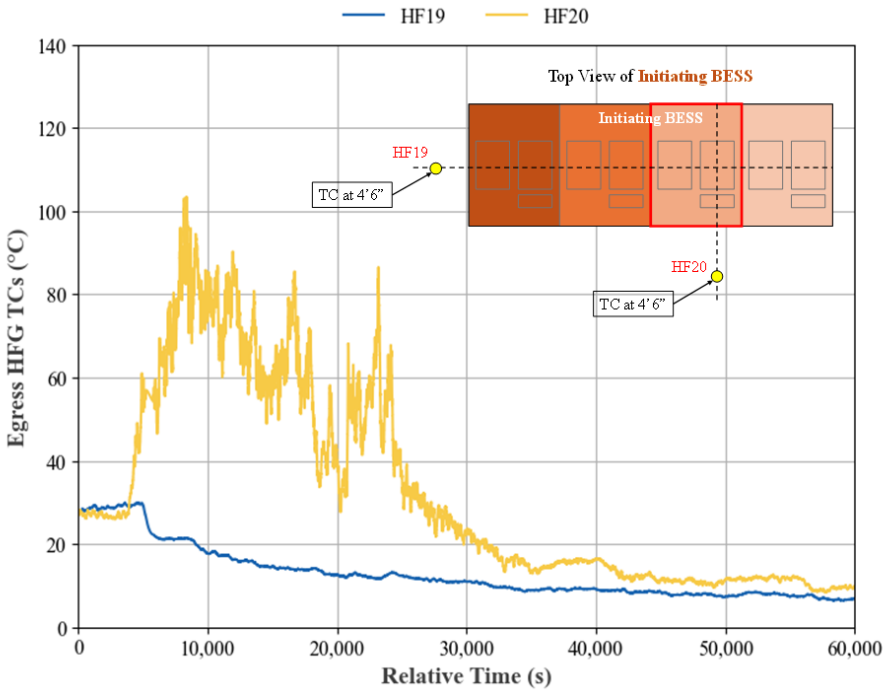

Figure 71: Egress HFG TCs temperature measurements.

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5.4 Heat Flux Results

HFGs were used to measure the heat flux at various target locations resulting from the fire in Pod INC that occurred during the LSFT. As previously described, HFGs were located on the corresponding faces of Target BESSs 1, 2, and 3 that were closest to the Initiating BESS. For Target BESS 1, this was its back surface; for Target BESS 2, this was its side surface, and for Target BESS 3, this was its front surface. HFGs were additionally located on the Target Wall facing the side of the Initiating BESS as well as in the egresses between the Initiating BESS and Target BESS 1 and between the Initiating BESS and the Target Wall. There were occasions during the testing where electrical interference from the failing battery created some data loss but due to redundant instrumentation, complete data sets were produced.

Aligning with the previously discussed temperature measurements, lower heat fluxes were measured on the exterior faces of Target BESSs 1 and 2 compared to Target BESS 3. Figures 72 and 73 show that the heat flux on the back face of Target BESS 1 remained below 0.5 kW/m^2 in the majority of locations on this surface. HFG 03, located directly across from initiating Pod INC, recorded the highest heat flux on this target BESS, but even in this location, the heat flux consistently measured below 1.5 kW/m^2. As a result, it is clear that there was an insignificant level of heat exposure to the back side of the initiating BESS.

On the side exterior face of Target BESS 2, heat flux measurements are only picked up during the portion of the test where TR propagation was most prolific. During this time, the maximum heat flux of 4.74 kW/m^2 is measured on this target BESS, as shown in Figure 75.

For the last target BESS, Target BESS 3, an almost identical pattern in measured heat flux to that of Target BESS 2 is observed, with the heat flux measurements only being picked up around the time of prolific TR propagation. The difference between the heat flux measured on Target BESS 3 versus Target BESS 1 is that this target BESS displayed comparatively elevated heat flux values due to its positioning directly across from the initiating BESS with direct exposure to the fire stemming from Pod INC. This resulted in the greatest maximum heat flux throughout the LSFT, which was recorded as 35.6 kW/m^2, as shown in Figure 76.

The same pattern as observed from the target BESSs' heat flux measurements is also also observed for the Target Wall, with heat flux measurements only being picked up in the time frame during which TR propagation was most prolific, as shown in Figures 78 and 79. However, again aligning with the previously discussed temperature measurements, lower heat fluxes are observed on the Target Wall compared to other HFG locations which were closer to the Initiating BESS and the fire. As such, the maximum heat flux measured on the Target Wall was only 1.45 kW/m^2.

The last heat flux measurements were taken in the egresses between the Initiating BESS and Target BESS 1 and between the Initiating BESS and the Target. The HFG located between the Initiating BESS and the Target Wall was non-functional during the test; however, from the temperature measurements recorded at this location, it is known that the HFG was sheltered here and would likely not have picked up very intense heat flux measurements. Contrarily, the HFG located between the Initiating BESS and Target BESS 1 was closer in proximately to the fire and correspondingly measured a heat flux of 5.69 kW/m^2, as shown in Figure 80.

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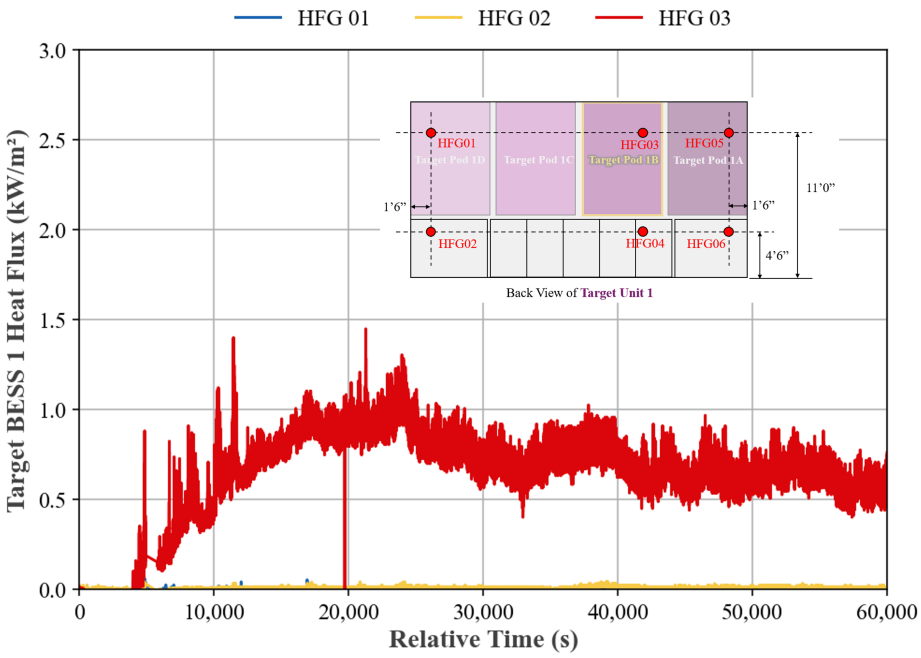

Figure 72: Target BESS 1 heat flux measurements.

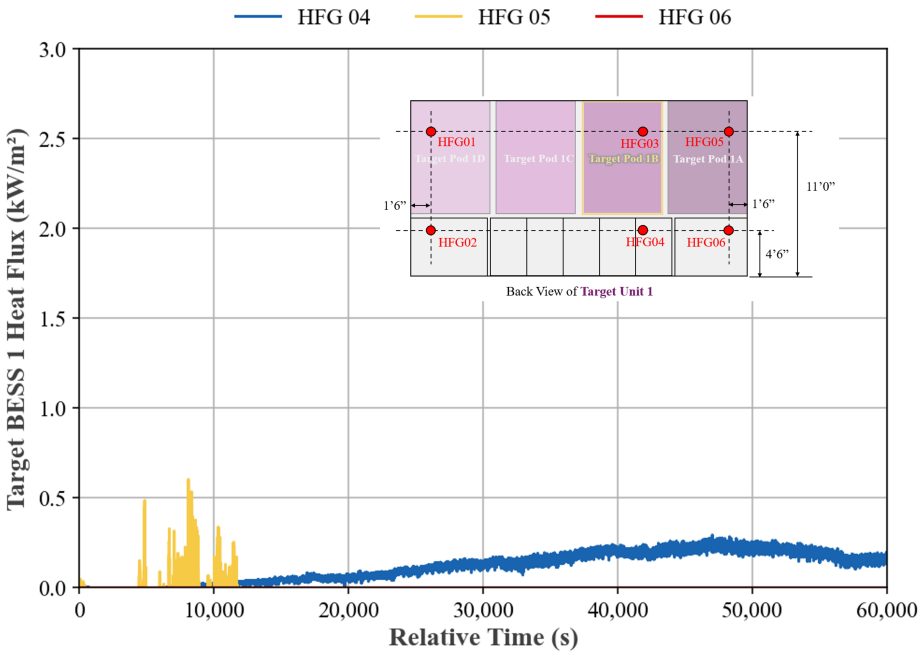

Figure 73: Target BESS 1 heat flux measurements.

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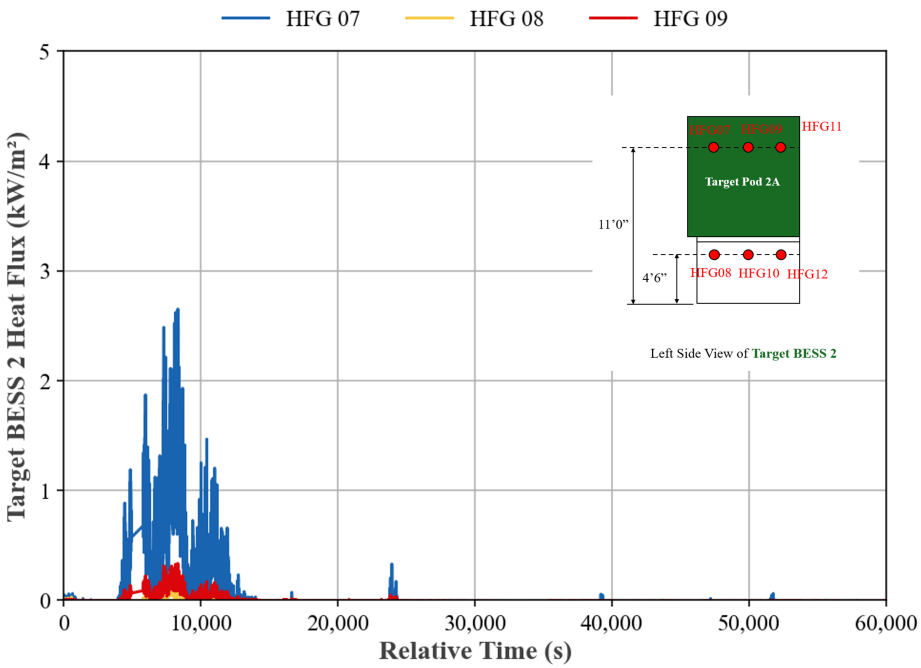

Figure 74: Target BESS 2 heat flux measurements.

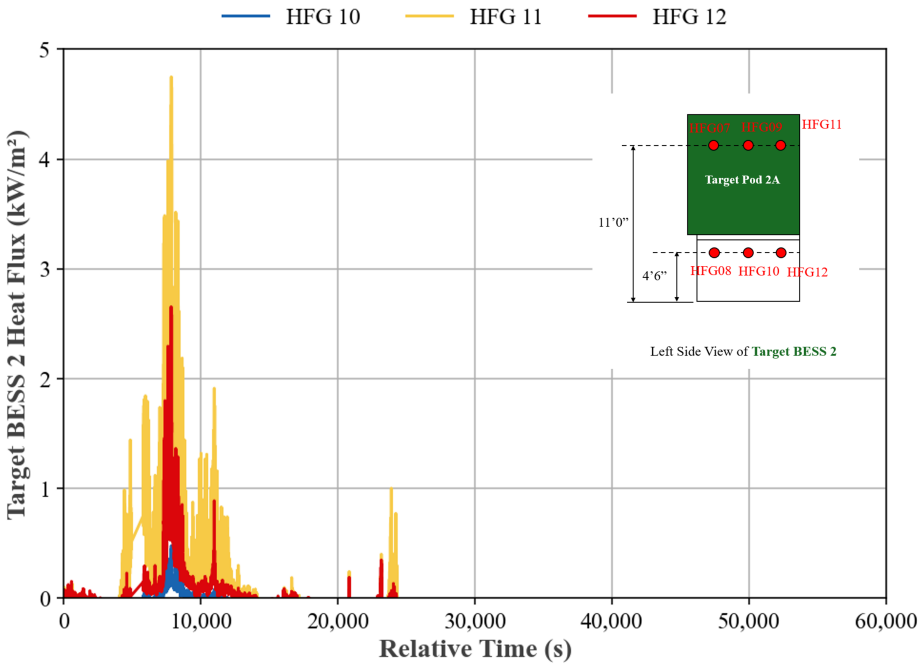

Figure 75: Target BESS 2 heat flux measurements.

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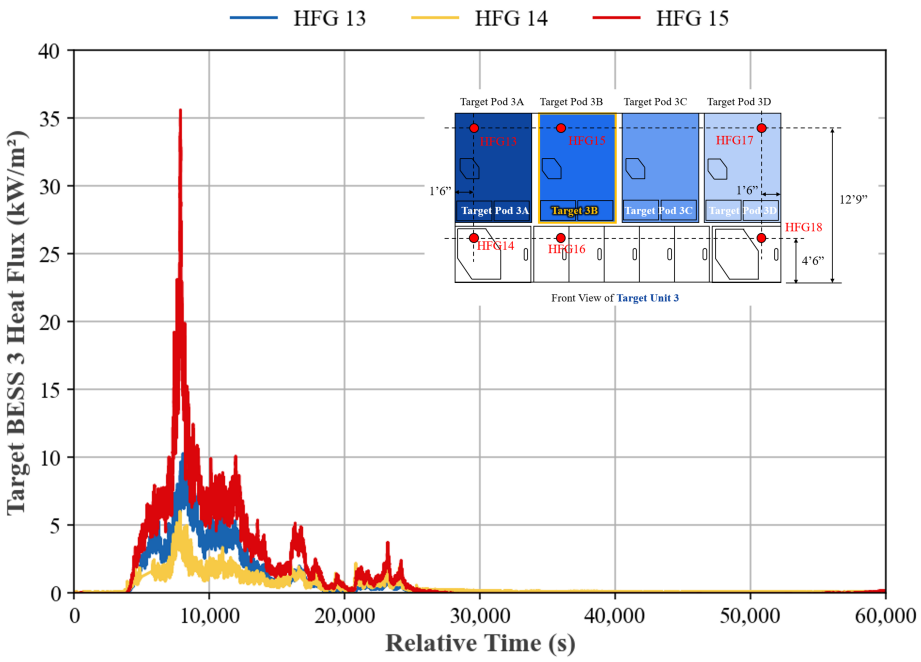

Figure 76: Target BESS 3 heat flux measurements.

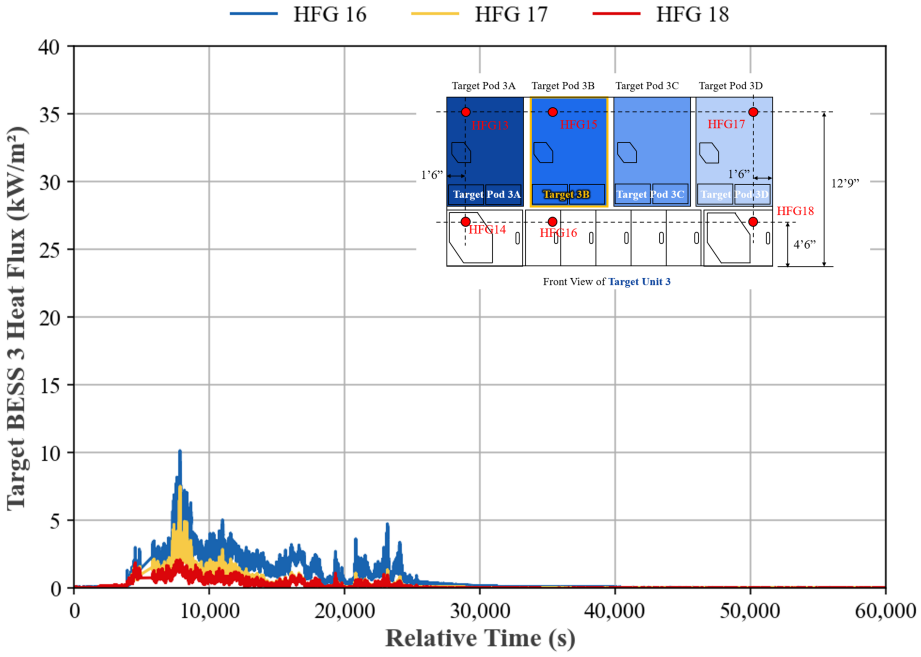

Figure 77: Target BESS 3 heat flux measurements.

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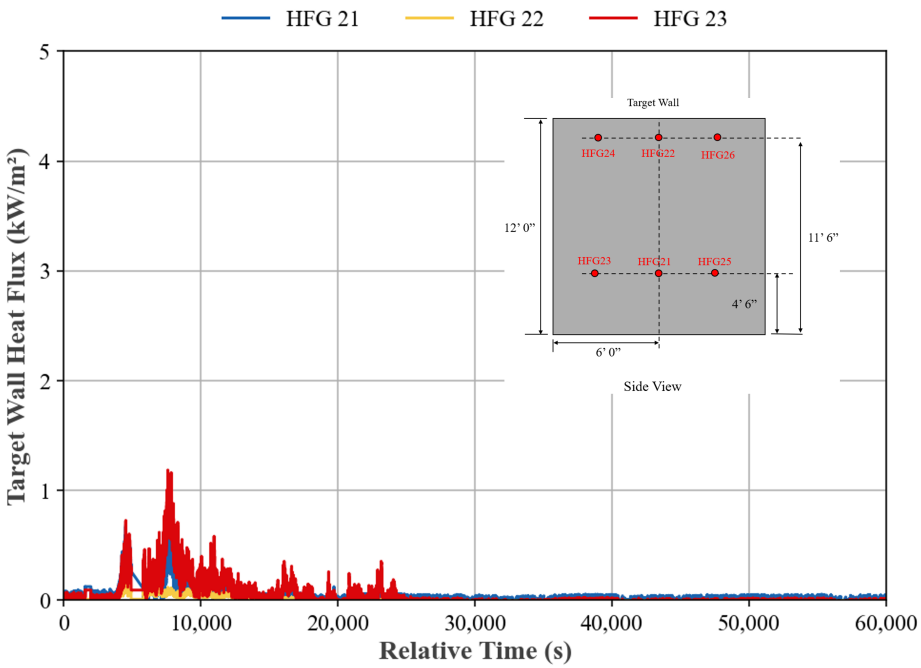

Figure 78: Target Wall heat flux measurements.

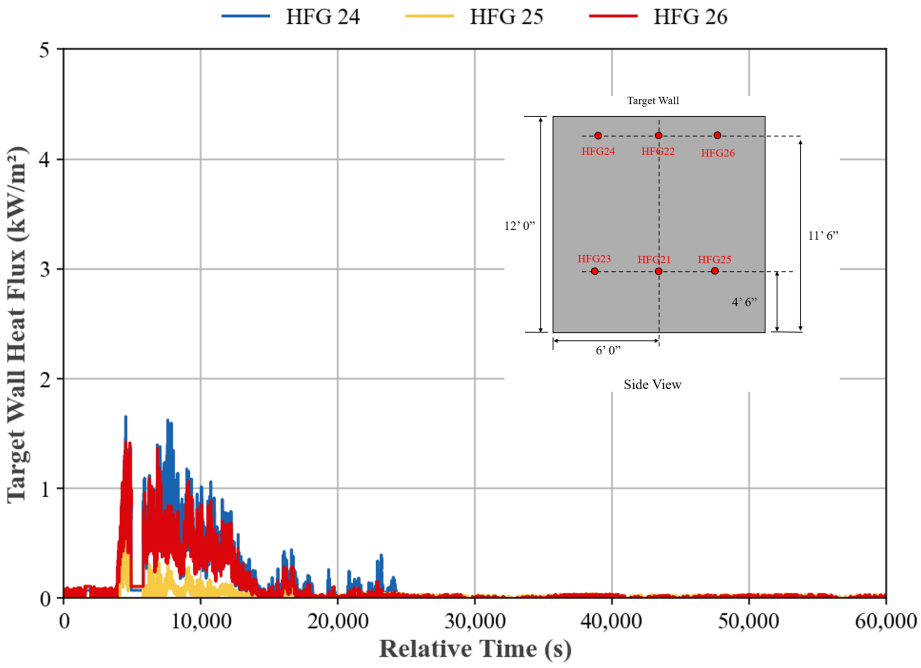

Figure 79: Target Wall heat flux measurements.

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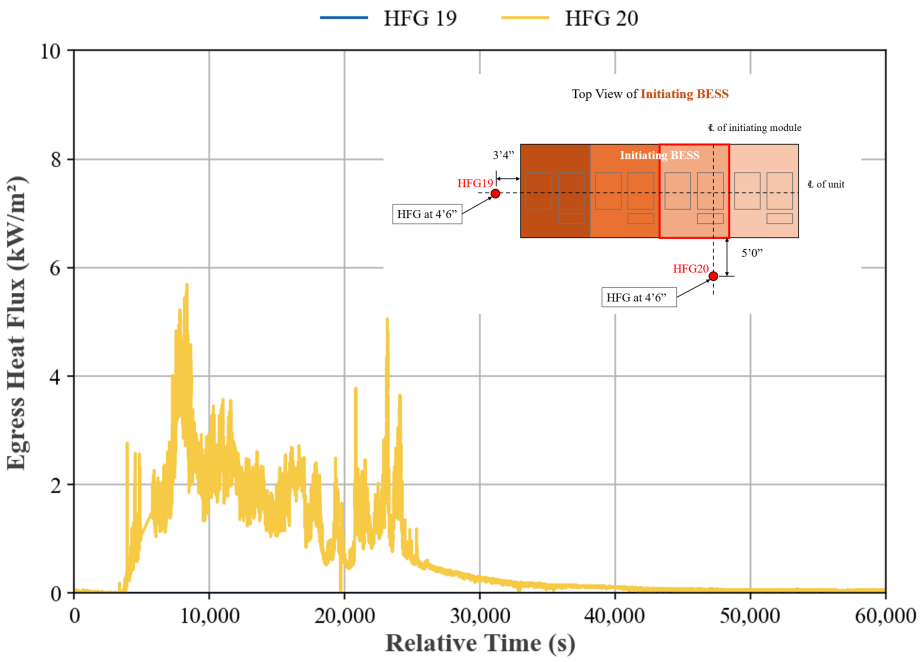

Figure 80: Egress heat flux measurements.

5.5 Gas Concentration Results

During the LSFT, an FTIR was used to measure the concentrations of gases released in the smoke plume stemming from the fire in Pod INC. The gases analyzed by the FTIR at include 1,3 butadiene (C_4H_6), acetylene (C_2H_2), methane (CH_4), carbon monoxide (CO), carbon dioxide (CO_2), carbonyl sulfide (COS), octane (C_8H_{18}), diethyl carbonate ($C_5H_{10}O_3$), dimethyl carbonate ($C_3H_6O_3$), ethane (C_2H_6), ethylene (C_2H_4), ethylene oxide (C_2H_4O), ethyl methyl carbonate ($C_4H_8O_3$), formaldehyde (CH_2O), sulfuric acid (H_2SO_4), hydrogen bromide (HBr), hydrogen chloride (HCl), hydrogen cyanide (HCN), hydrogen fluoride (HF), isobutylene (C_4H_8), methanol (CH_3OH), nitrous oxide (N_2O), ammonia (NH_3), nitric oxide (NO), phosphoryl fluoride (POF_3), propane (C_3H_8), and propylene (C_3H_6).

Throughout the duration of the test where the smoke plume was present and gas sampling was occurring (an approximate time range of 5,000 s through 19,000 s into the test), the gas was primarily composed of carbon dioxide (98.8% ± 0.6%), carbon monoxide (0.4% ± 0.5%), methane (0.3% ± 0.2%), and propylene (0.2% ± 0.1%), with small quantities of other gases making up the remaining 0.3% of the smoke plume components. Peak concentrations of all the measured gases are provided in Table 9 followed by plots for all gas measurements, which are shown in Figures 81 to 100.

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Chemical Compound	Maximum Measured Value (ppm)
1,3-Butadiene C_4H_6	44.0
Acetylene C_2H_2	87.4
Methane CH_4	386.3
Carbon Monoxide CO	1792.4
Carbon Dioxide CO_2	7308.9
Carbonyl Sulfide COS	0.4
Octane C_8H_{18}	0.7
Diethyl Carbonate $C_5H_{10}O_3$	0.9
Dimethyl Carbonate $C_3H_6O_3$	73.8
Ethane C_2H_6	26.5
Ethylene C_2H_4	179.4
Ethylene Oxide C_2H_4O	Below Measurable Range
Ethyl Methyl Carbonate $C_4H_8O_3$	13.3
Formaldehyde CH_2O	7.2
Sulfuric Acid H_2SO_4	0.5
Hydrogen Bromide HBr	Below Measurable Range
Hydrogen Chloride HCl	Below Measurable Range
Hydrogen Cyanide HCN	54.6
Hydrogen Fluoride HF	Below Measurable Range
Isobutylene C_4H_8	Below Measurable Range
Methanol CH_3OH	17.9
Nitrous Oxide N_2O	2.3
Ammonia NH_3	Below Measurable Range
Nitric Oxide NO	14.6
Phosphoryl Fluoride POF_3	Below Measurable Range
Propane C_3H_8	7.8
Propylene C_3H_6	31.0

Table 9: Peak Measured Gas Concentrations

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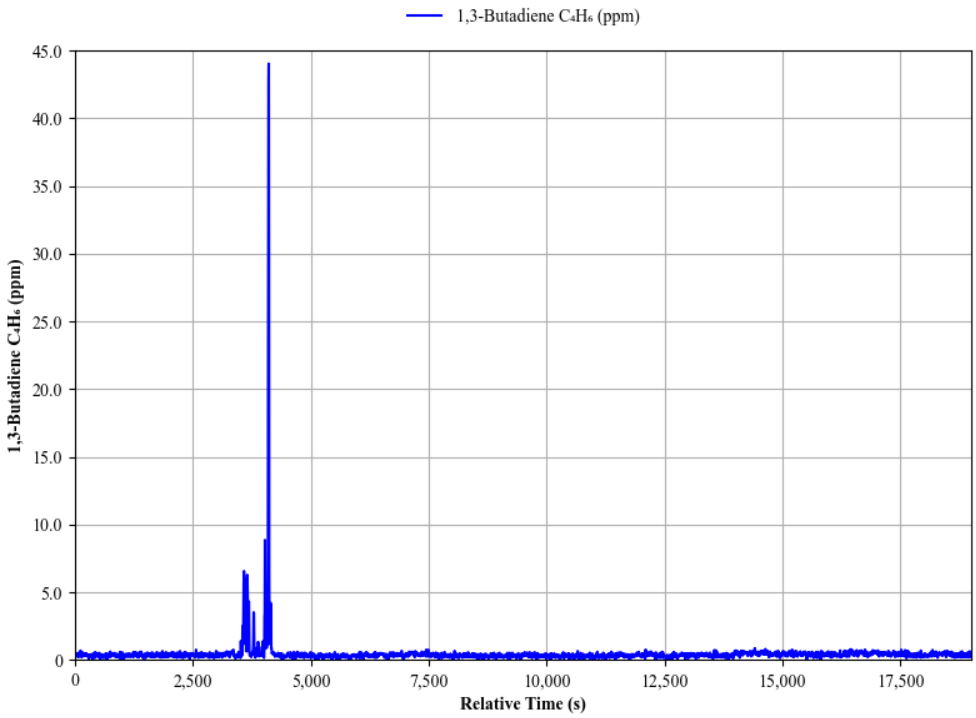

Figure 81: 1,3-Butadiene C_4H_6 plot.

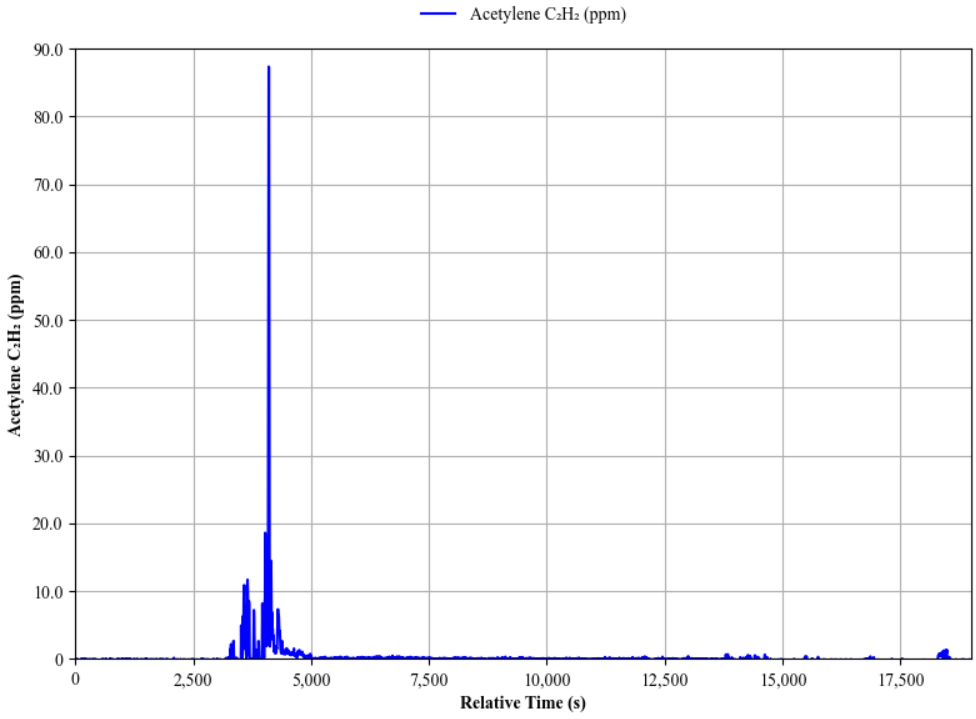

Figure 82: Acetylene C_2H_2 plot.

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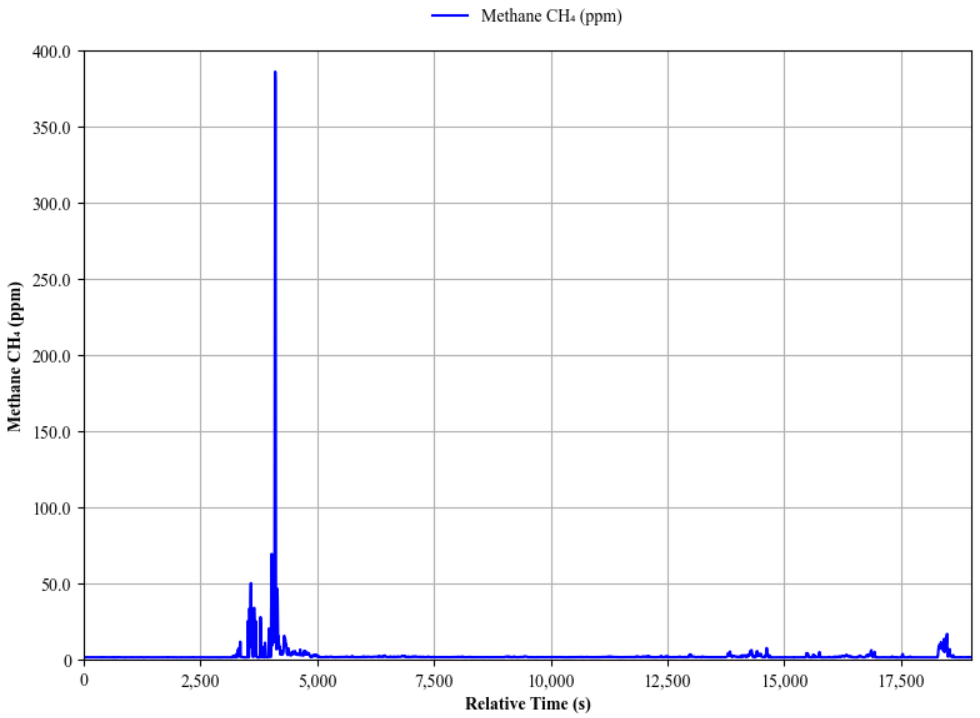

Figure 83: Methane CH_4 plot.

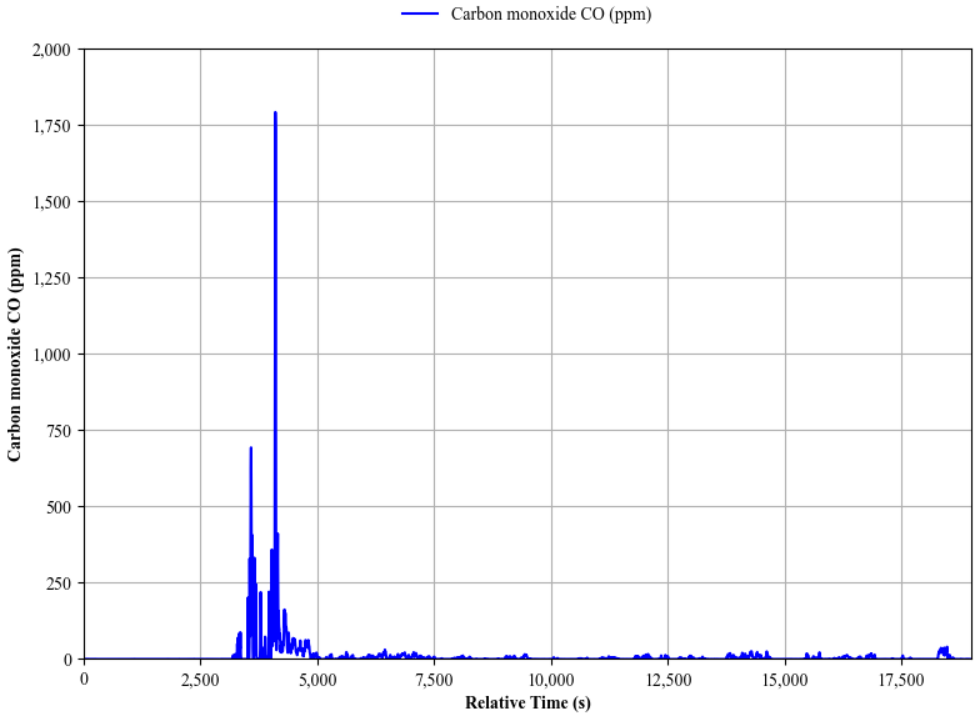

Figure 84: Carbon monoxide CO plot.

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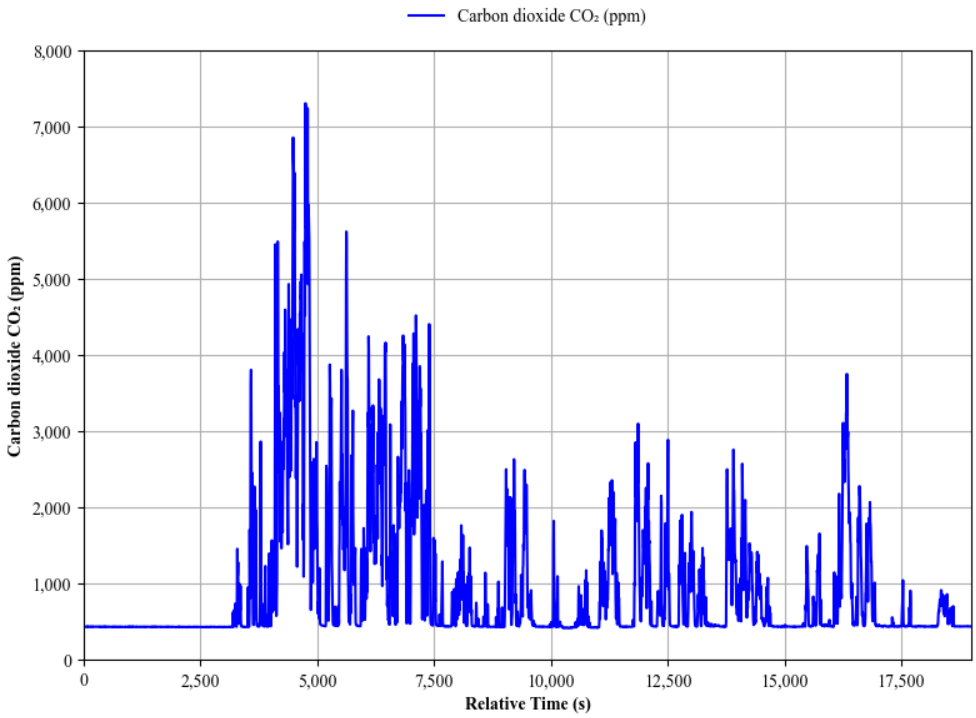

Figure 85: Carbon dioxide CO_2 plot.

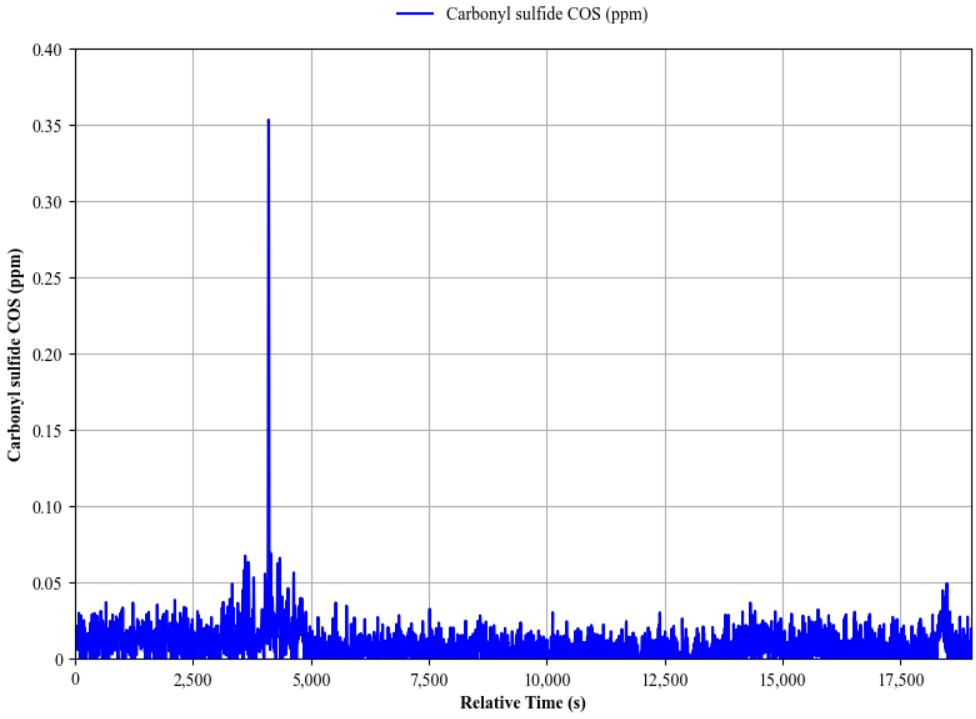

Figure 86: Carbonyl sulfide COS plot.

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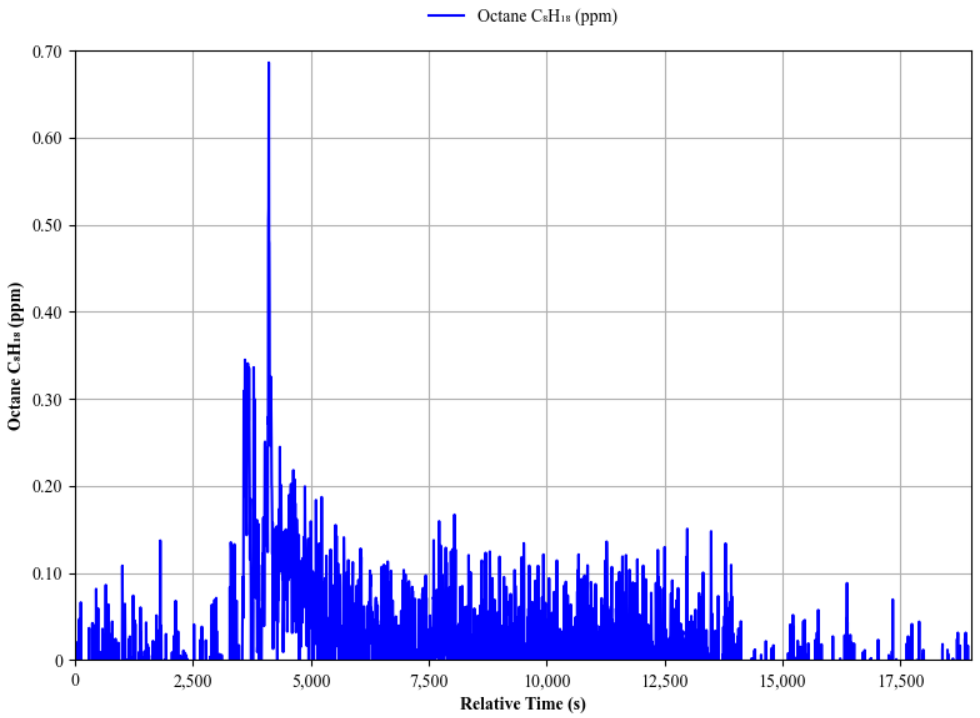

Figure 87: Octane C_8H_{18} plot.

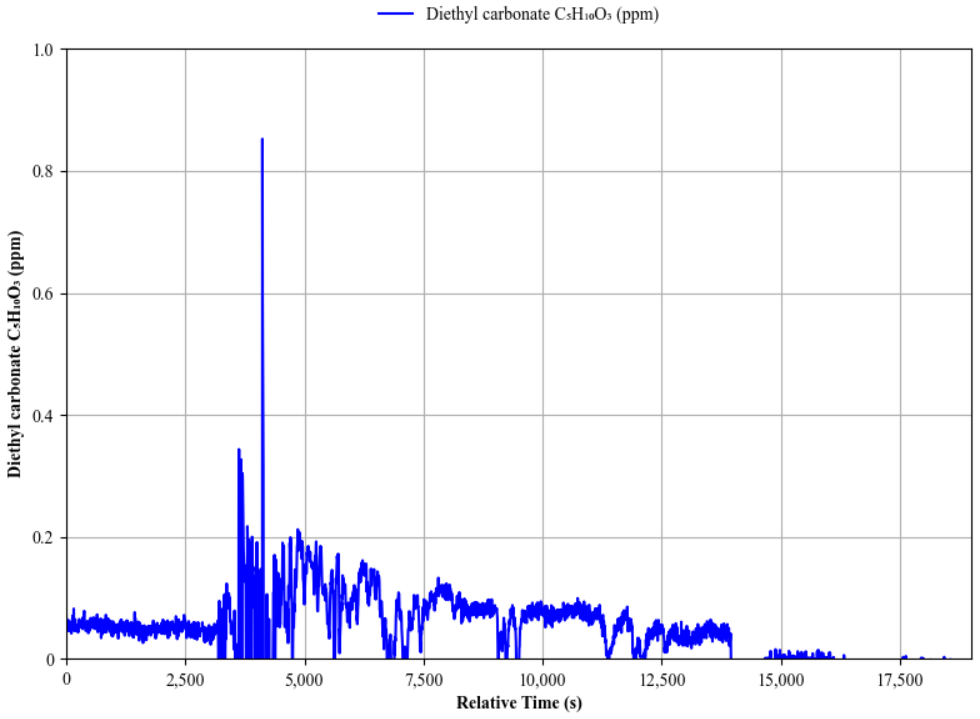

Figure 88: Diethyl carbonate $C_5H_{10}O_3$ plot.

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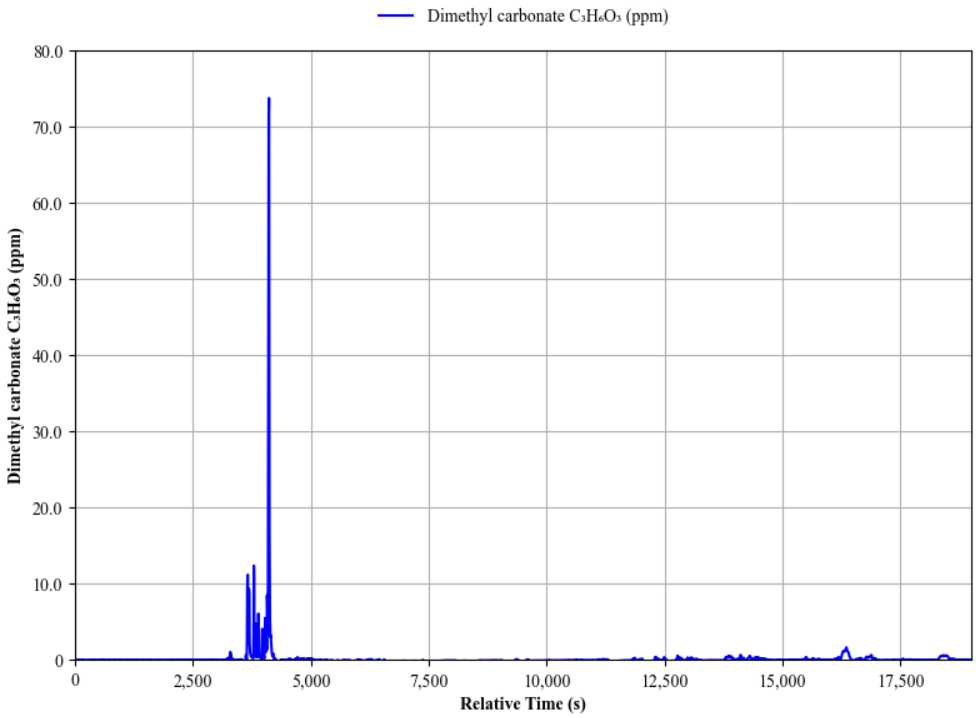

Figure 89: Dimethyl carbonate $C_3H_6O_3$ plot.

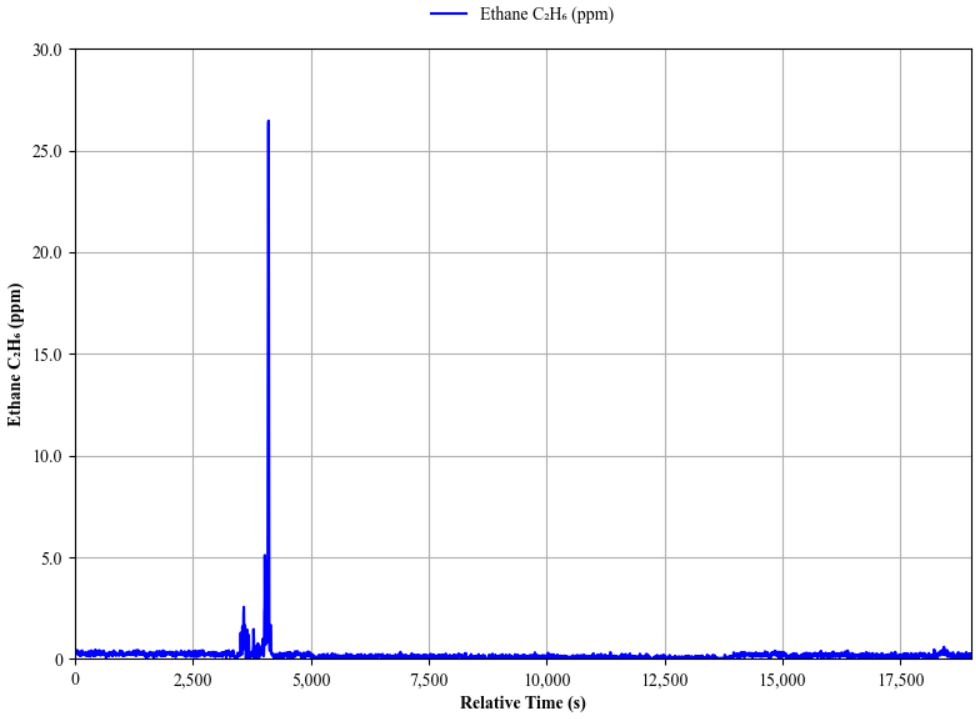

Figure 90: Ethane C_2H_6 plot.

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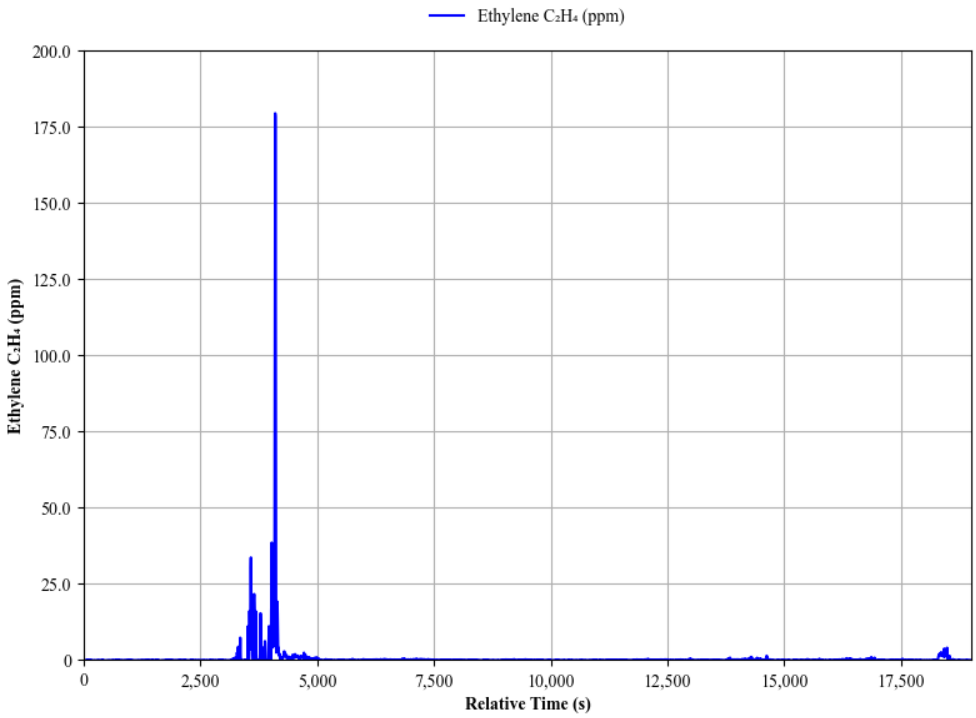

Figure 91: Ethylene C_2H_4 plot.

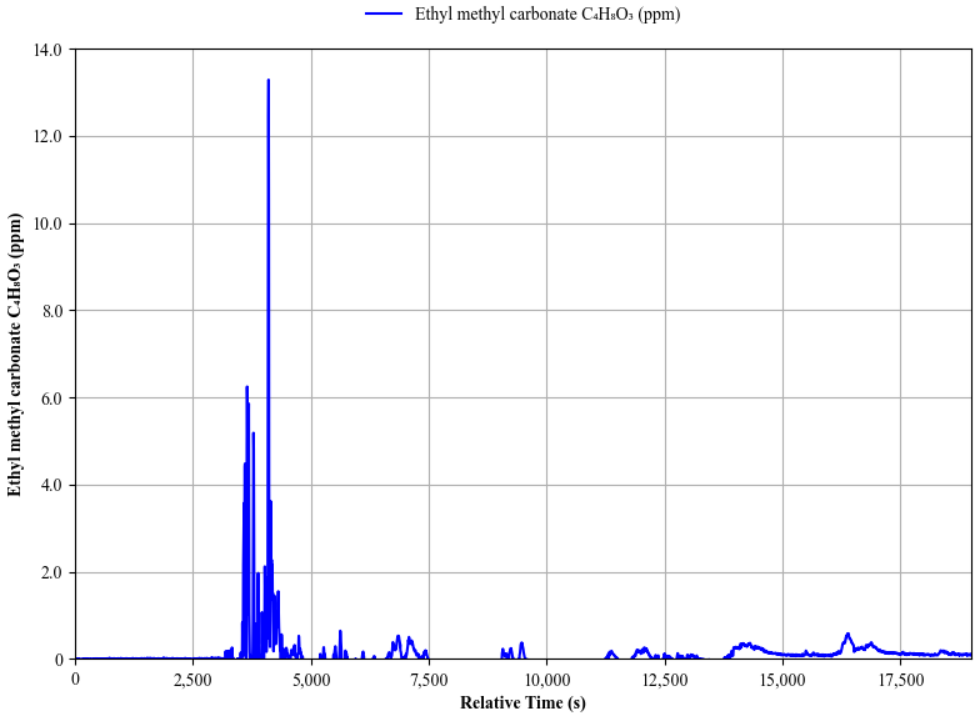

Figure 92: Ethyl methyl carbonate $C_4H_8O_3$ plot.

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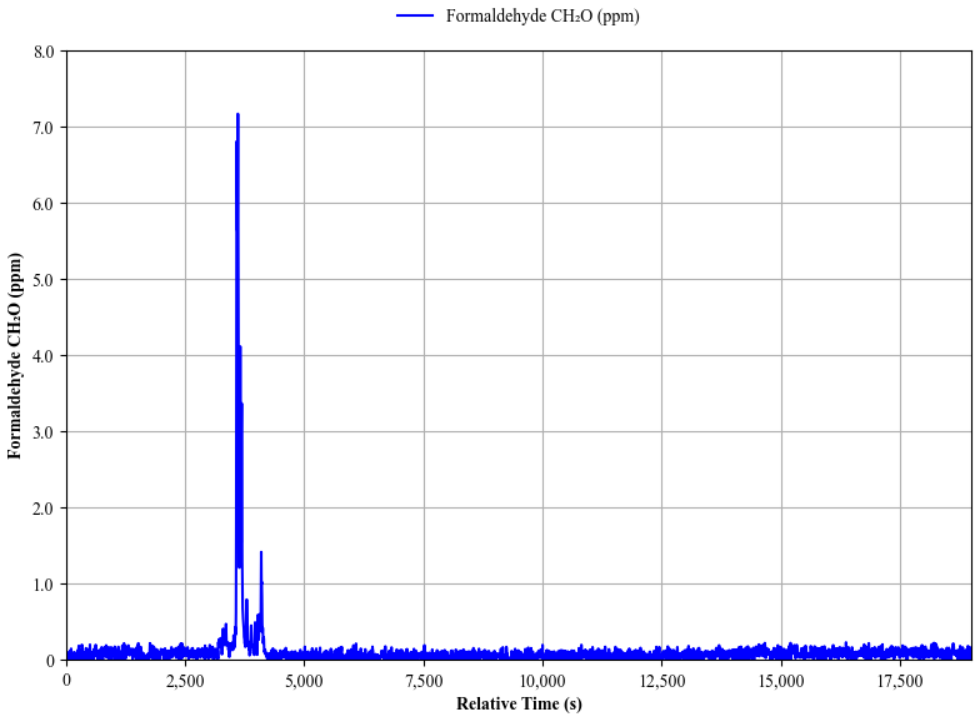

Figure 93: Formaldehyde CH_2O plot.

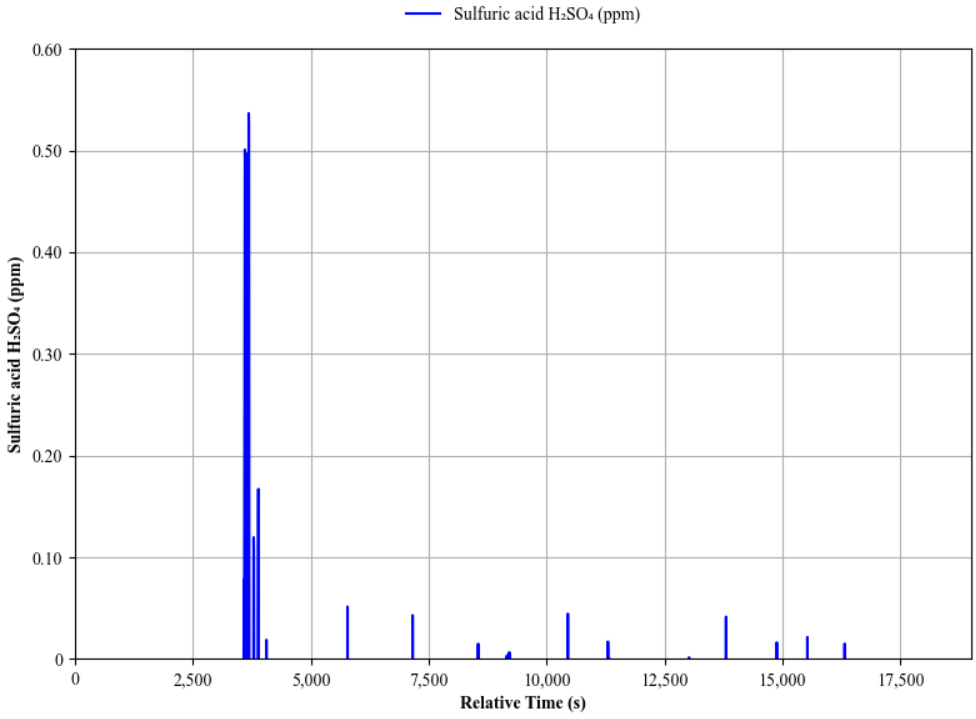

Figure 94: Sulfuric acid H_2SO_4 plot.

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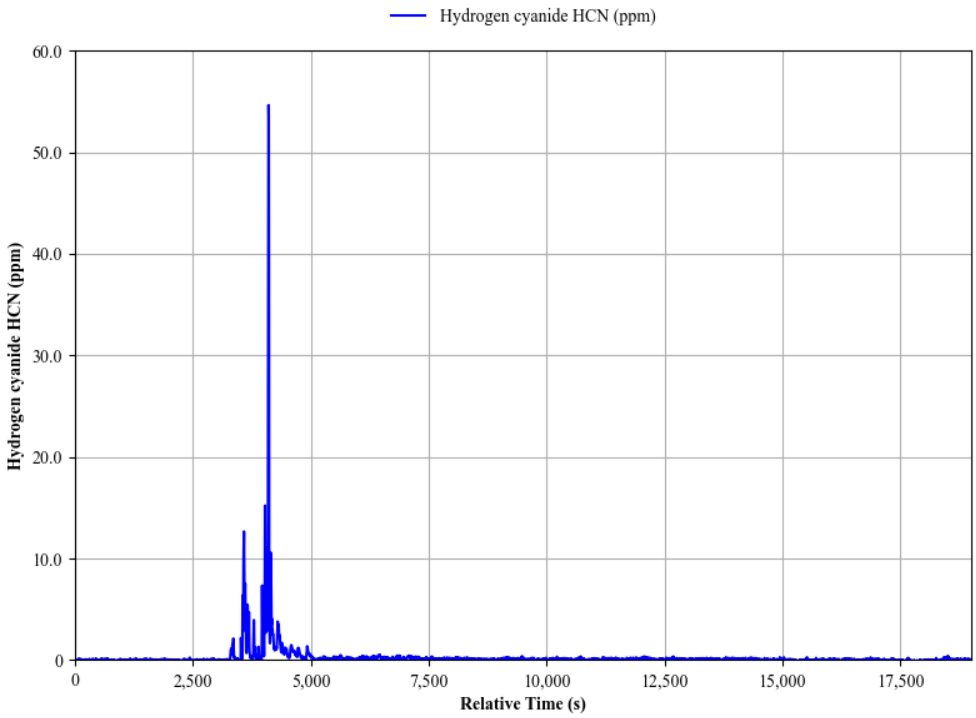

Figure 95: Hydrogen cyanide HCn plot.

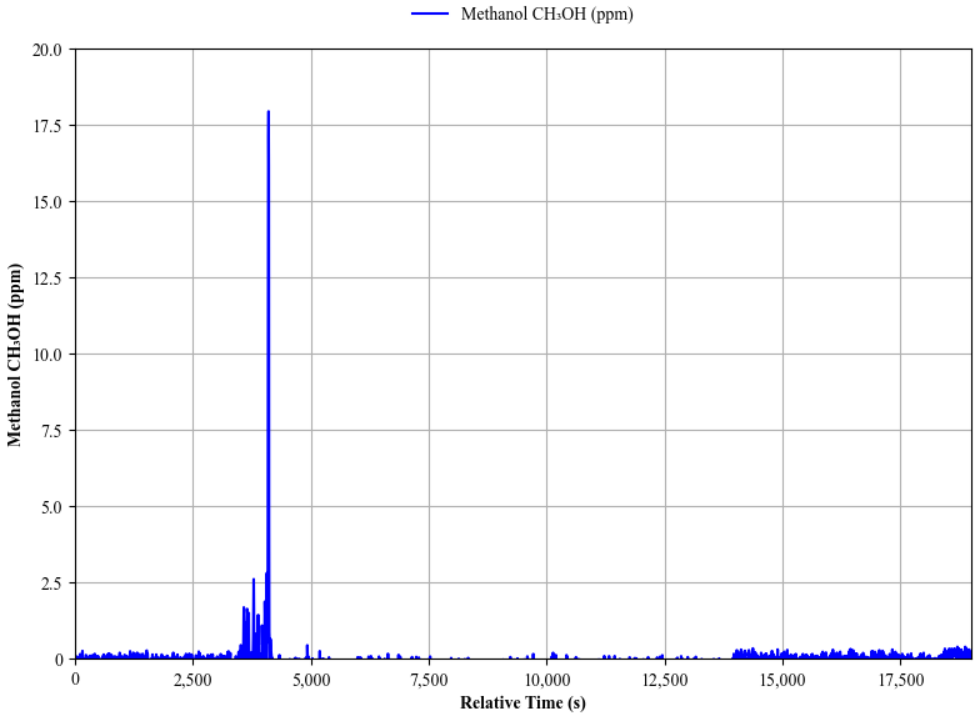

Figure 96: Methanol CH_3OH plot.

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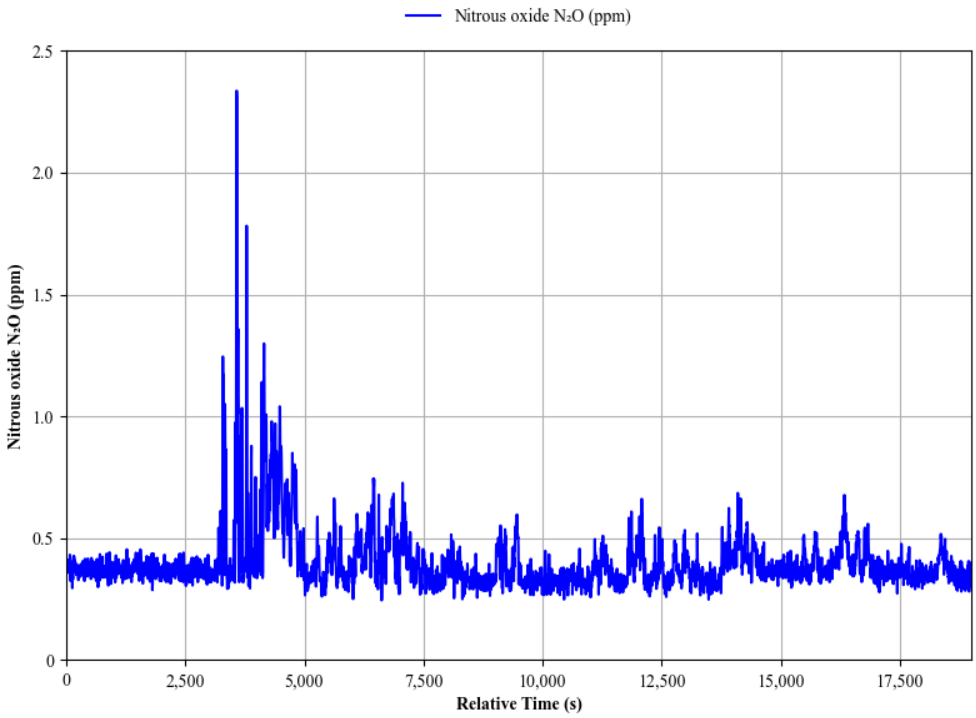

Figure 97: Nitrous oxide N_2O plot.

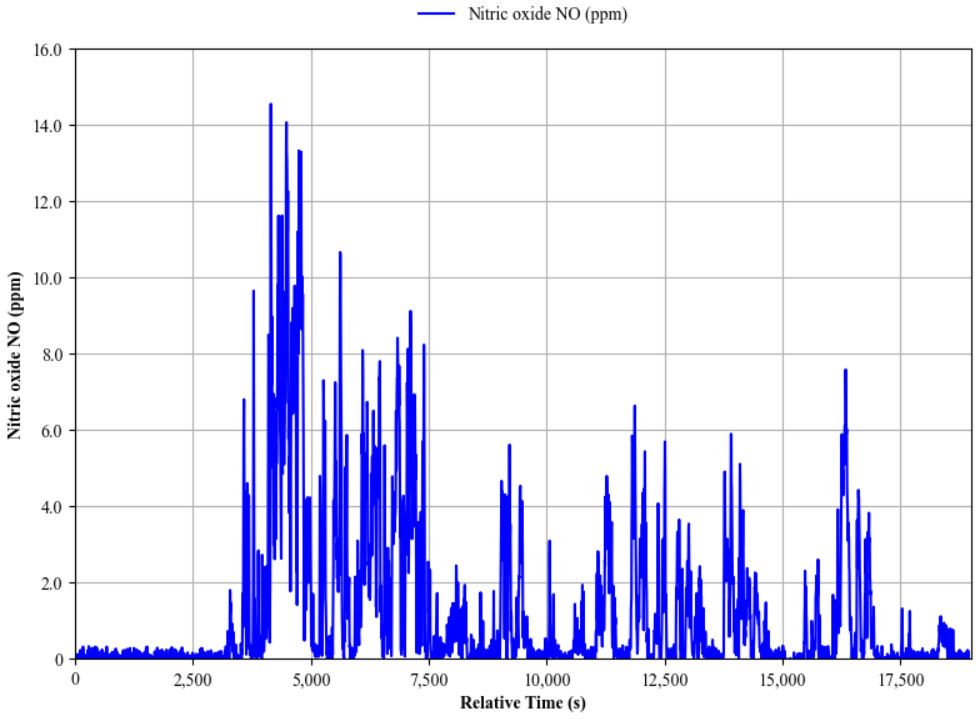

Figure 98: Nitric oxide NO plot.

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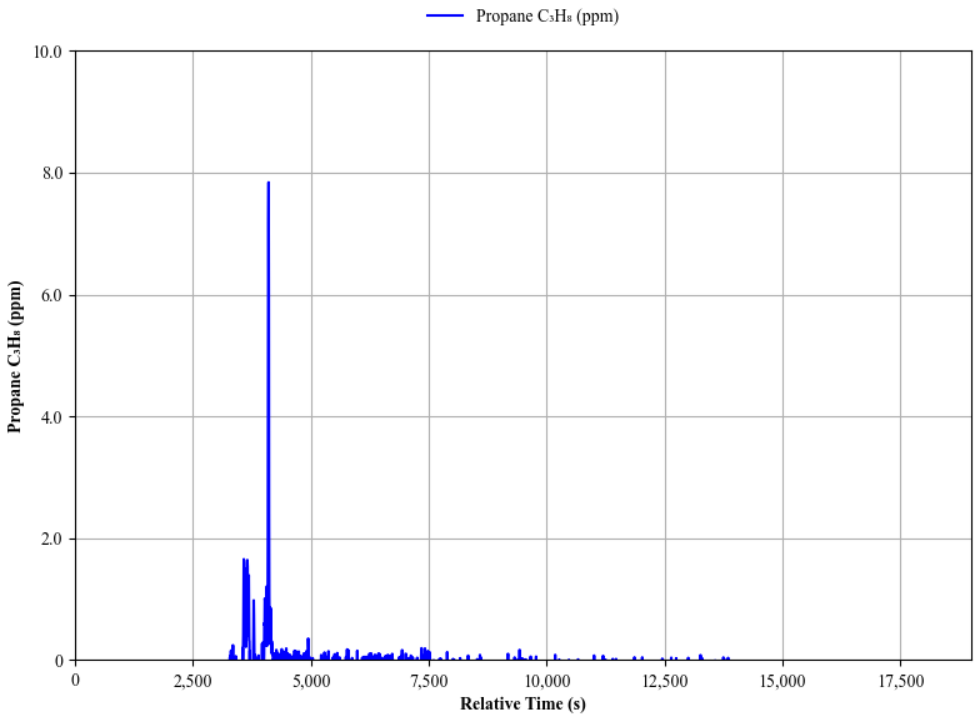

Figure 99: Propane C_3H_8 plot.

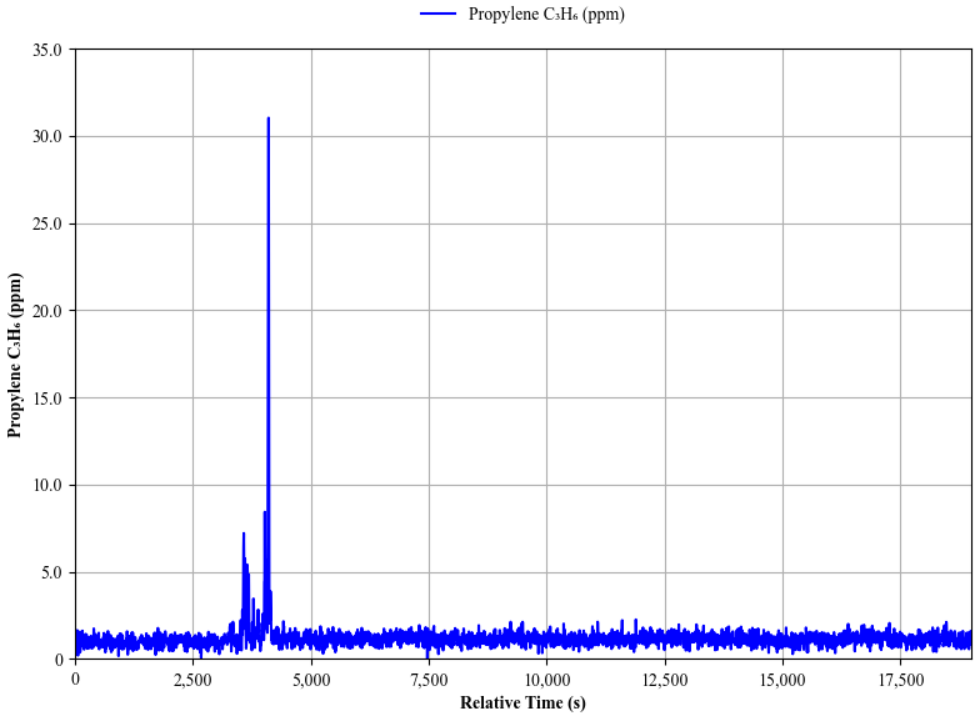

Figure 100: Propylene C_3H_6 plot.

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6 Post-Test Damage Evaluation

Figure 101 shows the damage that occurred to the Initiating BESS during the LSFT. According to temperature measurements inside the initiating Pod (Pod INC on the initiating BESS), as shown in Figures 42 through 41, TR propagated to all modules within the initiating pod. However, as shown by the temperature measurements throughout the remainder of the initiating BESS, this TR propagation did not progress to neighboring Pods, Pod INB or Pod IND, with the maximum internal temperatures in Pods INB and IND measured as 111°C and 200°C, respectively. As such, the TR propagation in initiating Pod INC and the associated fire caused extensive damage within Pod INC and extended to superficial damage on Pods INB and IND, as shown in Figure 101a. The superficial damage on Pod INB in the initiating BESS is mainly concentrated on the surface closest to the initiating Pod INC, but soot deposition and discoloration from high temperature exposure is also visible from the front face of the pod, as shown in Figure 101b. The majority of the damage visible on the initiating Pod INC is captured in Figure 101c, which shows that the majority of the outer-front cover on the Pod melted away, with extensive damage revealed underneath. One of the other doors located on the lower left portion on the front face of initiating Pod INC also popped open during the test due to high heat damage. This Pod also shows massive amounts of discoloration and damage from burning, soot deposition, and high temperature exposure. Similar to Pod INA, Pod IND on the initiating BESS also had its damage concentrated on the side of the Pod closest to the initiating Pod INC, with that superficial damage, including high temperature exposure discoloration, extending to the front surface of the Pod, as shown in Figure 101d. More detailed views of the damage to initiating Pod INC are provided in Figures 101e and 101g, with Figures 101e showing the molten metal that dripped from the upper portion of the pod during the fire alongside the inlet louver that fell from the pod, and Figure 101g showing a detailed view of the opening left behind after the inlet louver fell.



(a) Pods INB, INC (initiating), and IND - front oblique view of overall damage.



(b) Pod INB - front view of upper damage.

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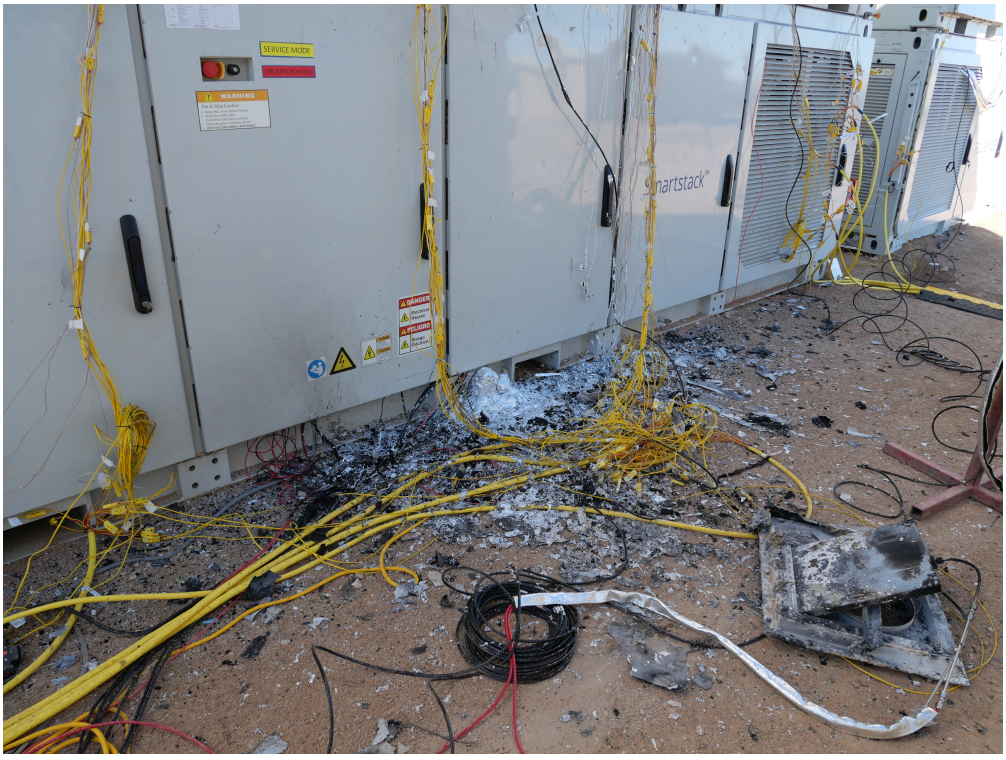
(c) Pod INC (initiating) - front view of upper damage.



(d) Pod IND - front view of overall damage.



(e) Pod INC (initiating) - lower damage.

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(f) Pod INC - front, overall view of damage.



(g) Pod INC - front, detailed view of inlet louver opening damage.

Figure 101: Post-test damage of initiating BESS.

While Figure 103 shows that there was virtually no damage to any of the Pods in Target BESS 2, Figures 102 and 103 shows that there was some damage to Target BESS 2 and Target BESS 3, respectively, due to the large fire size that occurred in the Initiating BESS. This fire resulted in high temperature exposure damage both behind the Initiating BESS (Target BESS 1) and across the aisle in front of it (Target BESS 3). Figures 102 shows that the damage to Target BESS 1 was concentrated in the upper back face of Pod 1B, where discoloration, soot deposition, and peeling paint are observed as a result of temperatures reaching nearly 350°C in that area, as shown in Figure 57b.

Figure 104a shows the overall damage of the BESS, with the damage being concentrated to Pods 3B and 3C on this target BESS, where temperatures of upwards of 400°C were achieved, as shown in Figure 68b. Figure 104b shows that the upper portions of Pods 3B and 3C have discoloration due to high temperature exposure damage, and Figures 104c and 104d shows that lower portions of these Pods also experienced elevated temperatures, nearly 250°according to Figure 68a, as evidenced by the curling and distortion of the stickers located on these Pods. However, the temperature measurements within these Pods, which maxed out internally at 57.6°C for Pod B and 53.2°C for Pod C, show that the internals of these Pods remained unharmed.

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(a) Pod 1B - front view of lack of overall damage.



(b) Pod 1B - back view of upper damage.



(c) Pod 1B - oblique back view of lack of lower (skid) damage.

Figure 102: Post-test damage of Target BESS 1.

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(a) Pod A - side view of lack of upper damage. (b) Pod A - side view of lack of lower (skid) damage.

Figure 103: Post-test damage of Target BESS 2



(a) All Target 3 pods - front view of overall damage.

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(b) Pods 3B, 3C - front view of overall damage.



(c) Pods 3B, 3C - detailed front view of lower pod damage.



(d) Pod 3C - detailed front view of lower pod damage.

Figure 104: Post-test damage of Target BESS 3.

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References

[1] R. H. Kyle Tian, "Test Report For ANSI/CAN/UL9540A Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems [Cell Level]," Technical Report CQES230800035101, SGS-CEC New Energy Technology (Chongqing) Co., Ltd., 2023.

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March 2, 2026

Taryn Egerton
Planning Director & Conservation Agent
Office of Planning and Community Development
Town of Agawam
Public Works and Municipal Annex
1000 Suffield Street
Agawam, MA 01001

RE: Responses to Comments regarding the Application for Site Plan Approval for 769 Silver Street

Dear Ms. Egerton,

On January 29, 2026, our project team submitted an Application for Site Plan Approval for a Battery Energy Storage System (BESS) at 769 Silver Street. This application was then scheduled to be discussed by the Planning Board at their meeting on February 19, 2026. In advance of that Planning Board meeting, comments regarding the application and project were received from three (3) Town departments: the Office of Planning & Community Development, the Engineering Division, and the Fire Department. The various comments from each Town department are outlined below and are immediately followed by responses from our project team in red.

If you could please distribute this memorandum to the appropriate Town departments who provided comments, the Planning Board, and any other entities you feel appropriate in advance of the March 5, 2026 Planning Board meeting, that would be appreciated. Here are the comments and the responses:

Office of Planning & Community Development

The following questions were raised in a Site Plan Review letter from the Office of Planning & Community Development dated February 19, 2026:

1. **Parking:** A total of twelve new parking spaces are shown for the office building. Will there be any handicap accessible spaces?

   - Response: Yes. The location of the designated handicap space has been added to Sheet AW1-C-201 and pavement marking details for handicap accessible spaces have been added to AW1-C-302.

2. **Sign Location:** The “Sign Details” sheet depicts the signs to be located on the project site. Signage will be posted throughout the property and exact locations can be found on the lighting and security plan. Will there be a sign installed on Silver Street?

   - Response: There will not be any signage installed along Silver Street. The only signage for the project will be the necessary safety signage.

3. **Dumpster Location:** Will there be a dumpster for the office/administrative building?

   - Response: This will be a future decision by the operations team. We expect yes, but the location is to be determined.

Engineering Division

The following questions were raised in a memorandum from the Engineering Division dated February 18, 2026:

1. The location of the existing sanitary sewer main, water main and laterals shall be shown on the Site Plans. The Contractor shall determine the condition of the existing water line within the easement prior to the beginning of construction.

- Response: All utility information collected in the site survey is shown on the plans. Additional notes have been added to the Utility Drawings (AW1-C-203) requiring that all utilities are located prior to the start of construction and that any conflicts with proposed improvements be resolved prior to construction.

  Additional notes have also been added to the Utility Drawings (See Note 4) regarding the existing water main in the utility easement at the center of the site. The note indicates the water main in the easement shall be located, inspected, and its condition assessed prior to the start of construction. Inspection shall be coordinated with the Agawam Water Department and Agawam Engineering Division.

2. Engineering requests that the Agawam Standard Detail W-2: Water Service in HMA (attached) be added to the Site Plans.

   - Response: The detail has been added to drawing AW1-C-302.

3. The locations of all proposed erosion control measures shall be shown on the Site Plans.

   - Response: Erosion control measures have been added to Drawings AW1-C-200, AW1-C-201 and AW1-C-202. Erosion Controls shown represent the minimum required controls at the start of construction. The site will be monitored during construction, and erosion control maintained or added in accordance with the details and notes on drawing AW1-C-300. This is reflected in Note 2.

     In addition to the erosion control silt fence there will be an additional silt fence or “Turtle Exclusion Fencing” installed on the perimeter, beyond the erosion controls of the site as part of coordination with NHESP in efforts to avoid direct harm to Eastern Box Turtle. This is also reflected in Note 3 on drawing AW1-C-200.

4. The existing and proposed impervious area quantities for the overall project should be included on the Site Plans.

   - Response: A summary of the existing and proposed impervious quantities for the project have been added to Sheet AW1-C-201.

5. The direction of the north arrow appears to be inaccurate on the Site Plans.

   - Response: The direction of the North Arrow has been updated on all plans.

6. At least one parking space on the project site must be designated a handicap van accessible space, as per current ADA regulations.

   - Response: The location of the designated handicap space has been added to Sheet AW1-C-201 and pavement marking details for handicap accessible spaces have been added to AW1-C-302.

7. Proposed bituminous asphalt installation should have a minimum top course thickness of one and one-half (1.5) inches and a minimum binder course thickness of three (3) inches. The details shown on Sheet AWI-C-301 of the Site Plans should be revised to reflect these standards.

   - Response: The details on Sheet AW1-C-301 have been revised accordingly.

8. Engineering recommends the level spreader for the proposed detention basin outlet be constructed with riprap instead of loam and seed to help prevent sediment erosion from high velocity discharges.

   - Response: The design was initially prepared to minimize the amount of rip rap per discussions with NHESP regarding turtle habitat. We are currently including rip rap protection at the overflow, at the outlet pipes (see Comment #20 below) and will add rip rap protection along the overflow edge of the level spreader.

9. As stated in the Stormwater Management Report, the post-development Subcatchment SC-1 was divided into four separate watersheds (SC-IA, B, C & D). These delineations and the time of concentration paths for these watersheds are not shown on the Post-Development Conditions Plan. As such, Engineering was unable to complete their review of the stormwater calculations.

- Response: The watershed delineations and time of construction paths have been added to drawings AW1-D-101 in the updated Stormwater Management Report.

10. The lengths of the time of concentration paths noted on the Pre- & Post-Development Condition Plans appear to be inaccurate. The length of the path segments noted on the plans do not align with the distances provided when measured using the scale noted on the plan.

    - Response: We have reviewed the time of concentration path segments and updated as needed.

11. Engineering requests that an electronic copy of the HydroCAD files be submitted for review.

    - Response: The HydroCAD files are provided with the updated information.

12. The width of the proposed vegetated buffer strip must be a minimum of twenty-five (25) feet in order to provide pretreatment TSS removal, as per the Massachusetts Stormwater Regulations.

    - Response: Any vegetated buffers have not been included in TSS calculations. Vegetated buffers were shown to demonstrate qualitative improvement. TSS calculations for other BMPs have been included in the Stormwater Management Report. See Comment #16.

13. The proposed detention basin must be designed such that there is one (1) foot of freeboard area between the highest elevation of the basin and the peak elevation of the 100-year storm event. According to the submitted HydroCAD calculations, the 100-year peak elevation is 182.43, which only provides 0.07 feet of freeboard between the highest elevation of the basin - 182.50.

    - Response: The design of the detention basin has been updated to include a sediment forebay for improved treatment and additional storage. The peak elevation for the forebay and detention basin now provide at least one (1) foot of freeboard between the highest elevation of the basin and the peak elevation of the 100-year storm event.

14. The elevations of the basin emergency overflows shall be shown on the Grading Plan or Basin Overflow Section Detail.

    - Response: The basin emergency overflow elevation has been added to the Grading Plan (Dwg AW1-C-202) and the Basin Overflow Section Detail on Dwg AW1-C-301.

15. There was no Operations & Maintenance Plan included with the Stormwater Management Report.

    - Response: A Post-Construction Stormwater Inspection & Maintenance Plan has been included in Attachment H of the Stormwater Management Report.

16. The Total Suspended Solids (TSS) removed must be calculated for all proposed BMPs.

    - Response: TSS Removal Calculations have been added to the Stormwater Management Report for the main BMP treatment train that accept stormwater from the BESS yard. Two calculations are provided, one that covers the full treatment train including a drainage swale, sediment forebay and detention basin. A second calculation was provide to show TSS removal where stormwater may flow direct to the sediment forebay. Calculations are included in Attachment I.

17. Engineering is requesting additional information regarding how the treatment volume area between the basin bottom elevation of 178.00 and lowest outlet invert of 179 .5 will drain. If this portion of the basin is designed as an infiltration BMP, additional pretreatment of stormwater may be required. The basin should be designed such that all water drains from the basin within 72 hours, as per the Massachusetts Stormwater Regulations. Test pits will need to be performed at the location of the proposed detention basin to determine groundwater elevation and soil infiltration rates.

    - Response: A geotechnical investigation was conducted at the site. Nine soil borings and ten test pits were conducted around the site. The borings and test pits consistently revealed loose sand below the top subsoil/fill layer. We have prepared a calculation, included in Attachment J of the Stormwater Management Report, using a typical value for the hydraulic conductivity of sand with silt to demonstrate the time required for the basin to draw down.

Boring and test pit locations are shown on the plan and the geotechnical report has included in Attachment L. A summary of the boring and test pit information is included with the draw down calculation.

18. Test pits will be required in all areas that stormwater infiltration is proposed to verify soil conditions and ground water elevations.

    - Response: A geotechnical investigation was conducted at the site. Nine soil borings and ten test pits were conducted across the site. Although borings and test pits were not conducted in the exact location of the stormwater basin, the results were consistent across the site in terms of both soils encountered and depth to groundwater. The boring locations have been added to the plan and the geotechnical report has included in Attachment L.

19. Engineering is concerned the velocity of the discharge from the detention basin outlet pipes may be too high during heavy storm events. Additional outlet protection may be necessary. It is recommended that a hydraulic analysis of all outlet pipes be performed and submitted to Engineering for review.

    - Response: A hydraulic analysis including rip rap sizing calculations have been included in Attachment K of the Stormwater Management Report. Additionally, updates to the HydroCAD model, including a less conservative approach to modeling the topping stone and modifications to the detention basin have allowed for a reduction in the overall number of discharge pipes.

20. Engineering recommends the level spreader for the detention basin be expanded to include the discharge from the outlet pipes.

    - Response: The level spreaders and outlet pipes have been adjusted such that all outlet pipes discharge through the level spreaders. In combination with Comment #8 above, the rip rap outlet protection for the outlet pipes have been combined into the level spreader for outlet protection.

21. Trash racks will need to be installed at the upstream inverts of the basin outlet pipes.

    - Response: A Culvert End Bar Rack detail has been added to Sheet AW1-C-301 and the Bar Rack has been called out on Sheet AW1-C-202.

22. Engineering request specifications on the "Clean Gravel Fill" to be used within the topping stone areas to ensure infiltration occurs as anticipated.

    - Response: Specifications for the Clean Gravel Fill and Topping Stone have been added to the Schedule of Surface Finishes on Sheet AW1-C-301.

Fire Department

The following questions were raised in an email from the Fire Department on February 19, 2026 regarding text within the Application for Site Plan Approval (page numbers are noted in underlined font):

1. Page 156 – "**The Smartstack has a standardized, modular design that is not customizable or adjustable and is currently obtaining a UL 9540 factory listing.**"

   Questions: What is the timeframe for the Smartstack to obtain UL9540 factory listing? What is the plan if for some reason it does not receive the listing? A full UL9540 certification / UL9540A test report must be provided in order to fully vet the proposal and site plan.

   - Response: UL9540A unit level, cell level, and module level report is attached. UL9540 certification documentation are to follow in the next 1-2 months.

2. Page 123 – "**Each Smart Skid is equipped with three multi-detectors and a Fire Alarm Control Unit (FACU).**"

   Question: What is a multi-detector? Please provide specifications.

   - Response: A multi-detector is a smoke and heat detector. The make and model will be the OOH740 + DB1 024R-AT or equivalent. See attached datasheet.

3. Page 119 – "**This document is an emergency response plan (ERP) for the Agawam battery energy storage system (BESS) facility. The ERP provides a facility overview, site design, type of equipment, safety features, suppression and detection information along with response recommendations for potential BESS facility failure scenarios."**

   Questions: Understanding that it is not sound engineering to install fire suppression for BESS batteries, is there a fire suppression system installed in each Smartstack for system support components (i.e. electronics, HVAC, etc.) to prevent the spread of fire to Smartstack batteries? If not, what is the reasoning behind not having a fire suppression system for system support components? An engineering narrative should be provided justifying the omission of fire suppression if applicable.

   - Response: Correct, we will not be installing fire suppression in the battery containers. Currently we intend to install a fire suppression system within the support components cabinets that is separate from the battery container and includes electronics, HVAC, etc. If further analysis determines a fire suppression within support components cabinets is not beneficial, we will provide an engineering narrative justifying this decision.

4. The Agawam Fire Department is ordering an additional yard hydrant at 769 Silver St. The exact location will be determined at a later date and we will work with the developer to identify an appropriate location.

   - Response: Understood. We will collaborate with the Agawam Fire Department to determine an appropriate location.

Please do not hesitate to contact our project team with any questions regarding any of the above responses. Thank you.

Sincerely,

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STORMWATER MANAGEMENT REPORT
AGAWAM ENERGY CENTER
769 SILVER STREET
AGAWAM, MASSACHUSETTS

Prepared for

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SME
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TABLE OF CONTENTS

Section No.	Title	Page No.
1.0	**INTRODUCTION**	**1**
2.0	**PROJECT DESCRIPTION**	**1**
3.0	**SITE WATERSHED**	**4**
4.0	**STORMWATER MANAGEMENT STANDARDS**	**5**
4.1	Standard 1: No New Untreated Discharges	5
4.2	Standard 2: Peak Rate Attenuation	6
4.3	Standard 3: Recharge	8
4.4	Standard 4: Water Quality	9
4.5	Standard 5: Land Uses with Higher Potential Pollutant Loads	9
4.6	Standard 6: Critical Areas	10
4.7	Standard 7: Redevelopment and Other Projects Subject to the Standards only to the Maximum Extent Practicable	10
4.8	Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control	10
4.9	Standard 9: Operation and Maintenance Plan	11
4.10	Standard 10: Illicit Discharges	11
5.0	**CONCLUSION**	**11**

LIST OF ATTACHMENTS

ATTACHMENT A	NRCS SOIL SURVEY
ATTACHMENT B	STORMWATER DRAINAGE FIGURES
ATTACHMENT C	PRE-DEVELOPMENT HYDROCAD CALCULATIONS
ATTACHMENT D	POST-DEVELOPMENT HYDROCAD CALCULATIONS
ATTACHMENT E	TREATMENT VOLUME CALCULATIONS
ATTACHMENT F	LONG TERM POLLUTION PREVENTION PLAN
ATTACHMENT G	ILLICIT DISCHARGE STATEMENT
ATTACHMENT H	POST-CONSTRUCTION STORMWATER INSPECTION & MAINTENANCE PLAN
ATTACHMENT I	TSS REMOVAL CALCULATIONS
ATTACHMENT J	HYDRAULIC CONDUCTIVITY AND DRAWDOWN CALCULATION
ATTACHMENT K	RIP RAP SIZING CALCULATION FOR PIPE OUTLETS
ATTACHMENT L	GEOTECHNICAL REPORT

LIST OF FIGURES

Figure No.	Title	Page No.
1	SITE LOCATION MAP	3

STORMWATER MANAGEMENT REPORT
AGAWAM ENERGY CENTER
AGAWAM, MASSACHUSETTS

1.0 INTRODUCTION

This Stormwater Management Report was prepared by Sevee & Maher Engineers, Inc. (SME) to assess stormwater management for the construction of the proposed Agawam Energy Center project in Agawam, Massachusetts.

The Applicant proposes to develop an approximately 250-megawatt (MW), 4-megawatt hour (MWh), battery energy storage system (BESS) on the 17.2-acre site located at 769 Silver Street. The project will consist of battery containers, transformers, inverters, equipment pads, and associated infrastructure, including an interconnection substation. The proposed BESS site will be accessed from Silver Street. The battery containers will be surrounded by a combination of 18-foot-high solid wall, and 8-foot-high chain link and wood fencing that will act as physical, visual, and sound barriers as detailed in the attached plans. The BESS equipment will connect to the existing South Agawam Switching Station via the project's own substation and short transmission line.

The stormwater design is based on the water quality and quantity objectives identified in the stormwater management requirements pursuant to Chapter 175, §175-35 of the Code of the Town of Agawam and the Massachusetts Stormwater Management Standards.

The project will be located completely outside of all Areas Subject to Protection under M.G.L. c. 131, Section 40 listed in 310 CMR 10.02(1), as well as all buffer zones associated with Areas Subject to Protection. During construction, various Best Management Practices (BMPs) including erosion controls will be utilized to prevent impacts to adjacent resource areas and buffer zones.

2.0 PROJECT DESCRIPTION

The project property is an approximately 17-acre parcel on Silver Street in Agawam, Massachusetts. The property is zoned Industrial and is currently used for commercial/industrial purposes. The majority of the site being used for the project is currently developed with gravel and paved access roads, several buildings and other unvegetated gravel areas used or surface storage of equipment and materials. The Applicant plans to redevelop the site as an energy center with the addition of Battery Energy Storage Systems (BESS).

In accordance with the Chapter 175-35 Stormwater Management Plan, previously developed sites must meet the stormwater management standards to the maximum extent practicable. However, if it is not practicable to meet all the standards, the new system must be designed to improve existing conditions.

The addition of a washed crushed stone surface over much of the site, additional plantings and vegetation at the site entrance and around the perimeter of the site and the addition of grassed swale, sediment forebay and stormwater detention pond, the proposed conditions will improve upon existing conditions.

The site was identified for its gentle land slope, prior commercial/industrial use, as well as the commercial/industrial use of neighboring properties, as well as its proximity to the adjacent Eversource substation where it will make its electrical interconnection. The location of the project is shown in Figure 1, Site Location Map. More details on the project site are shown in the engineering drawing set submitted with this report.

As noted above, most of the site has been previously developed and disturbed for previous commercial use. Much of the site consists of uncontrolled, exposed gravel surfaces. To prepare the site, several of the existing buildings will be removed and the site will be graded to provide a uniform grade across the site. The proposed grading plan was prepared to generally maintain existing drainage patterns and avoid large cuts and fills.

The finished surface within the BESS yard will include a combination of compacted gravel access roads and a crushed "topping stone" surface. The topping stone used in the BESS yard and the proposed substation is a washed crushed stone used in the electrical grounding system for the facility for high electrical resistivity but also provides significant benefits in stormwater management. This crushed stone surface performs differently than most common construction practices. The stone which is washed to remove fines and contains large void ratios provides permeability plus storage.

Any disturbed areas or existing unvegetated areas on the perimeter of the site that are not required for roads, or the BESS units will be restored with loam and seed and native plantings.

The area at the front of the site, immediately off Silver Street, will include the Operations and Maintenance building and the associated entrance and parking area. The Operations and Maintenance building will utilize one of the existing buildings on site. This area will include driveway and parking improvements and landscaping improvements including a visual screening berm and plantings.

As noted above, the site will be graded to maintain existing drainage patterns. Most of the site will drain to the east towards the wetlands. In the proposed condition a grass swale, forebay and detention pond will be added to provide additional treatment of stormwater and management of peak flows. The site drainage and stormwater management is discussed in more detail below.



0 1000 2000 4000

1 INCH = 2000 FEET

FIGURE 1
SITE LOCATION MAP
LONGROAD ENERGY
AGAWAM ENERGY CENTER
AGAWAM, MASSACHUSETTS

SME
SEVEE & MAHER ENGINEERS

DWG: SITE LOCATION PLAN LMN: NONE CTB: SME-STD.CTB JOB#: 250579.01 REV: 12/17/2025

3.0 SITE WATERSHED

On-site soils were identified using the Natural Resources Conservation Service (NRCS) soil information for Hampden County, Massachusetts, Central Part. A copy of the custom Soil Resource Report is included in Attachment A of this report. The report includes a soil map for the project area. Soil mapping information is also included in the watershed plans.

The soil within the area of work consists of Merrimac fine sandy loam (254A, 254B, 254C and 254D) and Amostown fine sandy loam (258B). Soil classifications for 254A, 254B, 254C and 254D are Hydrological Soil Group (HSG) A and were modeled as HSG A for purposes of water quantity calculations. Soil Classification 258B is HSG C/D and was modeled as HSG D for purposes of water quantity calculations.

Additional soils information is provided in a geotechnical report, which is included as Attachment L.

Existing Conditions

The ground surface on most of the property generally slopes towards the east in the direction of wetlands, with grades in the developed area ranging from less than 1 percent to 5 percent. The site is characterized by a low wetland area on the eastern side of the site, extending beyond the property line. The majority of the parcel is developed or previously disturbed except for the vegetated areas around the wetland areas which make up approximately 2 acres of the 17-acre site. Stormwater flows currently travel uncontrolled across the primarily unvegetated surface towards the wetlands.

Under existing conditions, stormwater runoff from most of the project area comes from Subcatchment 1 (SC-1). Stormwater generally flows from the higher areas to the wetlands, identified as Analysis Point (AP-1) for this report. The far eastern side of the site (east of the wetlands), still within the SC-1 drainage area, flows west towards the same AP-1 wetland area. This area on the east side of SC-1 is largely gravel and appears to be used for access and material storage.

There is a small drainage subarea at the front of the site that is modeled as Subcatchment 2 (SC-2), where flows from the existing driveway and parking area flows to Silver Street, which is identified as Analysis Point (AP-2) for this report.

There is a third small drainage area in the southwest corner of the site, that flows to the adjacent property to the south. The subarea is made of largely of existing buildings and driveways, with some lawn area. This is modeled as Subcatchment 3 (SC-3) and identified as Analysis Point (AP-3) at the property line.

Proposed Conditions

Under the proposed conditions, the overall site drainage patterns will be similar to existing conditions. The analysis points will be the same as those described in the existing conditions analysis to allow for easy comparison of pre- and post-development peak flows. The site will be graded to provide a more uniform

slope, approximately 1 to 1.5% over most of the site but still following similar drainage patterns. Under proposed conditions, all stormwater from the BESS yard (SC-1A and SC-1B) will be routed to a proposed sediment forebay and detention pond located on the east side of the site between the developed area and the wetlands. The pond and forebay are both designed with storage below the lowest outlet invert to provide space for storage of the "first flush" before any discharge. A vegetated drainage swale will be constructed along eastern edge of the BESS yard to intercept surface flow from a large portion of the site and direct it to the pond while providing additional opportunity for removal of sediment.

The eastern portion of the site that contains the proposed substation (SC-1C) will also maintain existing stormwater flow patterns with stormwater draining east to west towards the wetlands. The substation area will be graded to a consistent 1% slope. There is no stormwater treatment proposed in this area. The addition of the substation yard and its "topping stone" surface represent an overall improvement in this area, compared to the existing gravel an poorly vegetated surface that currently existing in the area. The topping stone provides some initial storage in the voids, helping to reduce peak flows and filter stormwater. This area is also extremely flat and the addition of additional ponds or treatment structures that require gravity would require significant cut/fill and additional disturbance of currently undisturbed areas and areas within 100 feet of the wetlands.

The drainage areas at the front of the site (SC-2 and SC-3) that flow to Silver Street and the adjacent parcels have changed slightly in size and shape but overall, there will be no net increase in peak flows to these areas and improvements partially due to changes in changes in the vegetated and landscaped areas.

Stormwater management plans identify the on-site drainage patterns before and after development (see Drawings D-100 and D-101). These drawings are included as Attachment B for reference.

4.0 STORMWATER MANAGEMENT STANDARDS

4.1 Standard 1: No New Untreated Discharges

The proposed project consists of new point source discharge locations associated with the proposed detention basin. The outlet from the proposed stormwater basin will include two level spreaders to disperse stormwater flows from broad crested overflow weir, and a single discharge pipe. Both the broad crested weir and the drainage pipe outlet will include rip rap protection to disperse stormwater at acceptable velocities and minimize erosive forces at the outfall. and erosive forces. Construction details of the level spreader, overflow structure and pipe inlets and outlets are included in the engineering plan set provided for the project.

All other areas not being directed to the pond will continue to flow overland, similar to existing conditions.

4.2 Standard 2: Peak Rate Attenuation

Stormwater peak flow rates were modeled for the 2, 10-, 25- and 100-year/24-hour storm events with Type III Soil Conservation Service rainfall distribution, using HydroCAD Version 10.20. HydroCAD is based on methodologies developed by the U.S. Department of Agriculture Soil Conservation Service (SCS), namely TR-55 and TR-20, to calculate runoff rates and volumes based on descriptions of land use, ground characteristics, and size, in combination with other hydraulic and hydrologic calculations.

Rainfall depths for each of storms identified above were obtained from NOAA Atlas 14 Volume 10 (Perica et al., 2015; Rev. 2019) and accessed via the NOAA Precipitation Frequency Data Server.

The time of concentration (Tc) for each subcatchment was calculated in HydroCAD using a combination of sheet flow and shallow concentrated flow. Sheet flow uses roughness coefficients (Manning's n) and watercourse slope to calculate travel time of stormwater runoff for each subcatchment. The site was modeled using a maximum 100 foot of sheet flow. The shallow concentrated flow method was used to determine the velocity factor along the flow path of the runoff and thereby derive a travel time. The time of concentration of each subcatchment is the combination of these travel times. A minimum time of concentration of 6 minutes was used for all subcatchments, for both existing and proposed conditions.

Site drainage from the proposed development will generally follow the pre-development flow patterns.

As discussed in Section 3 above, the site was divided into the following subcatchments and analysis points. The subcatchments are shown on the Figures included in Attachment B.

Existing Conditions
Analysis Point 1 (AP-1) – Wetlands on east side of the site.
Subcatchment (SC-1) - Represents most of the site, including area to the east and west of the wetland that represents AP-1. This includes some area beyond the property line that flows onto the site.

Analysis Point 2 (AP-2) – Area along Silver Street
Subcatchment 2 (SC-2) – This area is largely made of the "front yard" of the property, including driveways and parking areas.

Analysis Point 3 (AP-3) - Southwest corner of the property.
Subcatchment 3 (SC-3) – This area is made up largely of adjacent buildings and driveway.

Proposed Conditions
Analysis Point 1 (AP-1) – Wetlands on east side of the site.
SC-1A – Northern portion of the BESS yard and a portion of the main access.

SC-1B – Southern portion of the BESS yard and a portion of the Operations and Maintenance Building and entrance area.
SC-1C – The northern and eastern perimeter areas of the site, including the wetlands and the substation area.

Analysis Point 2 (AP-2) – Area along Silver Street
SC-2 – The front of the property including landscaped and parking areas that flow to Silver Street.

Analysis Point 3 (AP-3) – Southern Side of the property.
SC-3 – Area on the southwest corner of the property that includes existing buildings and driveways and a small portion of the BESS yard.
SC-1D – A small area on the southeast corner. Part of SC-1 but represents a small area that will follow to the south due to the addition of a screening berm. Overall no increase in flow to the south.

A comparison of peak flows to the three analysis points is summarized in Table 1. As shown in Table 1, our model indicates that there will be no increase in peak flow rates to any of the three analysis points under the proposed conditions for the 2-year storm, 10-year storm, 25-year and 100-year storm. The proposed detention pond before AP-1 is adequately sized to handle the stormwater flows and control the discharge rate.

SC-2 contributing to AP-2 will remain largely the same in post-development conditions with updated landscaping and plantings between the project and Silver Street. The model yields a nominal decrease towards Silver Street.

SC-3 will be decreased in size in the post-development condition, with more drainage directed to the east. As a result, AP-3 will see a decrease in flows and there will be no risk of an increase in flows to adjacent properties.

TABLE 1
STORMWATER QUANTITY SUMMARY

	2-Year Storm		10-Year Storm		25-Year Storm		100-year Storm	
	Existing	**Proposed**	**Existing**	**Proposed**	**Existing**	**Proposed**	**Existing**	**Proposed**
Analysis Point 1 (cfs)	4.28	2.07	17.41	12.75	27.74	20.82	45.42	36.12
Analysis Point 2 (cfs)	<1	<1	1.29	1.54	2.12	2.33	3.57	3.83
Analysis Point 3 (cfs)	4.15	1.22	7.86	3.33	10.2	5.09	13.78	8.09

Copies of the calculations for the pre-development runoff are in Attachment C and post-development runoff is provided in Attachment D.

4.3 Standard 3: Recharge

The soil within the area of work consists of Merrimac fine sandy loam (254A, 254B, 254C and 254D) and Amostown fine sandy loam (258B). Soil classifications for 254A, 254B, 254C and 254D are Hydrological Soil Group (HSG) A and were modeled as HSG A for purposes of water quantity calculations. Soil Classification 258B is HSG C/D and was modeled as HSG D for purposes of water quantity calculations.

For A-type soils, the Stormwater Management Guidelines require that a recharge device be provided with capacity equal to 0.60-inches the impervious area. To evaluate this re-development project we looked at each subarea to confirm if there was an increase in the impervious area, to calculate the recharge volume for new impervious area.

For SC-1, a large portion of the site in proposed conditions, including the BESS area and the substation yard, will be covered with a 6-inch layer of the crushed “topping stone”, as part of the electrical grounding system. Although these areas are “stone” or “gravel” they do not behave the same as the compacted gravel surfaces that currently exist on the site and are proposed for the access roads at the site. The washed crushed stone mix overlaying 18-inches of gravel fill will provide improved permeability as well as storage in this stone, given its high void ratio. For this reason, this material was not considered impervious for the purposes of the recharge calculation. As a result, for SC-1 there is a net decrease in impervious area in the proposed conditions. In addition, the 6-inch layer of crushed stone with a void ratio of approximately 0.3, will provide 1.8 inches of initial storage in the stone. As a result, no recharge volume was calculated.

For SC-2 and SC-3 there was a reduction in impervious area in the proposed condition. As a result, no recharge volume was calculated.

4.4 Standard 4: Water Quality

The minimum required water quality treatment volume for the proposed development is one half inch of runoff times the impervious surface area. As discussed in 4.3 above, there is a net decrease in impervious area for the project when considering the characteristics of the topping stone. In addition, the topping stone also has the benefits of being a washed stone with little or no sediment load and also helps to trap sediment from other areas.

However, when determining a treatment volume for stormwater from SC-1A and SC-1B that will be flowing to the proposed detention based we included all paved and gravel areas, including the topping stone, to provide a conservative volume.

A calculation of the required treatment volume as well as a comparison of the treatment volume to the proposed volume provided below the lowest outlet from the pond is included in Attachment E. The storage below the lowest invert will provide additional opportunities for sediment removal and infiltration.

The topping stone, perimeter vegetated buffer strip and vegetated drainage swale will provide removal of sediment from stormwater flows along the path to the pond, providing pre-treatment.

The proposed detention basin and the vegetated swale along the east side of the BESS yard will provide an improvement in the quality of the stormwater runoff compared to the uncontrolled runoff from the large unvegetated gravel yard in the existing conditions.

Similar to the discussion in Section 4.3, no stormwater treatment was provided for SC-2 and SC-3 due to the net decrease in impervious surface in these areas.

As required by the Stormwater Management Standards, a Long-Term Pollution Prevention Plan is provided in Attachment F. In short, the plan identifies suitable practices for source control and pollution prevention measures.

4.5 Standard 5: Land Uses with Higher Potential Pollutant Loads

The proposed facility is not considered a Land Use with Higher Potential Pollutant Loads. No exterior machinery, heavy equipment or fleet storage is proposed and projected daily vehicle traffic volumes are estimated to be very low. The precautions and procedures for maintenance of battery storage equipment will be outlined in the Operations and Maintenance Plan for the facility. Overall, the proposed site

improvements will result in a more controlled environment with a lower sediment load. Therefore, Standard 5 does not apply to this project.

4.6 Standard 6: Critical Areas

The project is not located within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges are not located near or to any other critical area requiring the use of the specific source control and pollution prevention measures.

4.7 Standard 7: Redevelopment and Other Projects Subject to the Standards only to the Maximum Extent Practicable

The site was historically used as a lumber and yard for storage of various materials. Most of the site is a combination of various impervious and unvegetated surfaces, including a paved entrance driveway and parking near Silver Street, compacted gravel driveways and storage yard and several buildings. The total impervious area under current conditions for the area analyzed, which includes some off-site areas is approximately 15 acres.

Under the proposed conditions, there will be additional plantings and landscaped areas at the entrance and on the perimeter of the site. Gravel access roads to provide access to equipment and substation will be more defined and existing unvegetated areas that are not proposed for development will be revegetated. Several existing buildings will be removed. The area around the battery storage units and within the substation yard will be finished with a washed "Topping Stone" as part of the grounding system for the equipment. Due to the nature of the rough surface and high void ratio of the topping stone will provide initial storage and improve infiltration of stormwater and initial treatment compared to the existing gravel surface. The total impervious area under proposed conditions (gravel roads, buildings, equipment foundations) not counting the topping stone is approximately 7 acres.

The change in surface materials and the addition of the grassed swale, sediment forebay, detention basin, and increased landscaping in the proposed redevelopment will result in improved stormwater quality.

4.8 Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control

In accordance with the Massachusetts Stormwater Management Standards and the NPDES General Permit, a SWPPP will be prepared prior to construction. The erosion control notes and details included in the engineering plan set submitted for the project will cover most of the SWPPP requirements. A copy of the SWPPP will be provided to the Town prior to construction.

4.9 Standard 9: Operation and Maintenance Plan

An Operations & Maintenance plan has been prepared for the project and submitted as part of the Site Plan Approval Application. In addition, a Post-Construction Stormwater Inspection & Maintenance Plan is included in Attachment H.

4.10 Standard 10: Illicit Discharges

The submitted Long-Term Stormwater Pollution Prevention Plan (Attachment F) specifies measures to prevent illicit discharges from entering the stormwater management system. Source control and response plans are also specified to prevent illicit discharges from being conveyed through the stormwater management system.

Consistent with the Massachusetts Stormwater Handbook, a signed Illicit Discharge Compliance Statement prior to discharging stormwater to the post-construction stormwater BMP's. A draft copy of the Illicit Discharge Statement is provided in Attachment G.

5.0 CONCLUSION

The stormwater management for the Agawam Energy Center was designed in accordance with Massachusetts Stormwater Standards and Town of Agawam requirements. Stormwater runoff will be controlled through the addition of stormwater detention pond and the stabilization of existing gravel and unvegetated areas with new vegetative cover and native plantings and a "topping stone" surface. As a result, we do not anticipate any adverse impacts anticipated on downstream drainage or abutting properties.

ATTACHMENT A

NRCS SOIL SURVEY

SME
SEVEE & MAHER
ENGINEERS

United States Department of Agriculture

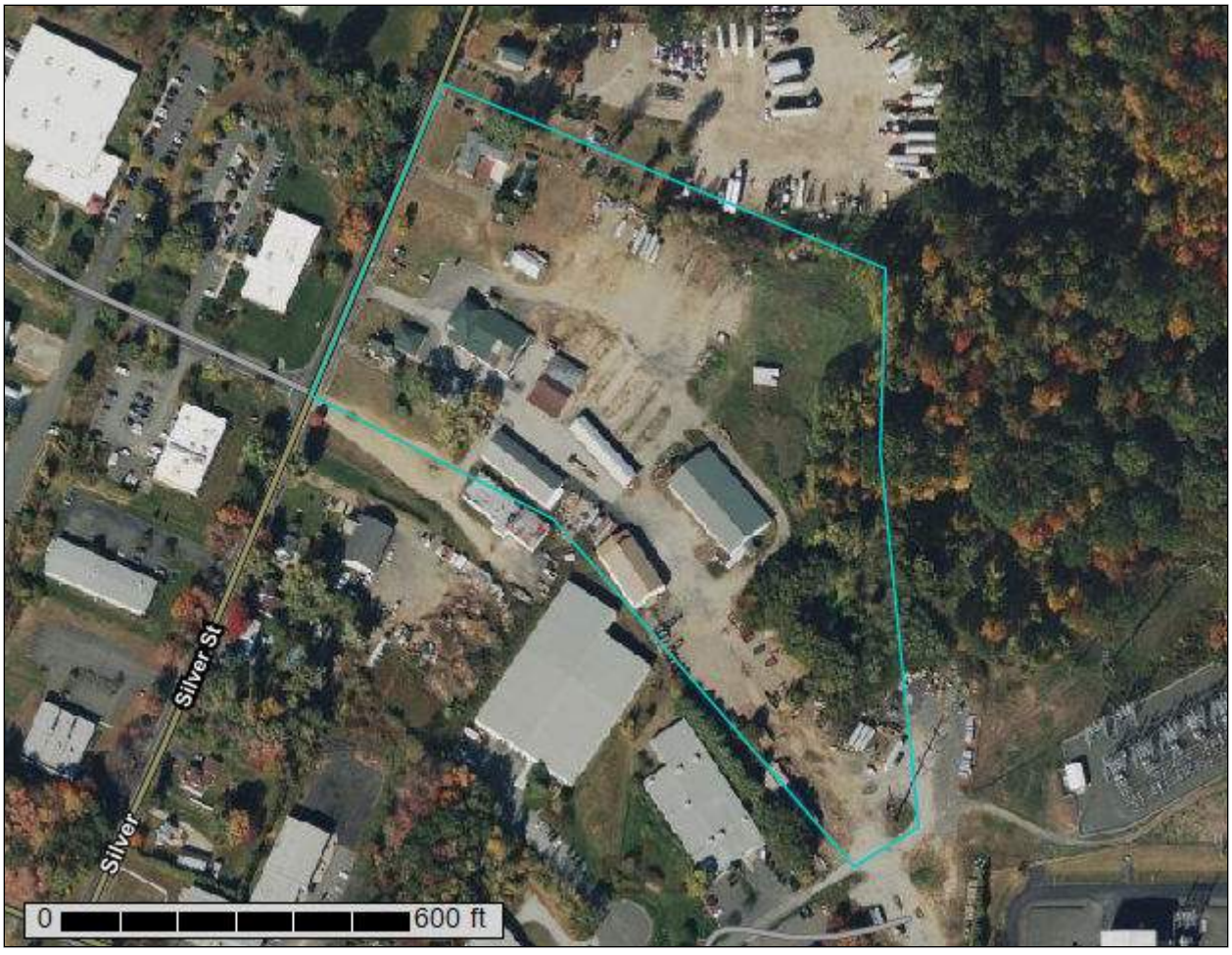
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Hampden County, Massachusetts, Central Part

Silver Street



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....12
Map Unit Descriptions.....12
Hampden County, Massachusetts, Central Part.....14
254A—Merrimac fine sandy loam, 0 to 3 percent slopes.....14
254B—Merrimac fine sandy loam, 3 to 8 percent slopes.....15
254C—Merrimac fine sandy loam, 8 to 15 percent slopes.....17
258B—Amostown fine sandy loam, 0 to 6 percent slopes.....19
References.....21

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



Map Scale: 1:2,480 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 35 70 140 210

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hampden County, Massachusetts, Central Part
Survey Area Data: Version 19, Sep 5, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND	MAP INFORMATION
	imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	9.8	59.5%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	5.9	35.8%
254C	Merrimac fine sandy loam, 8 to 15 percent slopes	0.4	2.6%
258B	Amostown fine sandy loam, 0 to 6 percent slopes	0.4	2.2%
Totals for Area of Interest		**16.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Hampden County, Massachusetts, Central Part

254A—Merrimac fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyqr
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash

Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Walpole

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqs
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Walpole

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

254C—Merrimac fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2tyqt
Elevation: 0 to 1,030 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Eskers, outwash plains, moraines, kames, outwash terraces
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash plains, dunes, deltas, outwash terraces

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

258B—Amostown fine sandy loam, 0 to 6 percent slopes

Map Unit Setting

National map unit symbol: 99ms
Elevation: 0 to 1,000 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Amostown and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Amostown

Setting

Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable sandy glaciofluvial deposits over hard silty glaciolacustrine deposits

Typical profile

H1 - 0 to 10 inches: fine sandy loam
H2 - 10 to 32 inches: fine sandy loam
H3 - 32 to 60 inches: silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F145XY005MA - Moist Lake Plain
Hydric soil rating: No

Minor Components

Pollux

Percent of map unit: 10 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Enosburg

Percent of map unit: 10 percent
Landform: Terraces, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

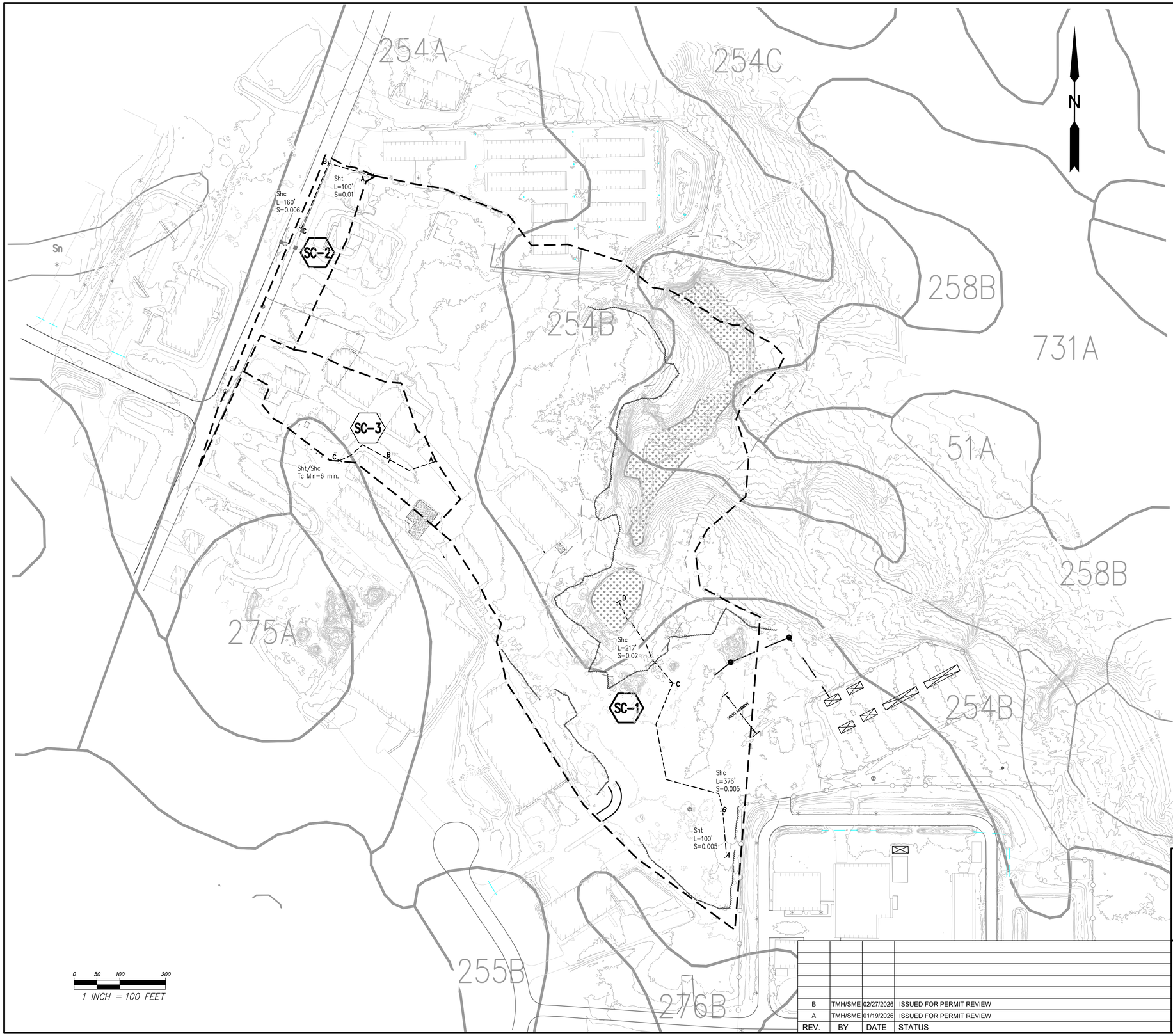
United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

ATTACHMENT B

STORMWATER DRAINAGE FIGURES

SME
SEVEE & MAHER
ENGINEERS



LEGEND

- PROPERTY LINE
- 100' PROPERTY SETBACK
- LIMIT OF WETLANDS
- 100' WETLAND BUFFER
- UTILITY EASEMENT
- EXISTING 1-FOOT CONTOUR (181)
- EXISTING 5-FT CONTOUR (180)
- EXISTING TREE LINE
- LIMIT OF WORK

NOTES

1. EXISTING CONDITIONS SURVEY CONDUCTED BY MILLSTONE LLC.

STORMWATER MANAGEMENT LEGEND

- SC-1 — SUBCATCHMENT DESIGNATION
- SUBCATCHMENT BOUNDARY
- A B C — TIME OF CONCENTRATION SEGMENT DESIGNATION / TIME OF CONCENTRATION PATH
- Sht L=50' S=0.005 — TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE.
- Sht — SHEET FLOW
- Shc — SHALLOW CONCENTRATED FLOW
- Cf — CHANNEL FLOW
- P9 — POND/STRUCTURE DESIGNATION (HYDROCAD)
- SOIL TYPE BOUNDARY
- Sn — SOIL TYPE DESIGNATION

REV.	BY	DATE	STATUS
B	TMH/SME	02/27/2026	ISSUED FOR PERMIT REVIEW
A	TMH/SME	01/19/2026	ISSUED FOR PERMIT REVIEW

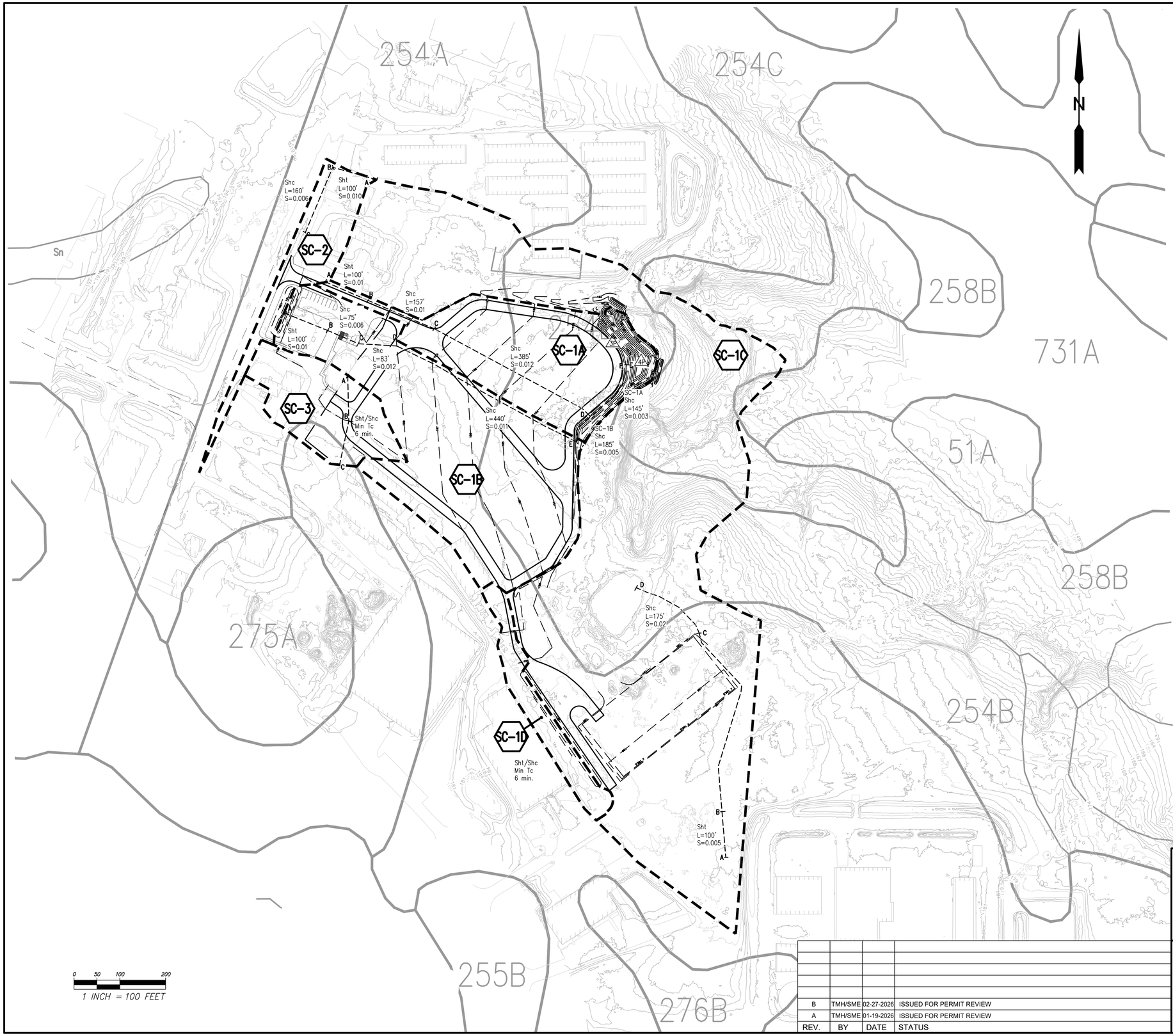
LONGROAD ENERGY
AGAWAM ENERGY CENTER
AGAWAM, MA

STORMWATER MANAGEMENT PLAN
PRE-DEVELOPMENT CONDITIONS

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	11/14/2025
SCALE:	1"=100'

JOB NO. 250741 DWG FILE AW1-D-100 REV B



LEGEND

- PROPERTY LINE
- 100' PROPERTY SETBACK
- LIMIT OF WETLANDS
- 100' WETLAND BUFFER
- UTILITY EASEMENT
- EXISTING 1-FOOT CONTOUR (181)
- EXISTING 5-FT CONTOUR (180)
- EXISTING TREE LINE
- LIMIT OF WORK

NOTES

1. EXISTING CONDITIONS SURVEY CONDUCTED BY MILLSTONE LLC.

STORMWATER MANAGEMENT LEGEND

- SC-2 — SUBCATCHMENT DESIGNATION
- SUBCATCHMENT BOUNDARY
- A B C — TIME OF CONCENTRATION SEGMENT DESIGNATION / TIME OF CONCENTRATION PATH
- Sht L=50' S=0.005 — TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE.
- Sl Sht — SHEET FLOW
- Sl Shc — SHALLOW CONCENTRATED FLOW
- C Cf — CHANNEL FLOW
- P9 — POND/STRUCTURE DESIGNATION (HYDROCAD)
- SOIL TYPE BOUNDARY
- Sn — SOIL TYPE DESIGNATION

REV.	BY	DATE	STATUS
B	TMH/SME	02-27-2026	ISSUED FOR PERMIT REVIEW
A	TMH/SME	01-19-2026	ISSUED FOR PERMIT REVIEW

LONGROAD ENERGY
AGAWAM ENERGY CENTER
AGAWAM, MA

STORMWATER MANAGEMENT PLAN
POST DEVELOPMENT CONDITIONS

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

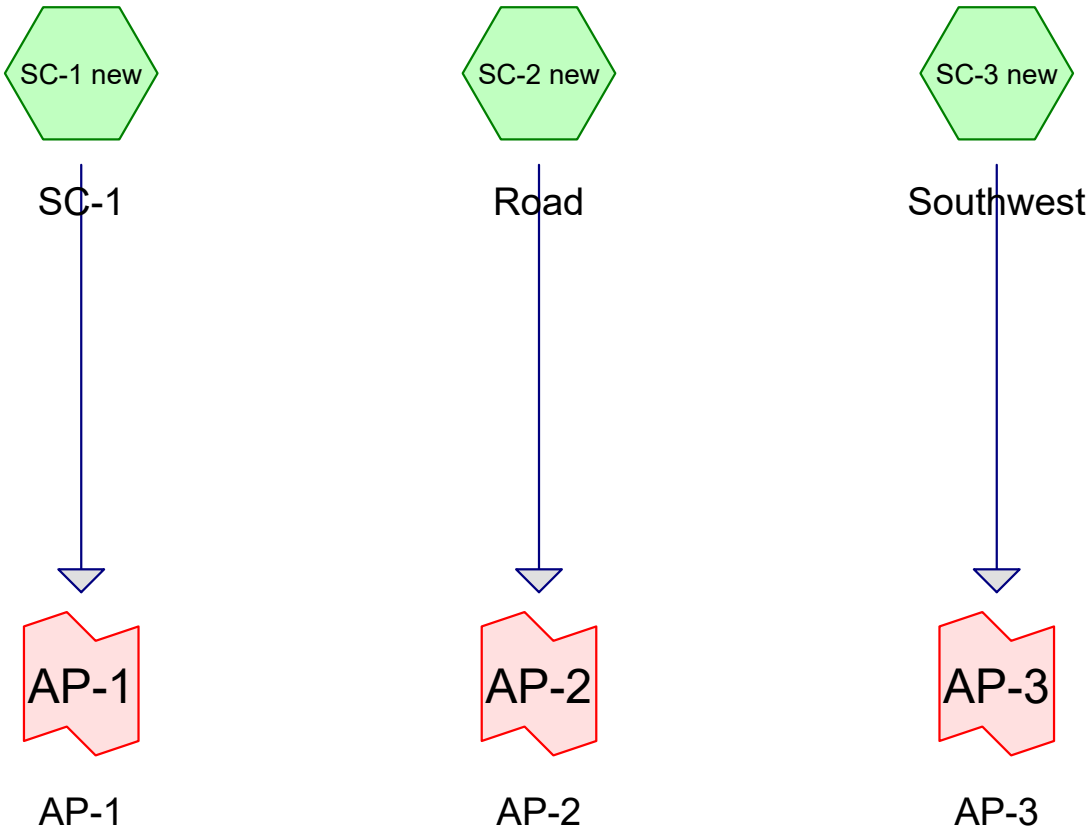
DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	11/14/2025
SCALE:	1"=100'

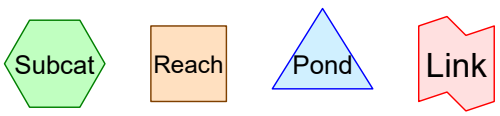
JOB NO. 250741 DWG FILE AW1-D-101 REV B

ATTACHMENT C

PRE-DEVELOPMENT HYDROCAD CALCULATIONS

SME
SEVEE & MAHER
ENGINEERS





Routing Diagram for Pre-Conditions - 02-27-27
Prepared by Sevee & Maher Engineers, Printed 3/1/2026
HydroCAD® 10.20-7a s/n 01260 © 2025 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.537	96	Gravel surface, HSG A (SC-1 new)
7.211	39	Pasture/grassland/range, Good, HSG A (SC-1 new, SC-2 new, SC-3 new)
0.145	80	Pasture/grassland/range, Good, HSG D (SC-3 new)
1.535	98	Paved parking, HSG A (SC-1 new, SC-2 new, SC-3 new)
1.421	98	Roofs, HSG A (SC-1 new, SC-2 new, SC-3 new)
4.878	30	Woods, Good, HSG A (SC-1 new)
22.728	**64**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
22.584	HSG A	SC-1 new, SC-2 new, SC-3 new
0.000	HSG B	
0.000	HSG C	
0.145	HSG D	SC-3 new
0.000	Other	
22.728		**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1 new: SC-1 Runoff Area=858,864 sf 5.79% Impervious Runoff Depth>0.42"
Flow Length=693' Tc=35.4 min CN=62 Runoff=4.26 cfs 0.693 af

Subcatchment SC-2 new: Road Runoff Area=49,610 sf 35.64% Impervious Runoff Depth>0.36"
Flow Length=260' Tc=14.6 min CN=60 Runoff=0.25 cfs 0.034 af

Subcatchment SC-3 new: Southwest Runoff Area=81,572 sf 75.20% Impervious Runoff Depth>1.81"
Tc=6.0 min CN=87 Runoff=4.15 cfs 0.282 af

Link AP-1: AP-1 Inflow=4.26 cfs 0.693 af
Primary=4.26 cfs 0.693 af

Link AP-2: AP-2 Inflow=0.25 cfs 0.034 af
Primary=0.25 cfs 0.034 af

Link AP-3: AP-3 Inflow=4.15 cfs 0.282 af
Primary=4.15 cfs 0.282 af

Total Runoff Area = 22.728 ac Runoff Volume = 1.010 af Average Runoff Depth = 0.53"
86.99% Pervious = 19.772 ac 13.01% Impervious = 2.956 ac

Summary for Subcatchment SC-1 new: SC-1

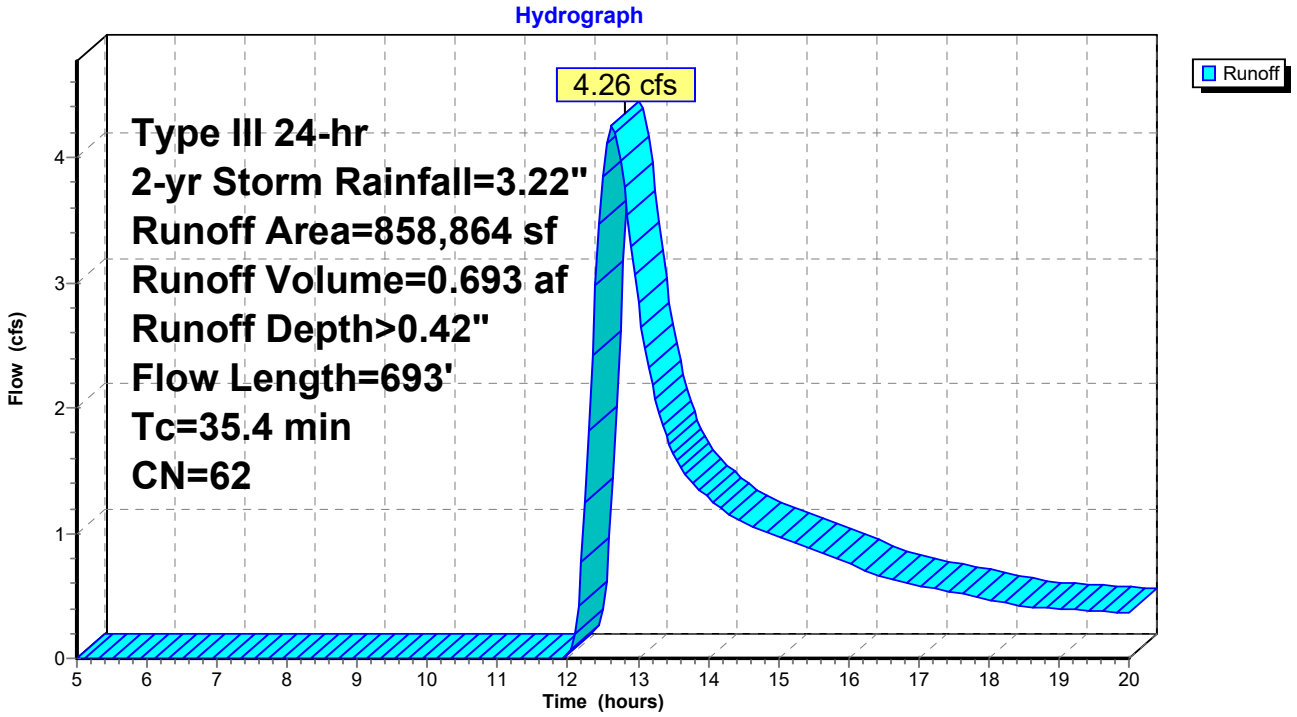
Runoff = 4.26 cfs @ 12.63 hrs, Volume= 0.693 af, Depth> 0.42"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

Area (sf)	CN	Description
268,264	39	Pasture/grassland/range, Good, HSG A
212,505	30	Woods, Good, HSG A
328,330	96	Gravel surface, HSG A
11,012	98	Paved parking, HSG A
38,753	98	Roofs, HSG A
858,864	62	Weighted Average
809,099		94.21% Pervious Area
49,765		5.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0050	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.22"
5.5	376	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.1	217	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.4	693	Total			

Subcatchment SC-1 new: SC-1



Summary for Subcatchment SC-2 new: Road

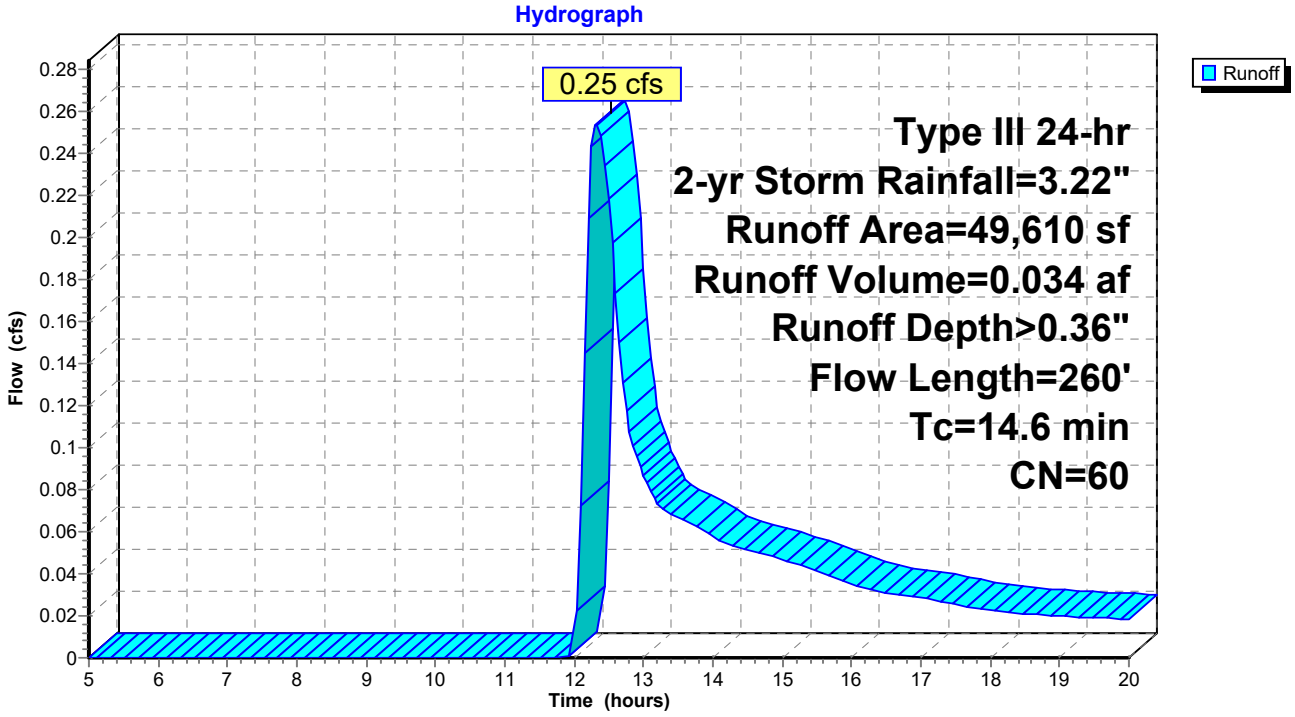
Runoff = 0.25 cfs @ 12.32 hrs, Volume= 0.034 af, Depth> 0.36"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

Area (sf)	CN	Description
14,423	98	Paved parking, HSG A
31,930	39	Pasture/grassland/range, Good, HSG A
3,257	98	Roofs, HSG A
49,610	60	Weighted Average
31,930		64.36% Pervious Area
17,680		35.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.7	160	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.6	260	Total			

Subcatchment SC-2 new: Road



Summary for Subcatchment SC-3 new: Southwest

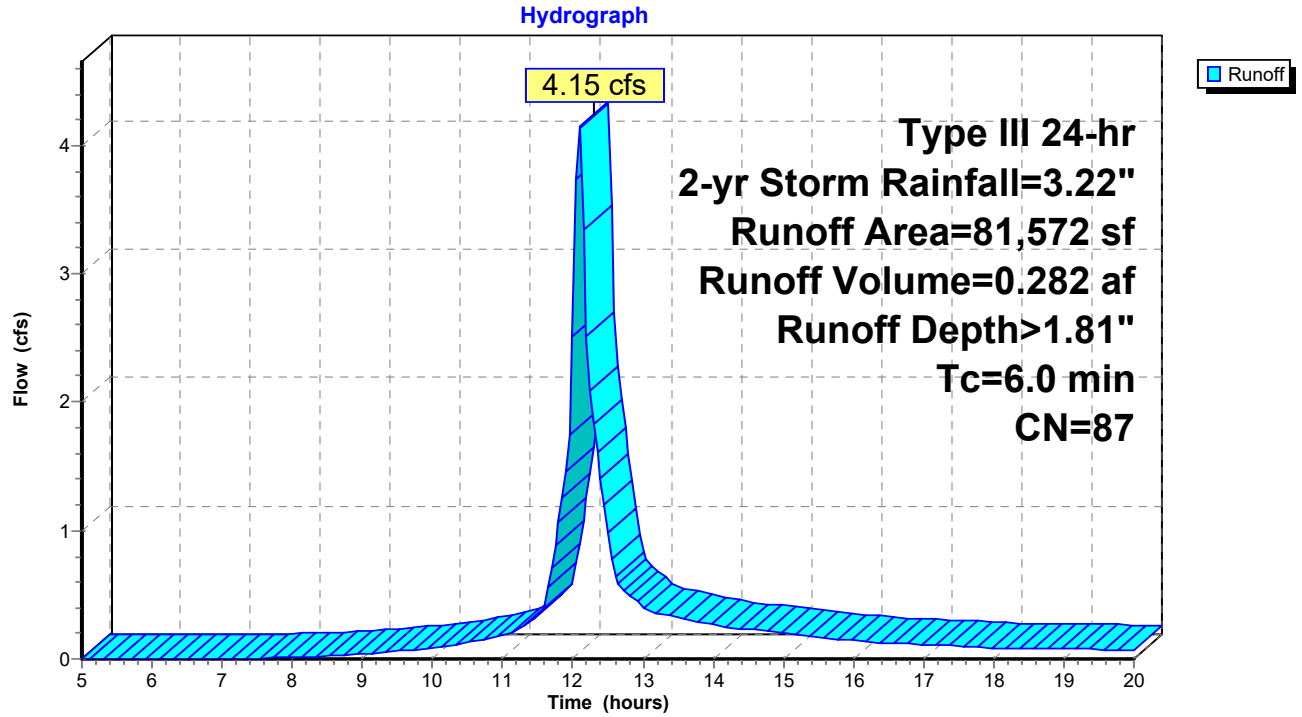
Runoff = 4.15 cfs @ 12.09 hrs, Volume= 0.282 af, Depth> 1.81"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

Area (sf)	CN	Description
41,439	98	Paved parking, HSG A
13,932	39	Pasture/grassland/range, Good, HSG A
6,300	80	Pasture/grassland/range, Good, HSG D
19,901	98	Roofs, HSG A
81,572	87	Weighted Average
20,232		24.80% Pervious Area
61,340		75.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3 new: Southwest

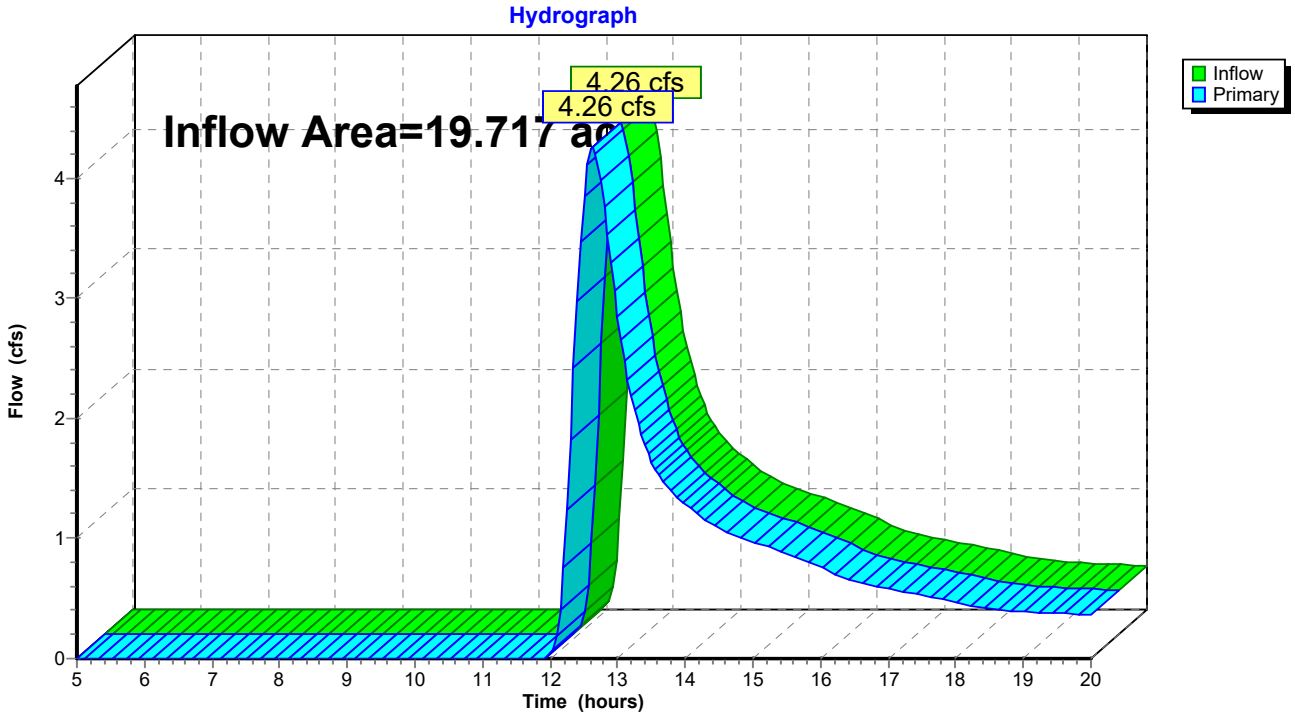


Summary for Link AP-1: AP-1

Inflow Area = 19.717 ac, 5.79% Impervious, Inflow Depth > 0.42" for 2-yr Storm event
Inflow = 4.26 cfs @ 12.63 hrs, Volume= 0.693 af
Primary = 4.26 cfs @ 12.63 hrs, Volume= 0.693 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-1: AP-1

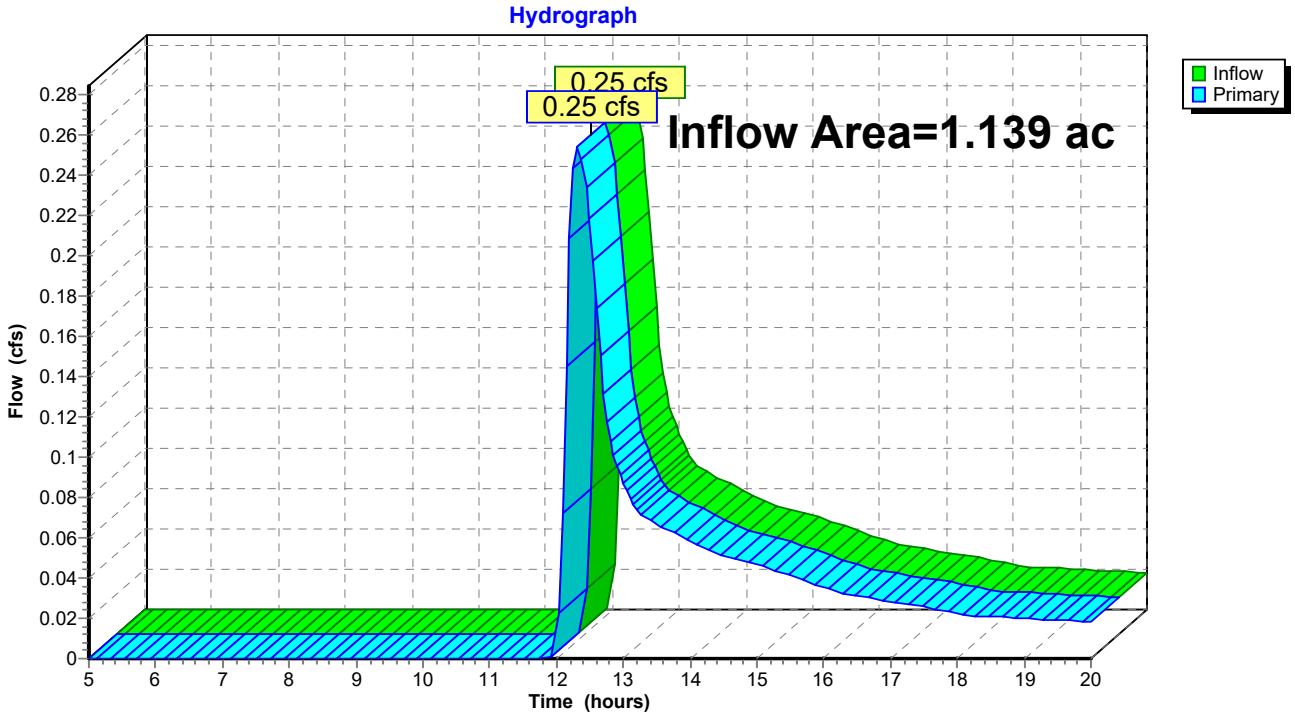


Summary for Link AP-2: AP-2

Inflow Area = 1.139 ac, 35.64% Impervious, Inflow Depth > 0.36" for 2-yr Storm event
Inflow = 0.25 cfs @ 12.32 hrs, Volume= 0.034 af
Primary = 0.25 cfs @ 12.32 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-2: AP-2

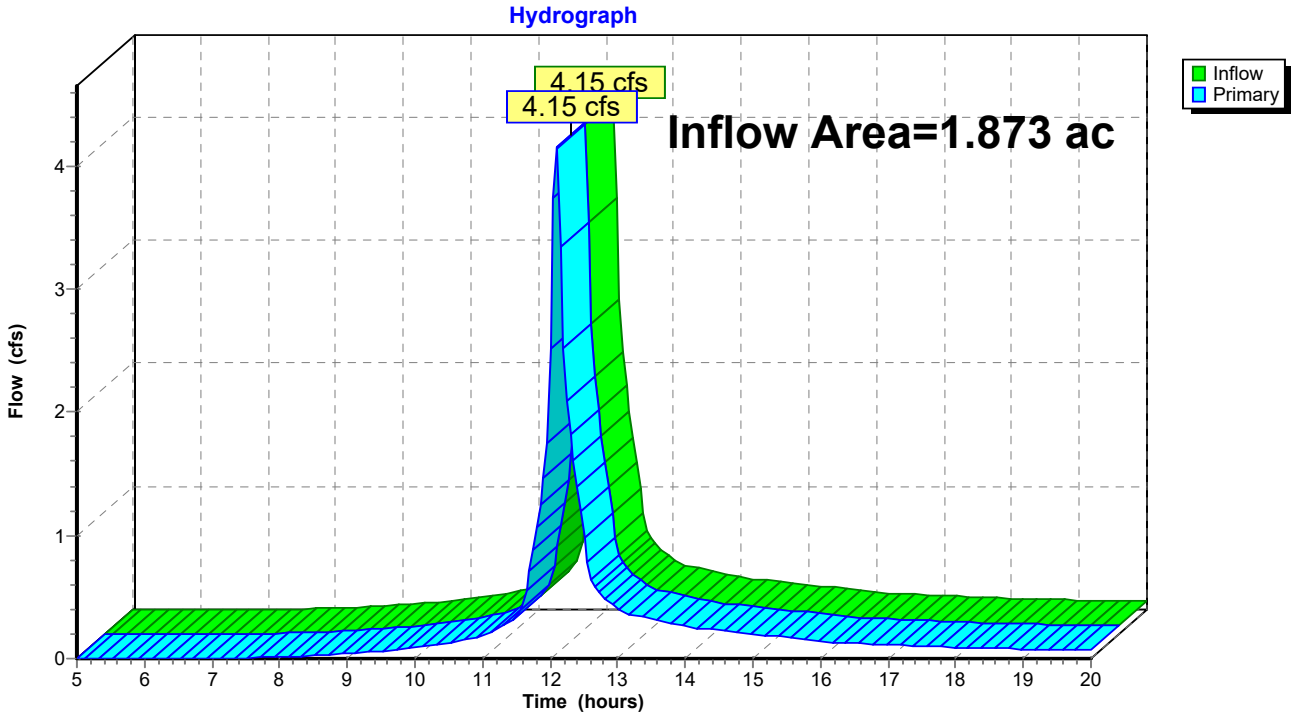


Summary for Link AP-3: AP-3

Inflow Area = 1.873 ac, 75.20% Impervious, Inflow Depth > 1.81" for 2-yr Storm event
Inflow = 4.15 cfs @ 12.09 hrs, Volume= 0.282 af
Primary = 4.15 cfs @ 12.09 hrs, Volume= 0.282 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-3: AP-3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1 new: SC-1 Runoff Area=858,864 sf 5.79% Impervious Runoff Depth>1.39"
Flow Length=693' Tc=35.4 min CN=62 Runoff=17.41 cfs 2.283 af

Subcatchment SC-2 new: Road Runoff Area=49,610 sf 35.64% Impervious Runoff Depth>1.27"
Flow Length=260' Tc=14.6 min CN=60 Runoff=1.29 cfs 0.120 af

Subcatchment SC-3 new: Southwest Runoff Area=81,572 sf 75.20% Impervious Runoff Depth>3.52"
Tc=6.0 min CN=87 Runoff=7.86 cfs 0.550 af

Link AP-1: AP-1 Inflow=17.41 cfs 2.283 af
Primary=17.41 cfs 2.283 af

Link AP-2: AP-2 Inflow=1.29 cfs 0.120 af
Primary=1.29 cfs 0.120 af

Link AP-3: AP-3 Inflow=7.86 cfs 0.550 af
Primary=7.86 cfs 0.550 af

Total Runoff Area = 22.728 ac Runoff Volume = 2.954 af Average Runoff Depth = 1.56"
86.99% Pervious = 19.772 ac 13.01% Impervious = 2.956 ac

Summary for Subcatchment SC-1 new: SC-1

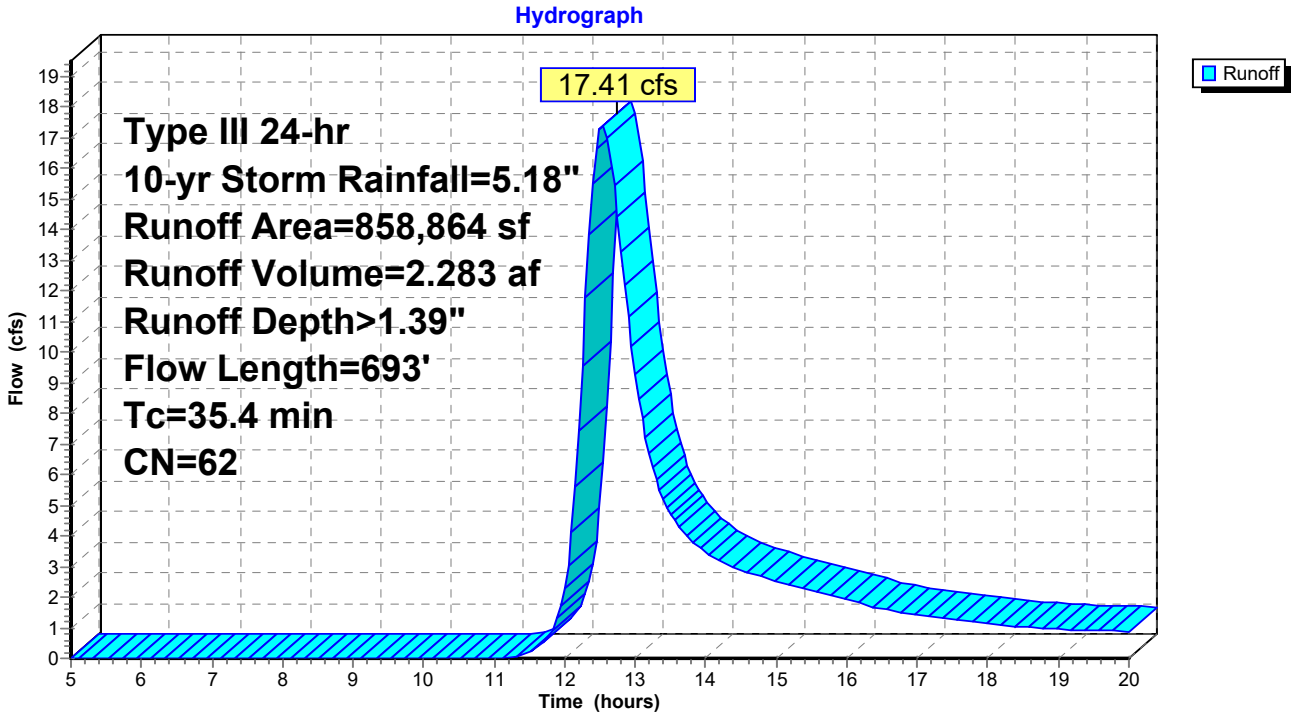
Runoff = 17.41 cfs @ 12.54 hrs, Volume= 2.283 af, Depth> 1.39"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

Area (sf)	CN	Description
268,264	39	Pasture/grassland/range, Good, HSG A
212,505	30	Woods, Good, HSG A
328,330	96	Gravel surface, HSG A
11,012	98	Paved parking, HSG A
38,753	98	Roofs, HSG A
858,864	62	Weighted Average
809,099		94.21% Pervious Area
49,765		5.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0050	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.22"
5.5	376	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.1	217	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.4	693	Total			

Subcatchment SC-1 new: SC-1



Summary for Subcatchment SC-2 new: Road

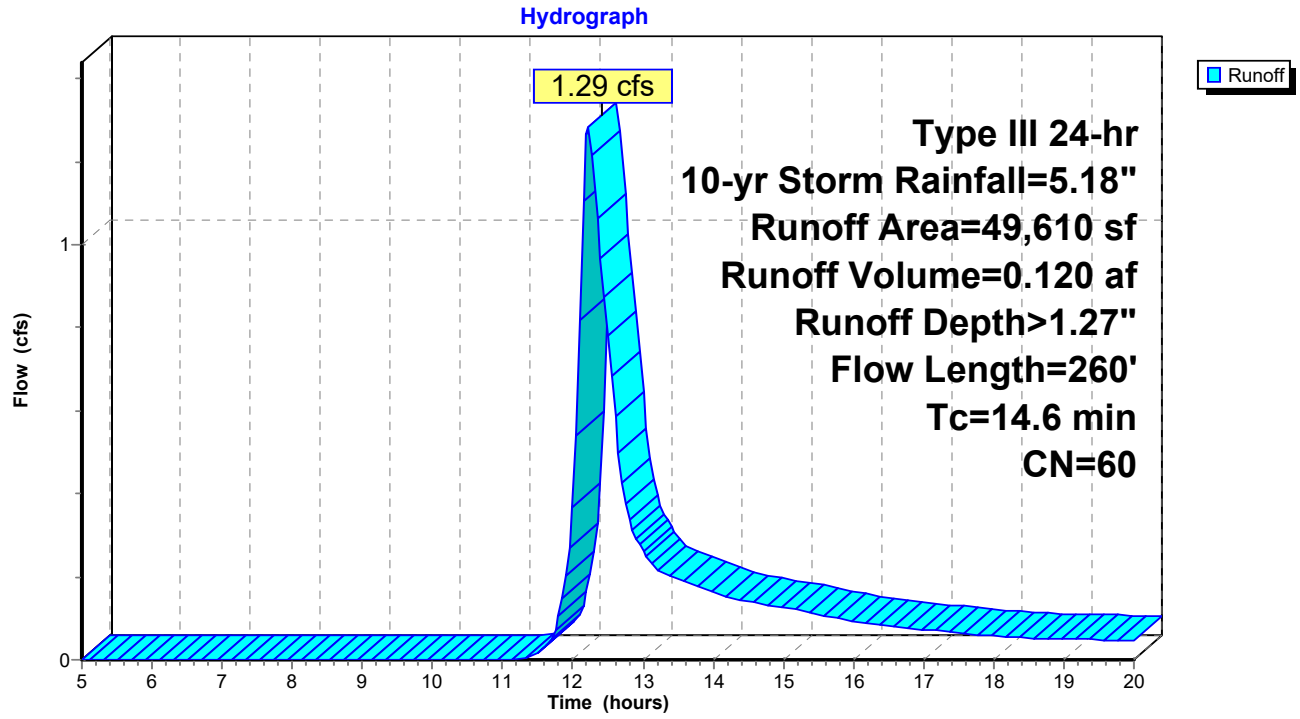
Runoff = 1.29 cfs @ 12.22 hrs, Volume= 0.120 af, Depth> 1.27"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

Area (sf)	CN	Description
14,423	98	Paved parking, HSG A
31,930	39	Pasture/grassland/range, Good, HSG A
3,257	98	Roofs, HSG A
49,610	60	Weighted Average
31,930		64.36% Pervious Area
17,680		35.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.7	160	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.6	260	Total			

Subcatchment SC-2 new: Road



Summary for Subcatchment SC-3 new: Southwest

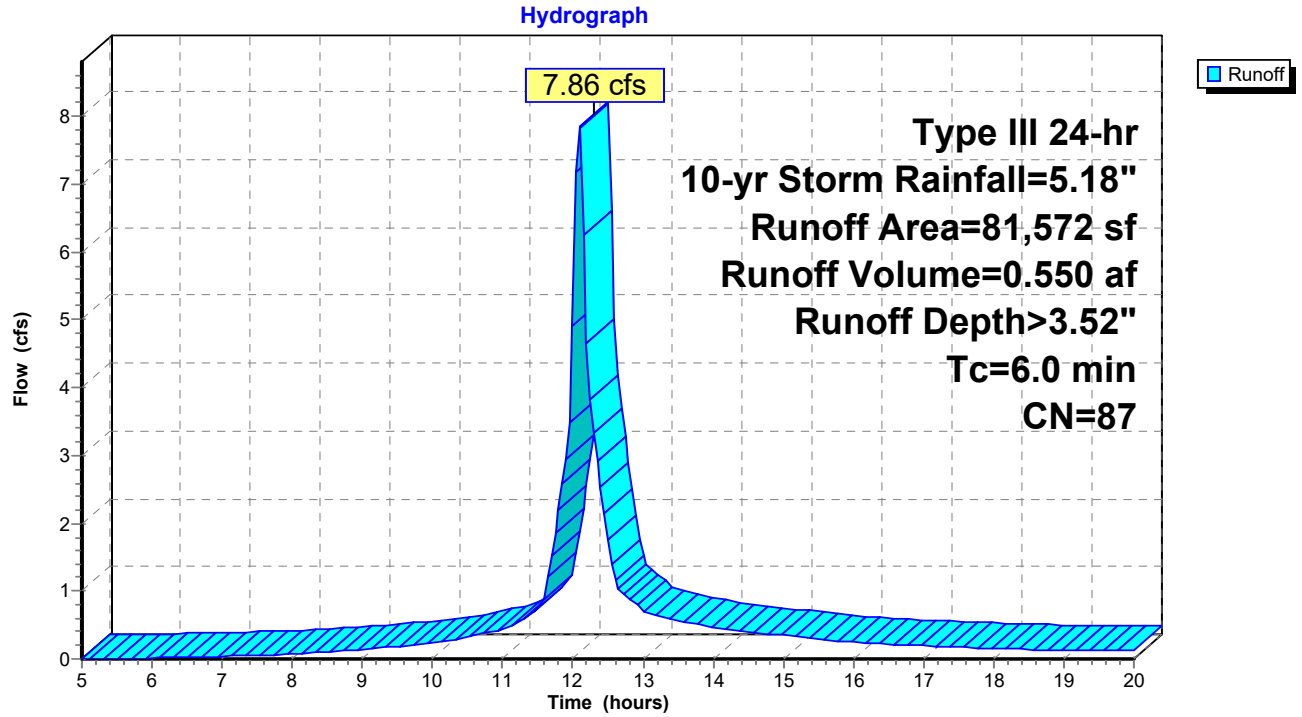
Runoff = 7.86 cfs @ 12.09 hrs, Volume= 0.550 af, Depth> 3.52"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

Area (sf)	CN	Description
41,439	98	Paved parking, HSG A
13,932	39	Pasture/grassland/range, Good, HSG A
6,300	80	Pasture/grassland/range, Good, HSG D
19,901	98	Roofs, HSG A
81,572	87	Weighted Average
20,232		24.80% Pervious Area
61,340		75.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3 new: Southwest

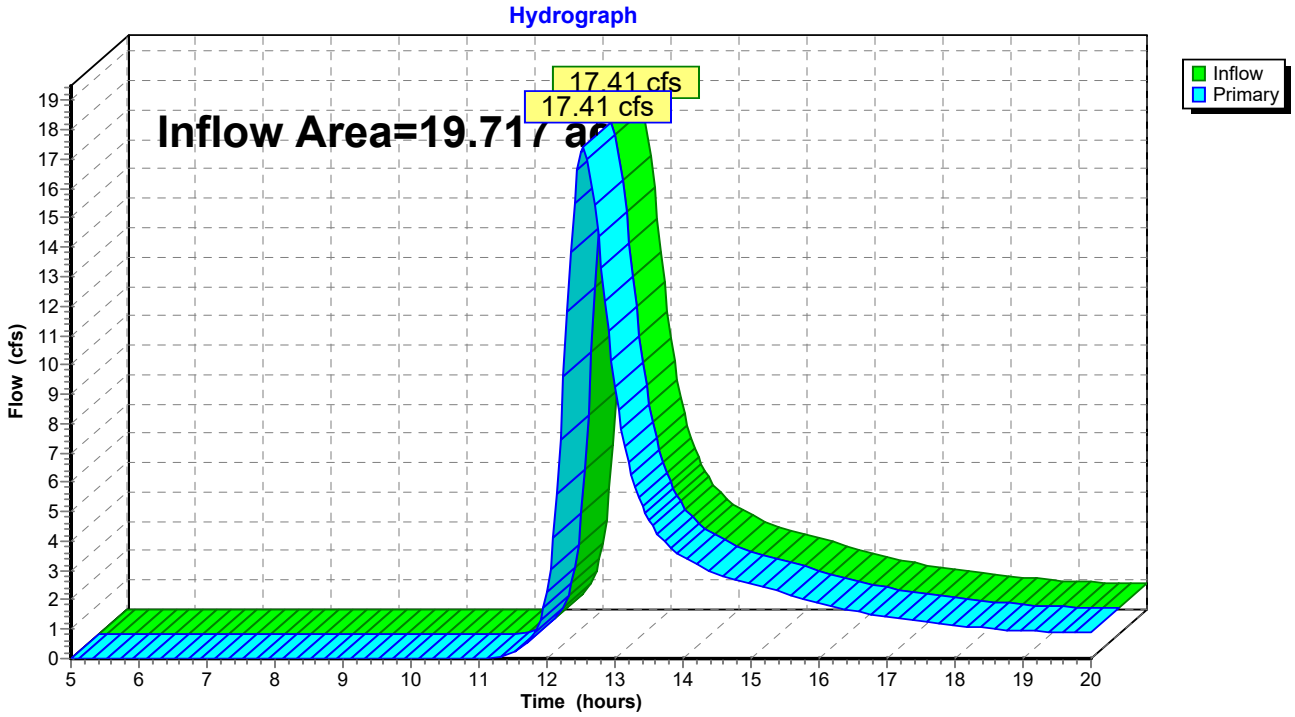


Summary for Link AP-1: AP-1

Inflow Area = 19.717 ac, 5.79% Impervious, Inflow Depth > 1.39" for 10-yr Storm event
Inflow = 17.41 cfs @ 12.54 hrs, Volume= 2.283 af
Primary = 17.41 cfs @ 12.54 hrs, Volume= 2.283 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-1: AP-1

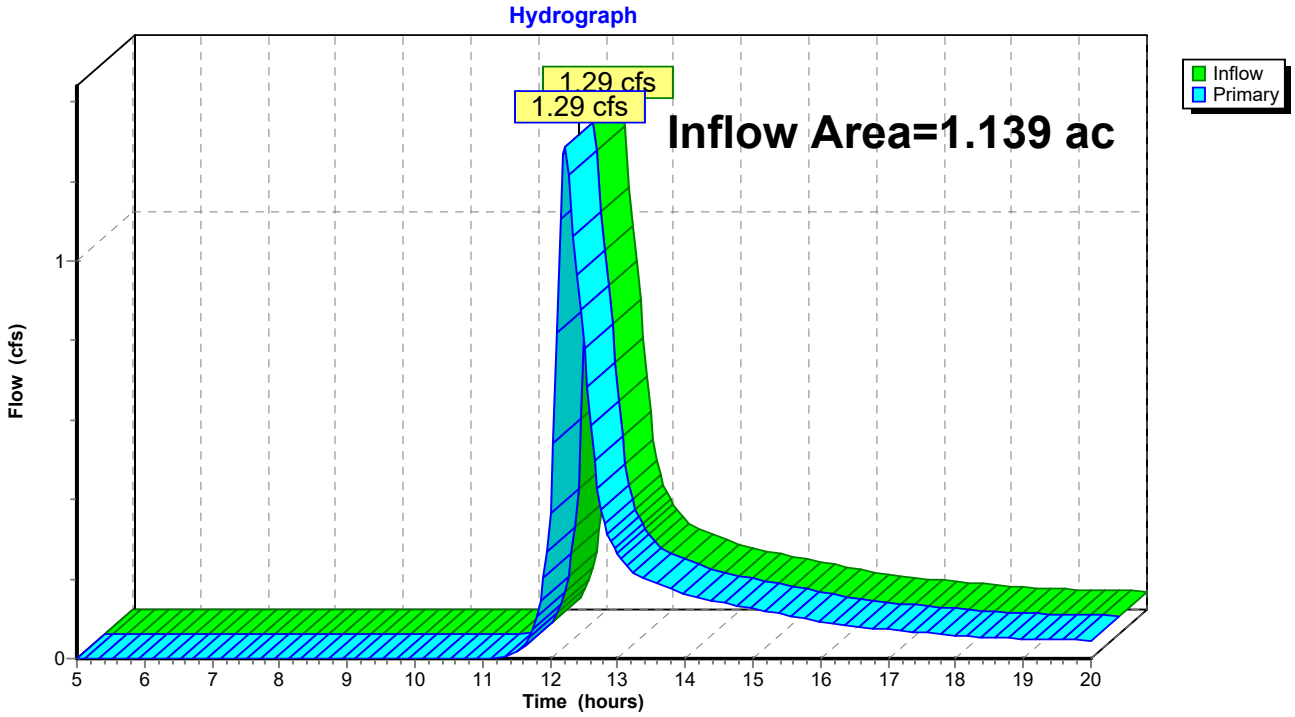


Summary for Link AP-2: AP-2

Inflow Area = 1.139 ac, 35.64% Impervious, Inflow Depth > 1.27" for 10-yr Storm event
Inflow = 1.29 cfs @ 12.22 hrs, Volume= 0.120 af
Primary = 1.29 cfs @ 12.22 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-2: AP-2

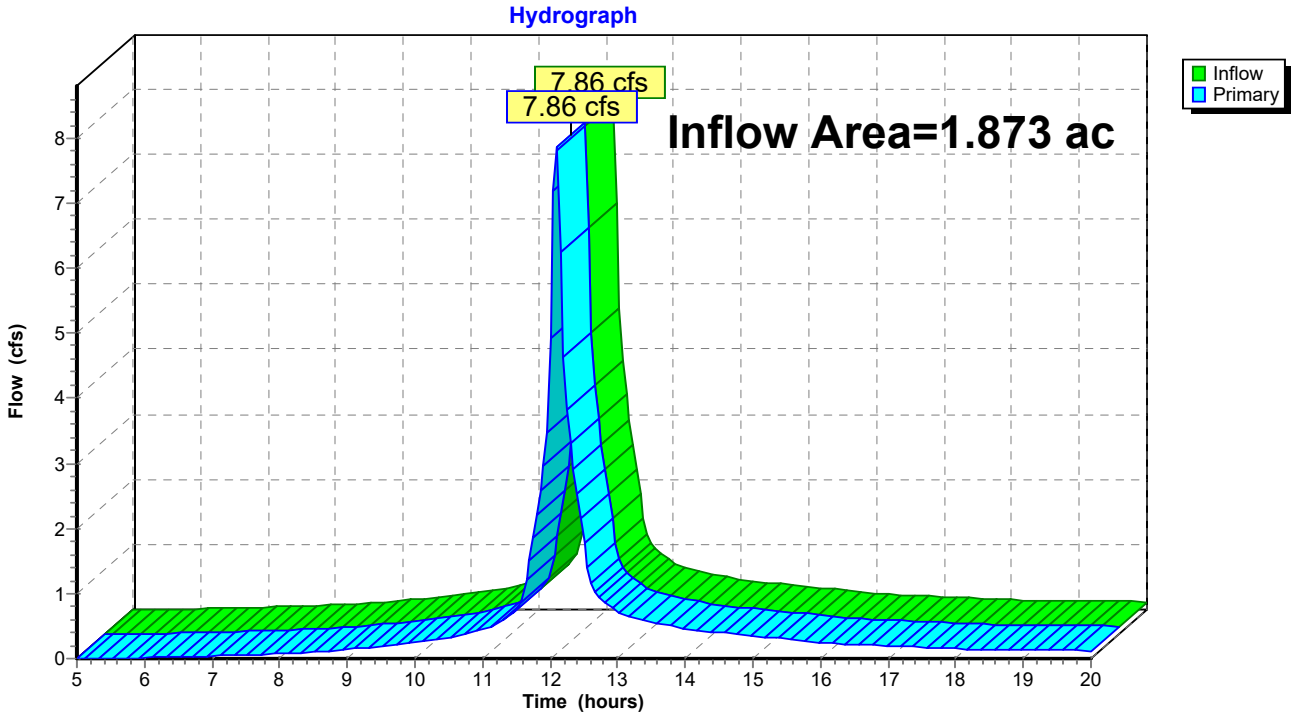


Summary for Link AP-3: AP-3

Inflow Area = 1.873 ac, 75.20% Impervious, Inflow Depth > 3.52" for 10-yr Storm event
Inflow = 7.86 cfs @ 12.09 hrs, Volume= 0.550 af
Primary = 7.86 cfs @ 12.09 hrs, Volume= 0.550 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-3: AP-3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1 new: SC-1 Runoff Area=858,864 sf 5.79% Impervious Runoff Depth>2.15"
Flow Length=693' Tc=35.4 min CN=62 Runoff=27.74 cfs 3.535 af

Subcatchment SC-2 new: Road Runoff Area=49,610 sf 35.64% Impervious Runoff Depth>2.00"
Flow Length=260' Tc=14.6 min CN=60 Runoff=2.12 cfs 0.190 af

Subcatchment SC-3 new: Southwest Runoff Area=81,572 sf 75.20% Impervious Runoff Depth>4.64"
Tc=6.0 min CN=87 Runoff=10.20 cfs 0.724 af

Link AP-1: AP-1 Inflow=27.74 cfs 3.535 af
Primary=27.74 cfs 3.535 af

Link AP-2: AP-2 Inflow=2.12 cfs 0.190 af
Primary=2.12 cfs 0.190 af

Link AP-3: AP-3 Inflow=10.20 cfs 0.724 af
Primary=10.20 cfs 0.724 af

Total Runoff Area = 22.728 ac Runoff Volume = 4.449 af Average Runoff Depth = 2.35"
86.99% Pervious = 19.772 ac 13.01% Impervious = 2.956 ac

Summary for Subcatchment SC-1 new: SC-1

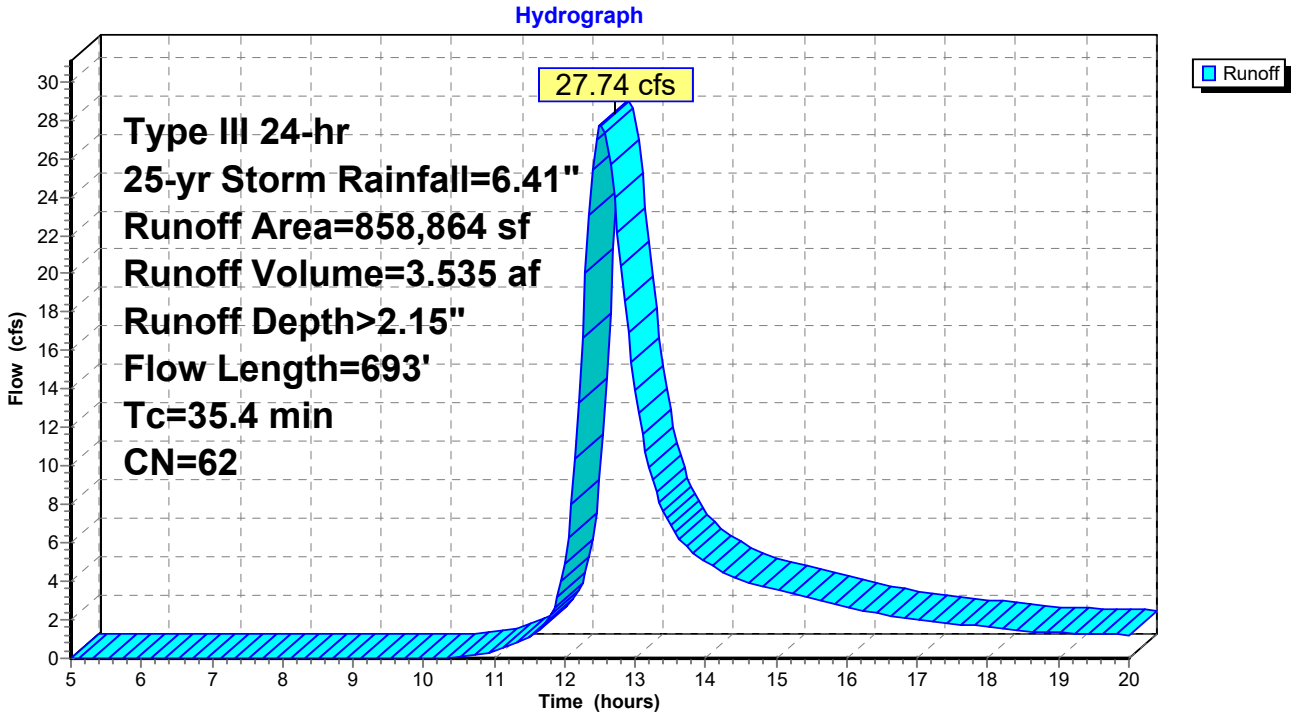
Runoff = 27.74 cfs @ 12.52 hrs, Volume= 3.535 af, Depth> 2.15"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

Area (sf)	CN	Description
268,264	39	Pasture/grassland/range, Good, HSG A
212,505	30	Woods, Good, HSG A
328,330	96	Gravel surface, HSG A
11,012	98	Paved parking, HSG A
38,753	98	Roofs, HSG A
858,864	62	Weighted Average
809,099		94.21% Pervious Area
49,765		5.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0050	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.22"
5.5	376	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.1	217	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.4	693	Total			

Subcatchment SC-1 new: SC-1



Summary for Subcatchment SC-2 new: Road

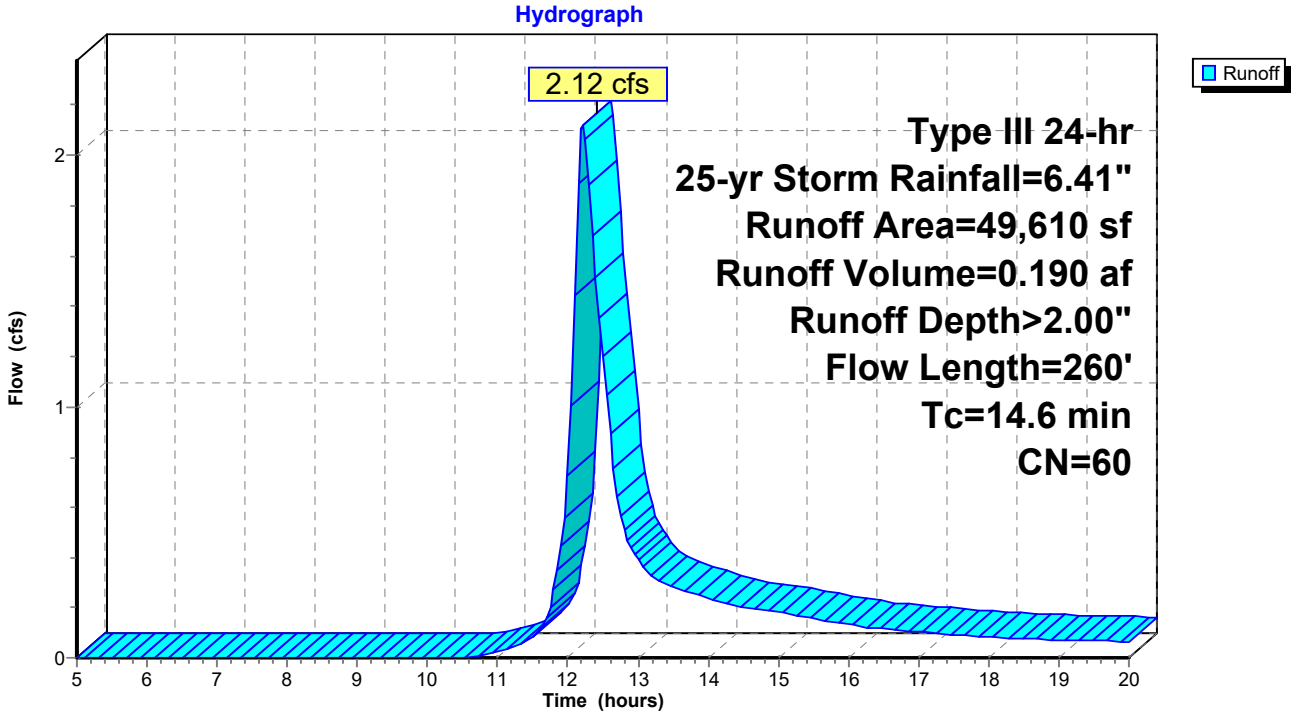
Runoff = 2.12 cfs @ 12.22 hrs, Volume= 0.190 af, Depth> 2.00"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

Area (sf)	CN	Description
14,423	98	Paved parking, HSG A
31,930	39	Pasture/grassland/range, Good, HSG A
3,257	98	Roofs, HSG A
49,610	60	Weighted Average
31,930		64.36% Pervious Area
17,680		35.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.7	160	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.6	260	Total			

Subcatchment SC-2 new: Road



Summary for Subcatchment SC-3 new: Southwest

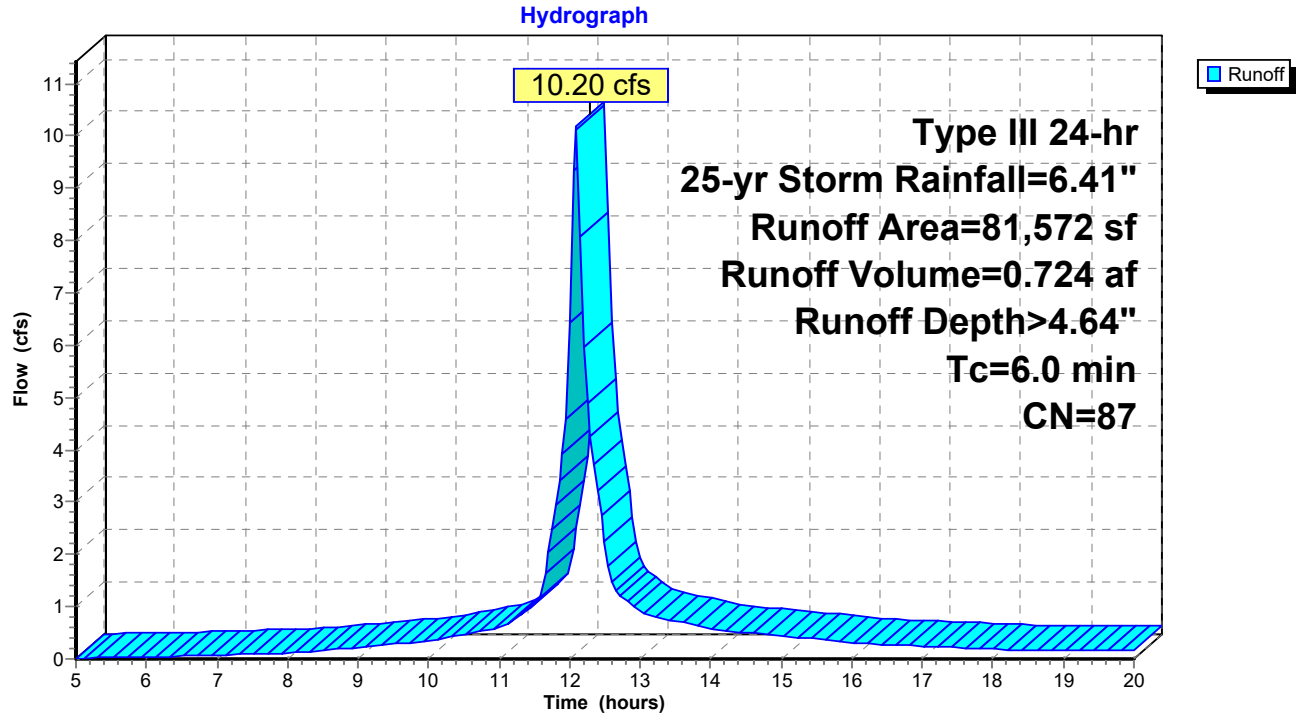
Runoff = 10.20 cfs @ 12.09 hrs, Volume= 0.724 af, Depth> 4.64"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

Area (sf)	CN	Description
41,439	98	Paved parking, HSG A
13,932	39	Pasture/grassland/range, Good, HSG A
6,300	80	Pasture/grassland/range, Good, HSG D
19,901	98	Roofs, HSG A
81,572	87	Weighted Average
20,232		24.80% Pervious Area
61,340		75.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3 new: Southwest

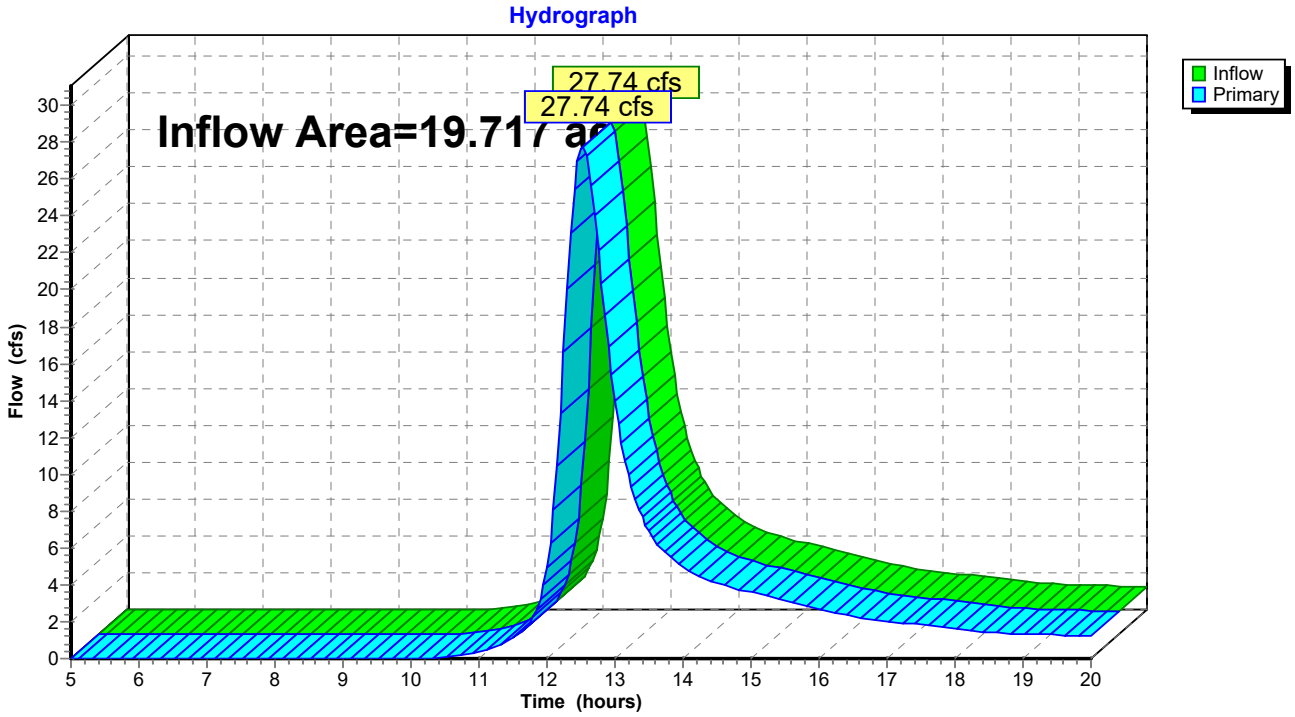


Summary for Link AP-1: AP-1

Inflow Area = 19.717 ac, 5.79% Impervious, Inflow Depth > 2.15" for 25-yr Storm event
Inflow = 27.74 cfs @ 12.52 hrs, Volume= 3.535 af
Primary = 27.74 cfs @ 12.52 hrs, Volume= 3.535 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-1: AP-1

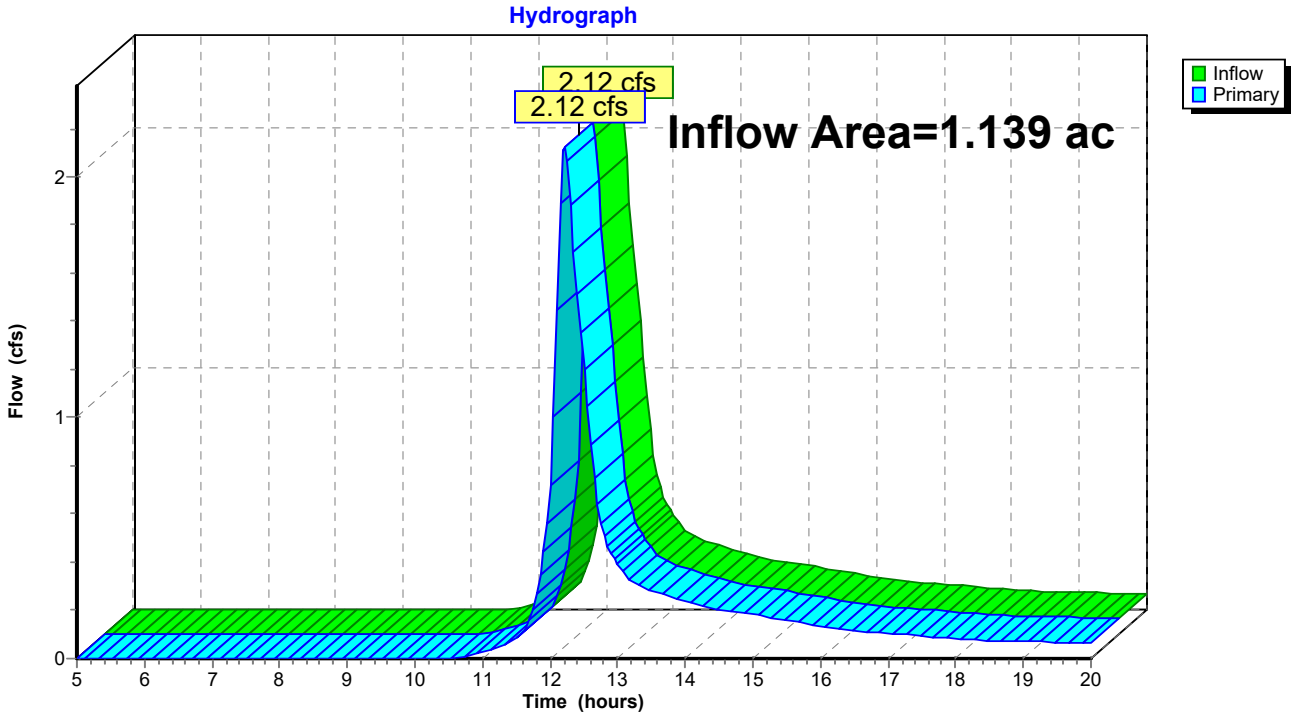


Summary for Link AP-2: AP-2

Inflow Area = 1.139 ac, 35.64% Impervious, Inflow Depth > 2.00" for 25-yr Storm event
Inflow = 2.12 cfs @ 12.22 hrs, Volume= 0.190 af
Primary = 2.12 cfs @ 12.22 hrs, Volume= 0.190 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-2: AP-2

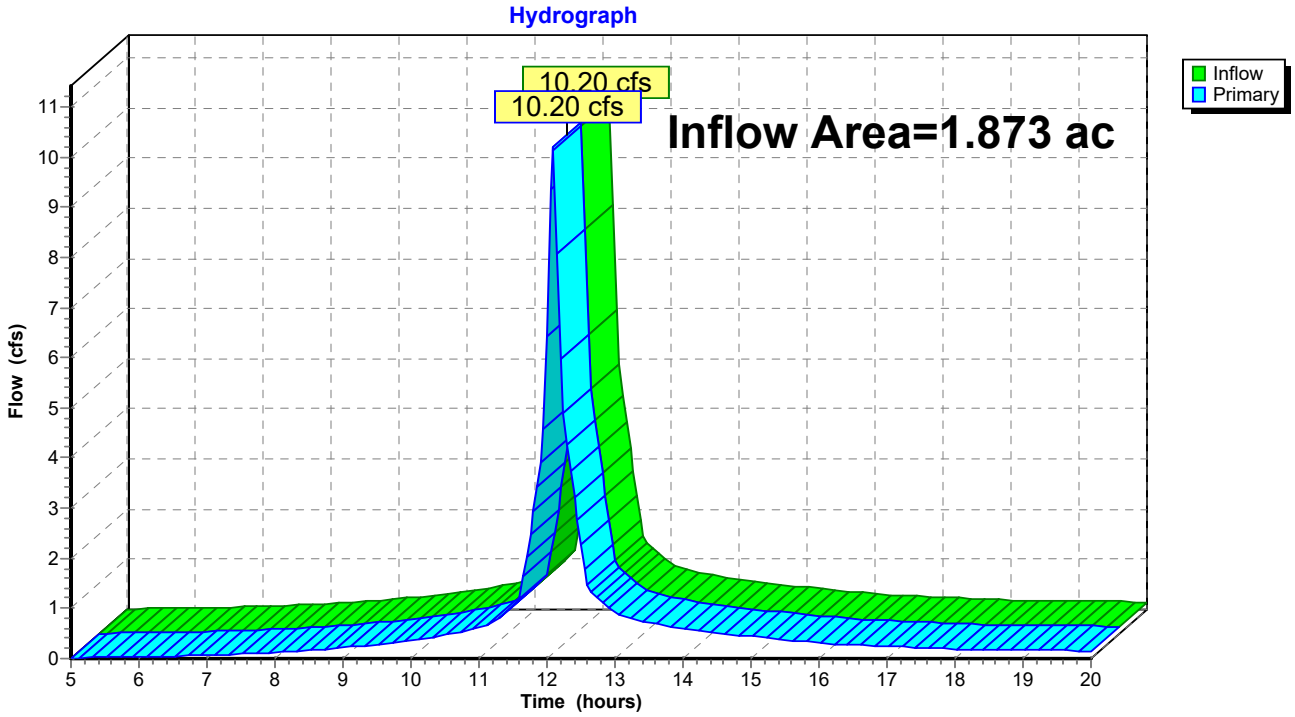


Summary for Link AP-3: AP-3

Inflow Area = 1.873 ac, 75.20% Impervious, Inflow Depth > 4.64" for 25-yr Storm event
Inflow = 10.20 cfs @ 12.09 hrs, Volume= 0.724 af
Primary = 10.20 cfs @ 12.09 hrs, Volume= 0.724 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-3: AP-3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1 new: SC-1 Runoff Area=858,864 sf 5.79% Impervious Runoff Depth>3.47"
Flow Length=693' Tc=35.4 min CN=62 Runoff=45.42 cfs 5.709 af

Subcatchment SC-2 new: Road Runoff Area=49,610 sf 35.64% Impervious Runoff Depth>3.28"
Flow Length=260' Tc=14.6 min CN=60 Runoff=3.57 cfs 0.311 af

Subcatchment SC-3 new: Southwest Runoff Area=81,572 sf 75.20% Impervious Runoff Depth>6.38"
Tc=6.0 min CN=87 Runoff=13.78 cfs 0.996 af

Link AP-1: AP-1 Inflow=45.42 cfs 5.709 af
Primary=45.42 cfs 5.709 af

Link AP-2: AP-2 Inflow=3.57 cfs 0.311 af
Primary=3.57 cfs 0.311 af

Link AP-3: AP-3 Inflow=13.78 cfs 0.996 af
Primary=13.78 cfs 0.996 af

Total Runoff Area = 22.728 ac Runoff Volume = 7.016 af Average Runoff Depth = 3.70"
86.99% Pervious = 19.772 ac 13.01% Impervious = 2.956 ac

Summary for Subcatchment SC-1 new: SC-1

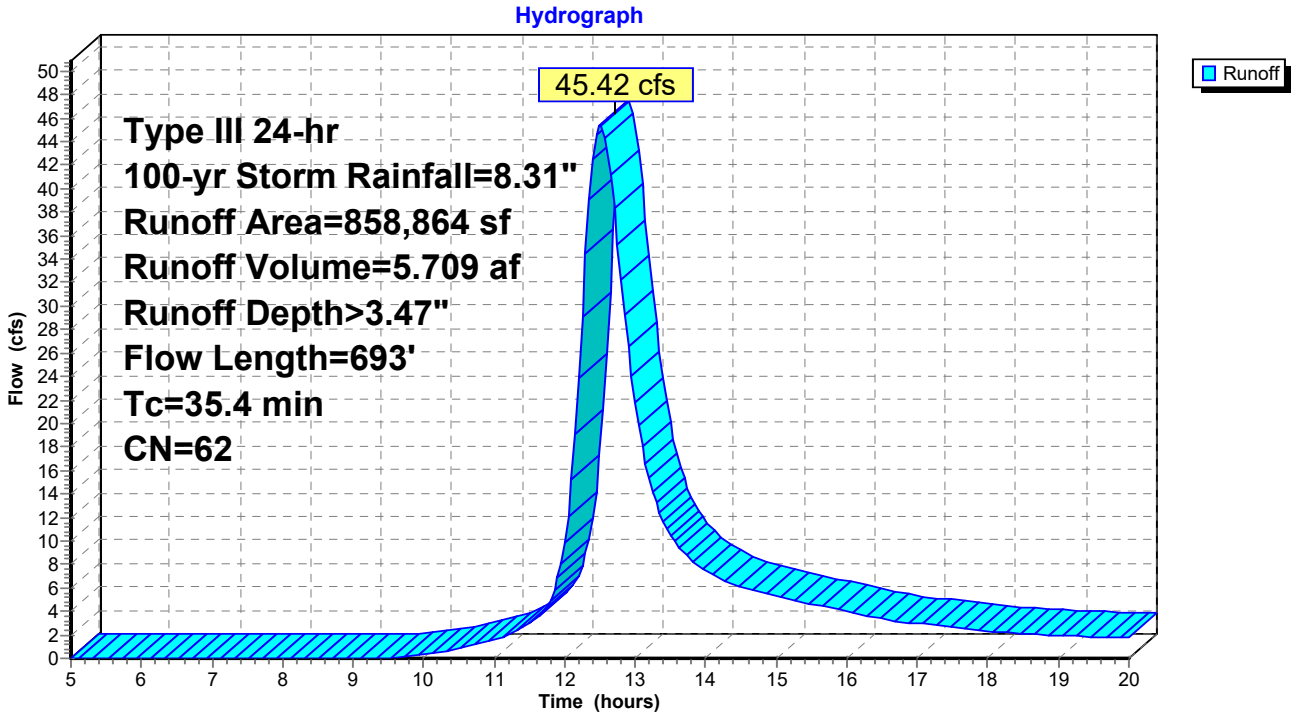
Runoff = 45.42 cfs @ 12.51 hrs, Volume= 5.709 af, Depth> 3.47"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

Area (sf)	CN	Description
268,264	39	Pasture/grassland/range, Good, HSG A
212,505	30	Woods, Good, HSG A
328,330	96	Gravel surface, HSG A
11,012	98	Paved parking, HSG A
38,753	98	Roofs, HSG A
858,864	62	Weighted Average
809,099		94.21% Pervious Area
49,765		5.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0050	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.22"
5.5	376	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.1	217	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.4	693	Total			

Subcatchment SC-1 new: SC-1



Summary for Subcatchment SC-2 new: Road

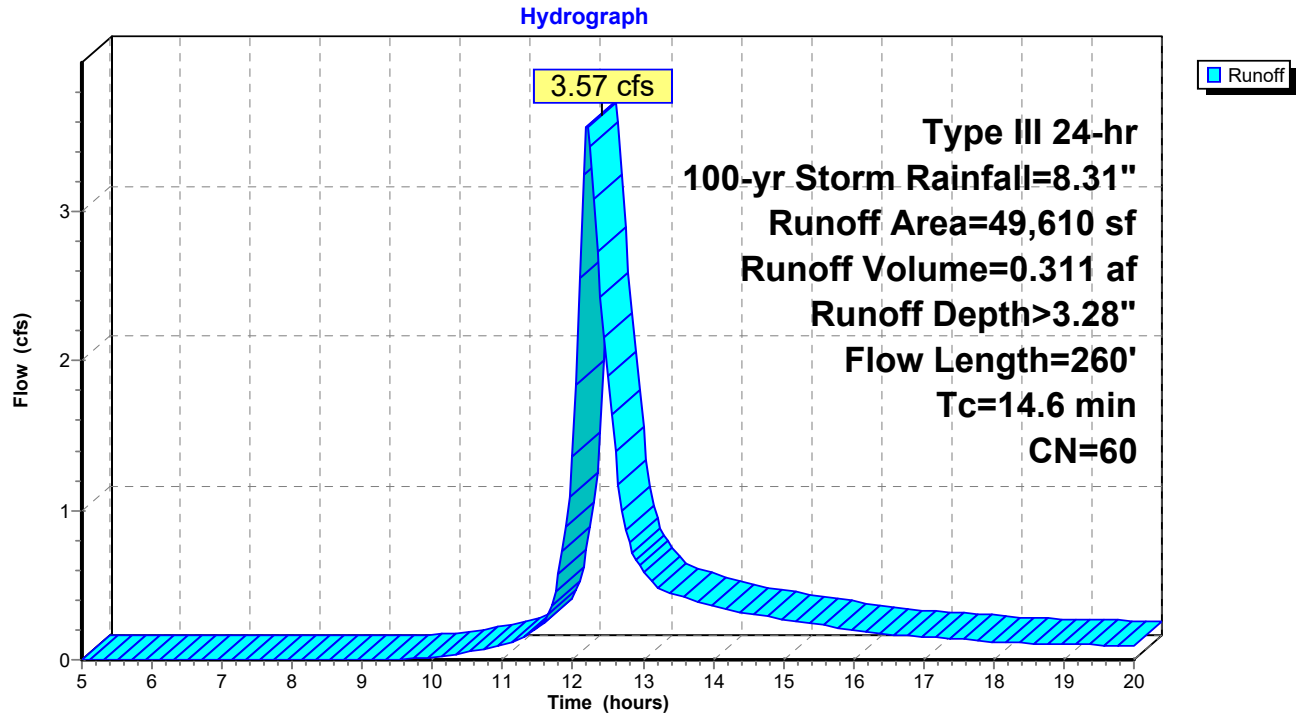
Runoff = 3.57 cfs @ 12.21 hrs, Volume= 0.311 af, Depth> 3.28"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

Area (sf)	CN	Description
14,423	98	Paved parking, HSG A
31,930	39	Pasture/grassland/range, Good, HSG A
3,257	98	Roofs, HSG A
49,610	60	Weighted Average
31,930		64.36% Pervious Area
17,680		35.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.7	160	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.6	260	Total			

Subcatchment SC-2 new: Road



Summary for Subcatchment SC-3 new: Southwest

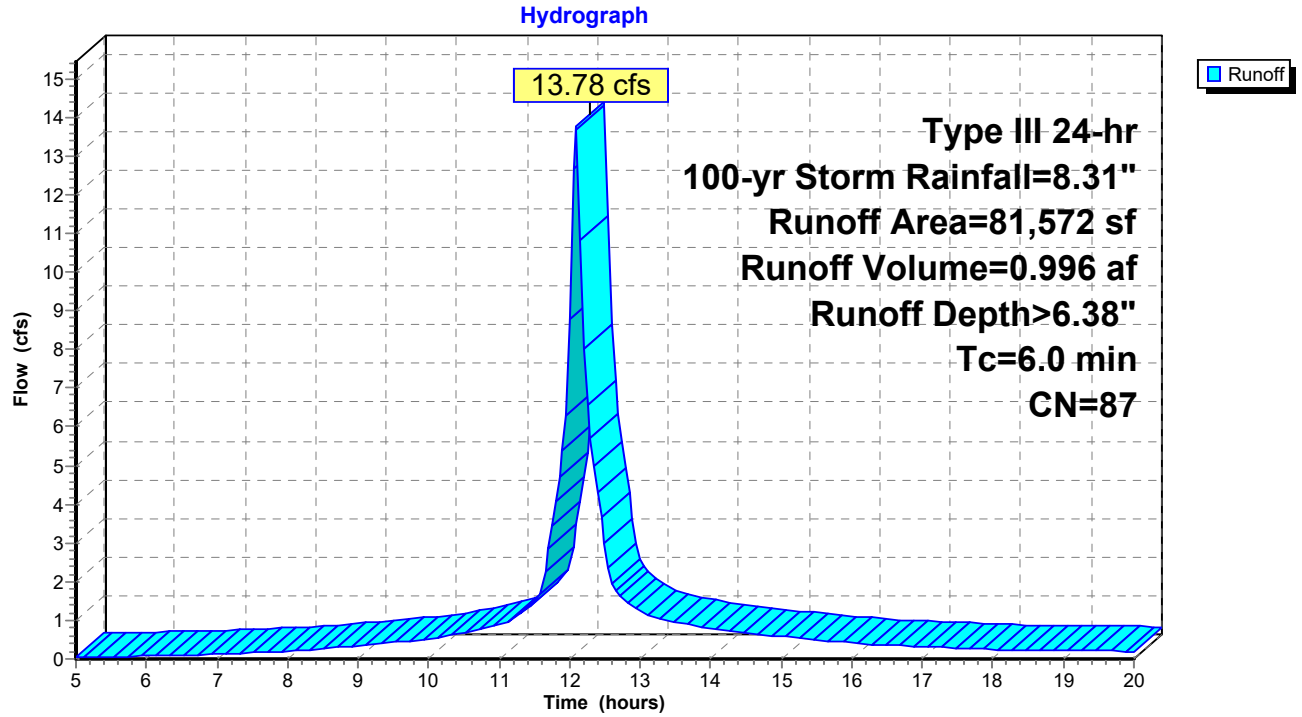
Runoff = 13.78 cfs @ 12.09 hrs, Volume= 0.996 af, Depth> 6.38"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

Area (sf)	CN	Description
41,439	98	Paved parking, HSG A
13,932	39	Pasture/grassland/range, Good, HSG A
6,300	80	Pasture/grassland/range, Good, HSG D
19,901	98	Roofs, HSG A
81,572	87	Weighted Average
20,232		24.80% Pervious Area
61,340		75.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3 new: Southwest

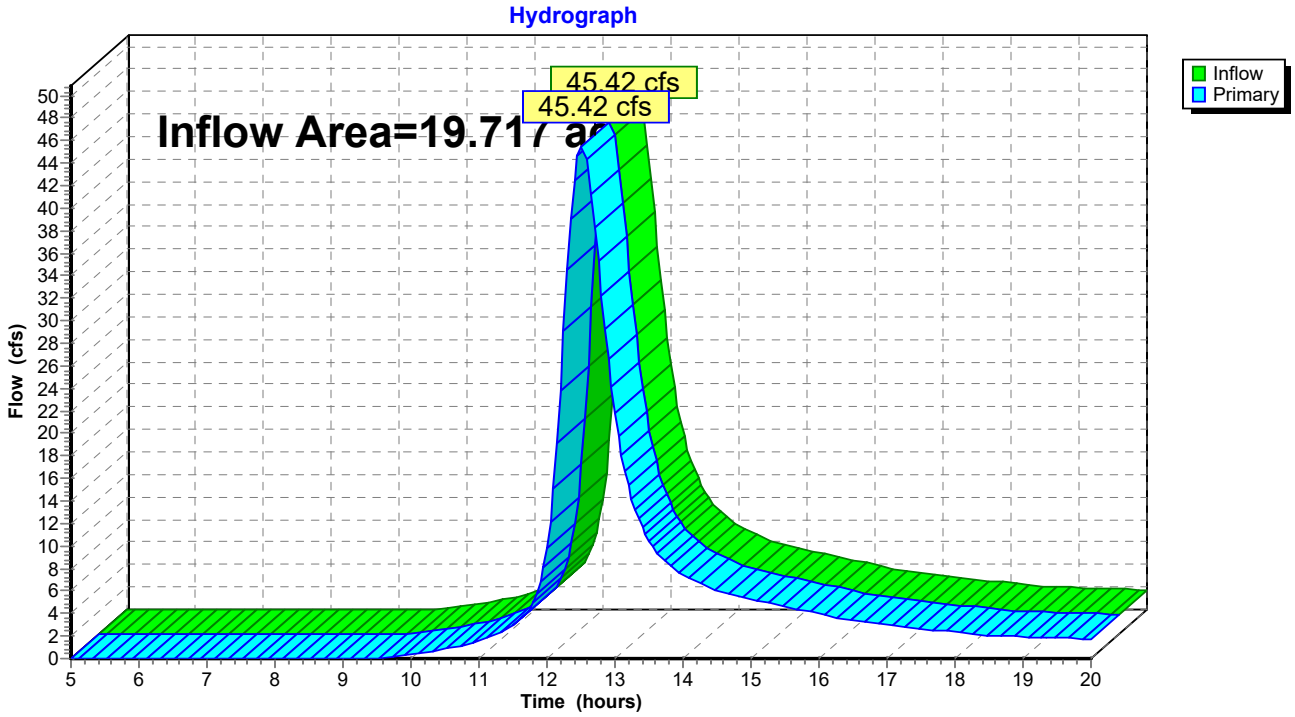


Summary for Link AP-1: AP-1

Inflow Area = 19.717 ac, 5.79% Impervious, Inflow Depth > 3.47" for 100-yr Storm event
Inflow = 45.42 cfs @ 12.51 hrs, Volume= 5.709 af
Primary = 45.42 cfs @ 12.51 hrs, Volume= 5.709 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-1: AP-1

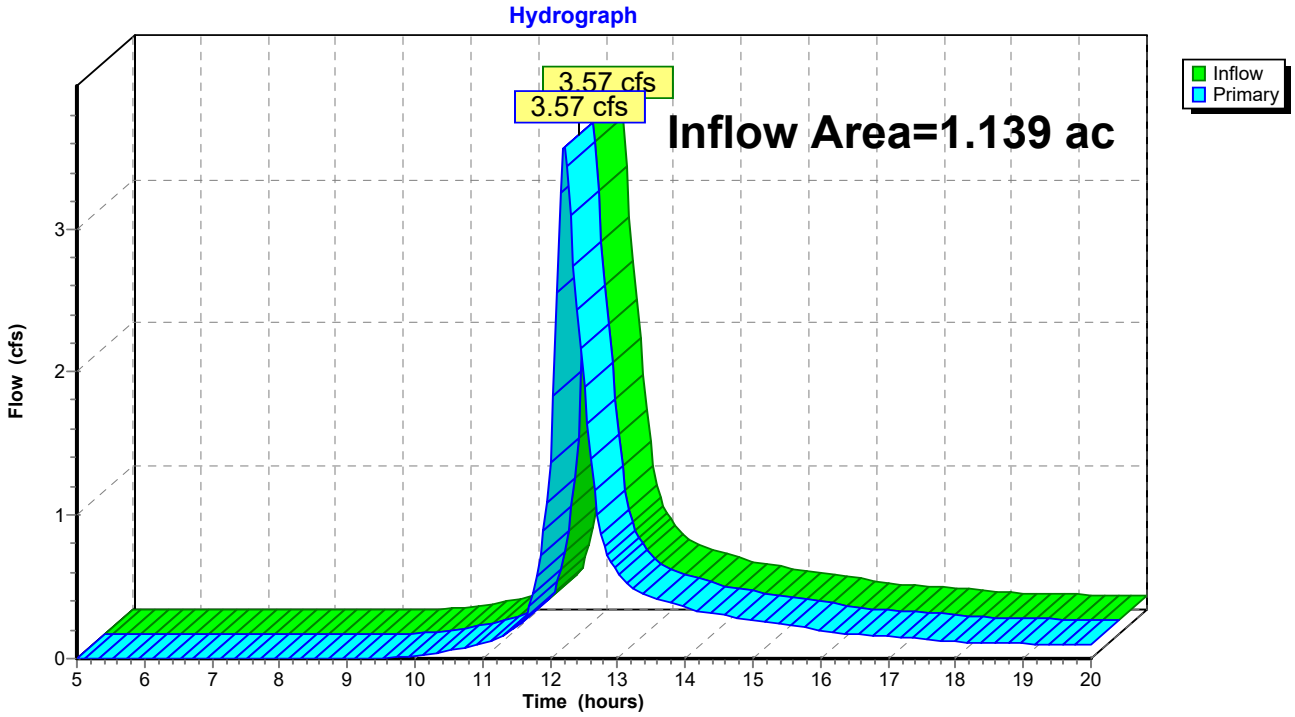


Summary for Link AP-2: AP-2

Inflow Area = 1.139 ac, 35.64% Impervious, Inflow Depth > 3.28" for 100-yr Storm event
Inflow = 3.57 cfs @ 12.21 hrs, Volume= 0.311 af
Primary = 3.57 cfs @ 12.21 hrs, Volume= 0.311 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-2: AP-2

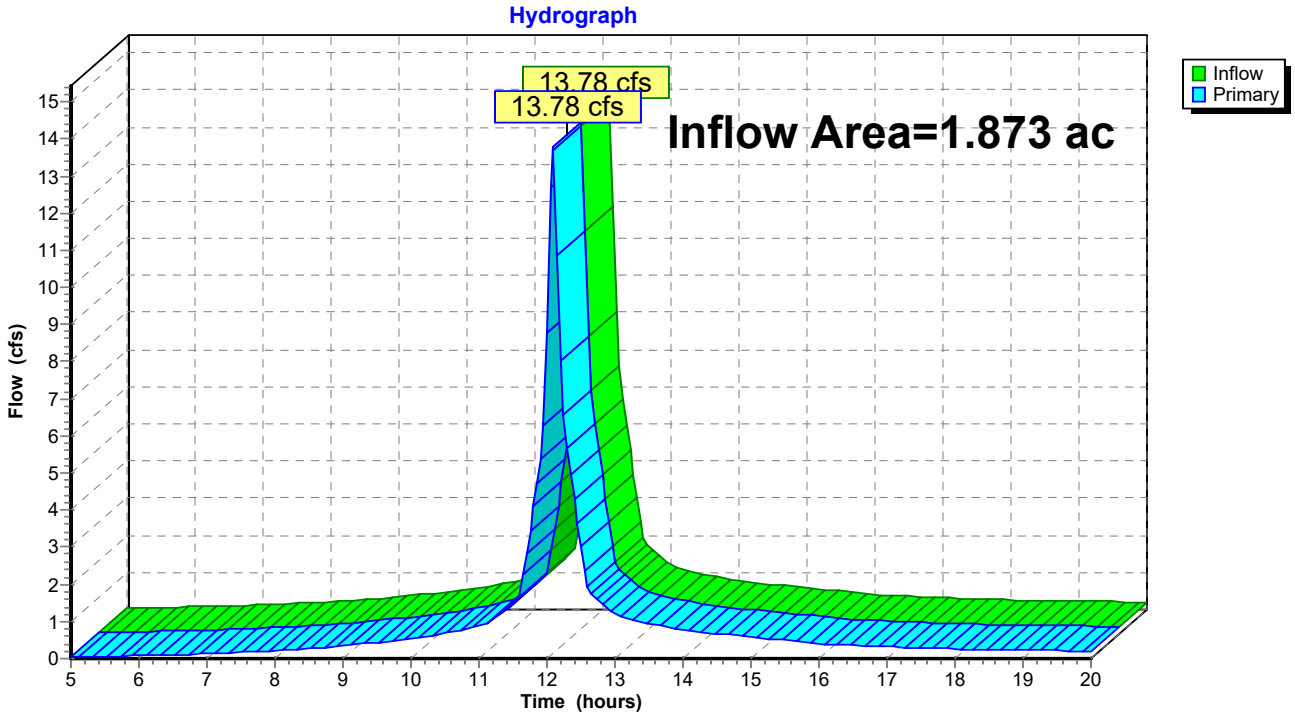


Summary for Link AP-3: AP-3

Inflow Area = 1.873 ac, 75.20% Impervious, Inflow Depth > 6.38" for 100-yr Storm event
Inflow = 13.78 cfs @ 12.09 hrs, Volume= 0.996 af
Primary = 13.78 cfs @ 12.09 hrs, Volume= 0.996 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

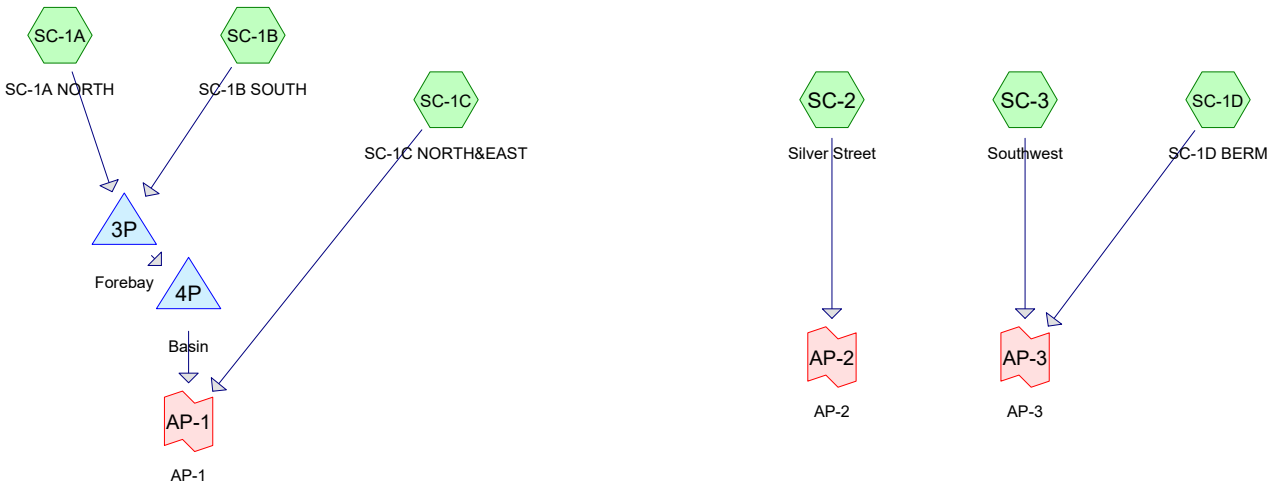
Link AP-3: AP-3



ATTACHMENT D

POST-DEVELOPMENT HYDROCAD CALCULATIONS

SME
SEVEE & MAHER
ENGINEERS



Subcat Reach Pond Link

Routing Diagram for Post-Conditions - 02-27-27
Prepared by Sevee & Maher Engineers, Printed 3/1/2026
HydroCAD® 10.20-7a s/n 01260 © 2025 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.403	98	Foundations/Equipment (SC-1A, SC-1B, SC-3)
3.434	96	Gravel (SC-1A, SC-1B, SC-1C, SC-1D, SC-3)
8.486	39	Pasture/grassland/range, Good, HSG A (SC-1A, SC-1B, SC-1C, SC-1D, SC-2, SC-3)
0.145	80	Pasture/grassland/range, Good, HSG D (SC-3)
0.891	98	Paved parking, HSG A (SC-1A, SC-1B, SC-1C, SC-2, SC-3)
0.647	98	Roofs, HSG A (SC-1B, SC-1C, SC-2, SC-3)
1.697	55	Topping Sonte (SC-1B)
1.271	55	Topping Stone (SC-1A, SC-3)
4.760	30	Woods, Good, HSG A (SC-1C)

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
14.784	HSG A	SC-1A, SC-1B, SC-1C, SC-1D, SC-2, SC-3
0.000	HSG B	
0.000	HSG C	
0.145	HSG D	SC-3
7.805	Other	SC-1A, SC-1B, SC-1C, SC-1D, SC-3

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	1.403	1.403	Foundations/Equipment	SC-1A, SC-1B, SC-3
0.000	0.000	0.000	0.000	3.434	3.434	Gravel	SC-1A, SC-1B, SC-1C, SC-1D, SC-3
8.486	0.000	0.000	0.145	0.000	8.630	Pasture/grassland/range, Good	SC-1A, SC-1B, SC-1C, SC-1D, SC-2, SC-3
0.891	0.000	0.000	0.000	0.000	0.891	Paved parking	SC-1A, SC-1B, SC-1C, SC-2, SC-3
0.647	0.000	0.000	0.000	0.000	0.647	Roofs	SC-1B, SC-1C, SC-2, SC-3

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	1.697	1.697	Topping Sonte	SC-1B
0.000	0.000	0.000	0.000	1.271	1.271	Topping Stone	SC-1A, SC-3
4.760	0.000	0.000	0.000	0.000	4.760	Woods, Good	SC-1C

Summary for Subcatchment SC-1A: SC-1A NORTH

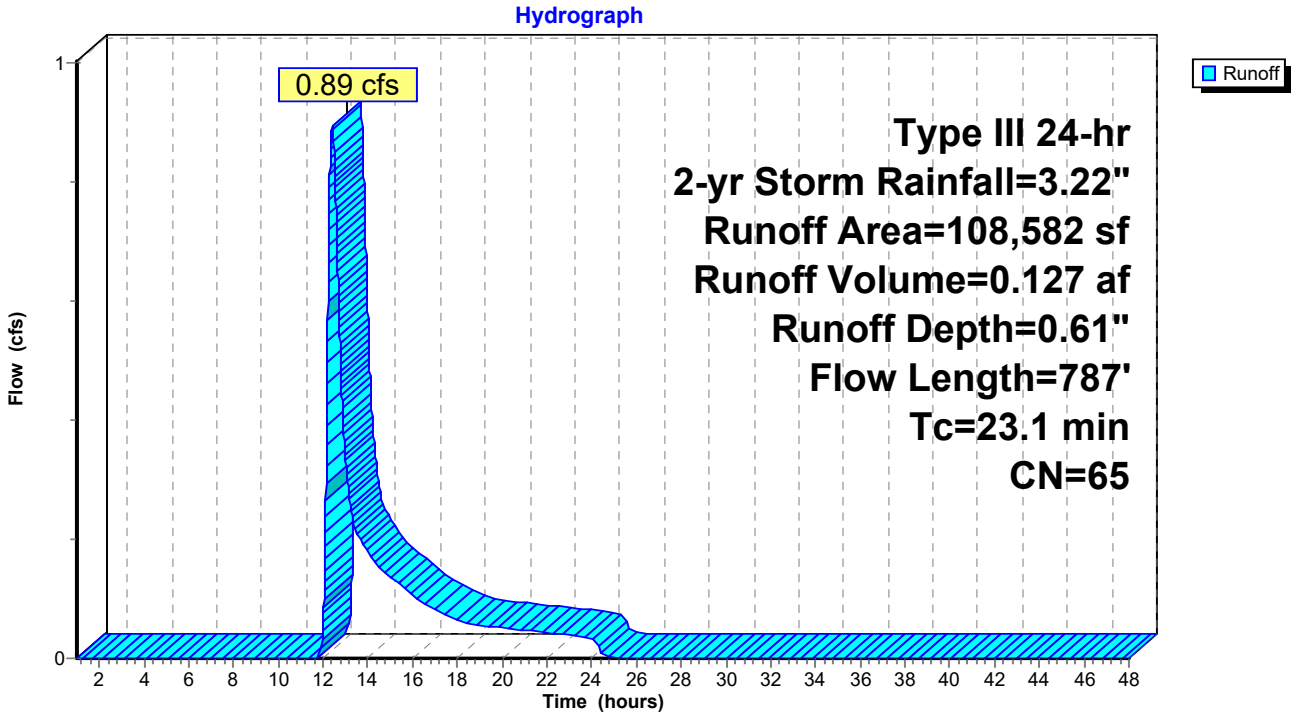
Runoff = 0.89 cfs @ 12.40 hrs, Volume= 0.127 af, Depth= 0.61"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
*	19,299	96	Gravel
	24,825	39	Pasture/grassland/range, Good, HSG A
	1,912	98	Paved parking, HSG A
*	48,595	55	Topping Stone
*	13,951	98	Foundations/Equipment
	108,582	65	Weighted Average
	92,719		85.39% Pervious Area
	15,863		14.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.7	157	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.6	385	0.0120	1.76		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
2.9	145	0.0030	0.82		**Shallow Concentrated Flow, D-E** Grassed Waterway Kv= 15.0 fps
23.1	787	Total			

Subcatchment SC-1A: SC-1A NORTH



Summary for Subcatchment SC-1B: SC-1B SOUTH

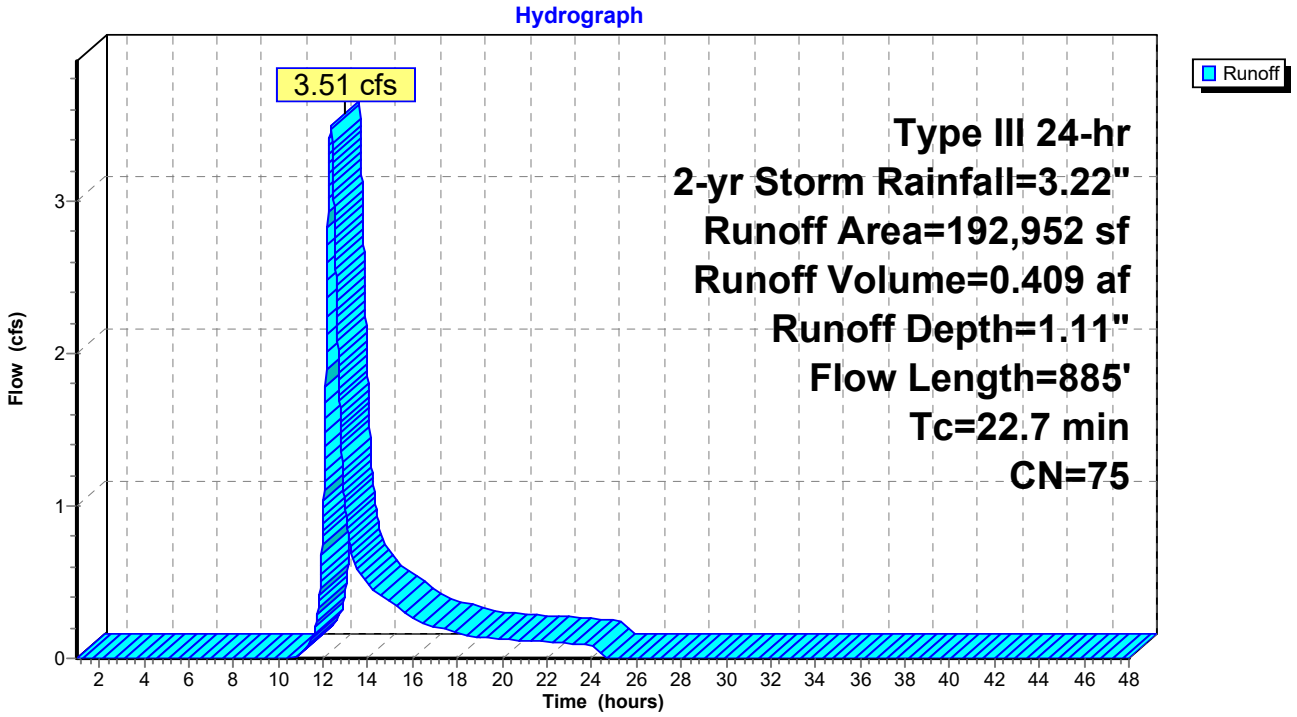
Runoff = 3.51 cfs @ 12.34 hrs, Volume= 0.409 af, Depth= 1.11"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
*	38,260	96	Gravel
	18,614	39	Pasture/grassland/range, Good, HSG A
	8,866	98	Roofs, HSG A
*	73,911	55	Topping Sonte
	9,866	98	Paved parking, HSG A
*	43,435	98	Foundations/Equipment
	192,952	75	Weighted Average
	130,785		67.78% Pervious Area
	62,167		32.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
0.8	75	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
1.8	83	0.0120	0.77		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
4.3	440	0.0110	1.69		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
2.9	187	0.0050	1.06		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
22.7	885	Total			

Subcatchment SC-1B: SC-1B SOUTH



Summary for Subcatchment SC-1C: SC-1C NORTH&EAST

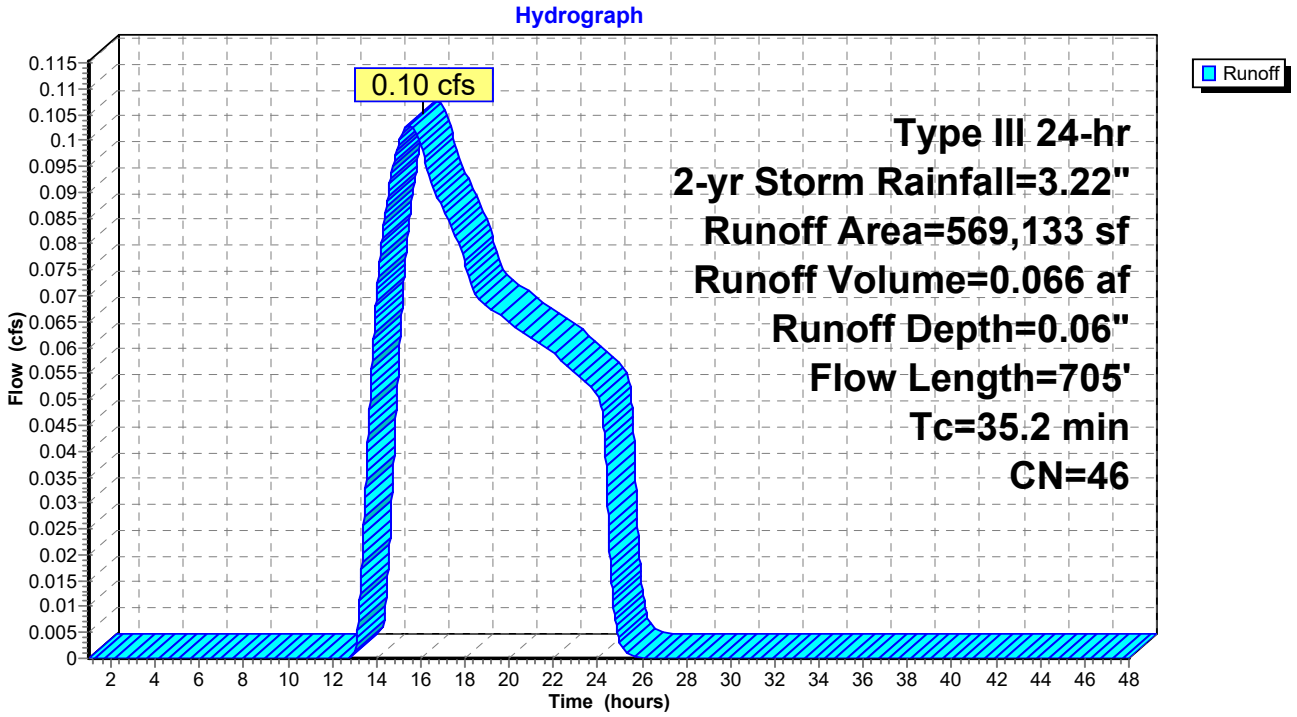
Runoff = 0.10 cfs @ 15.45 hrs, Volume= 0.066 af, Depth= 0.06"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
	264,412	39	Pasture/grassland/range, Good, HSG A
	207,341	30	Woods, Good, HSG A
	2,581	98	Paved parking, HSG A
*	83,152	96	Gravel
	11,647	98	Roofs, HSG A
	569,133	46	Weighted Average
	554,905		97.50% Pervious Area
	14,228		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0050	0.10		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
14.1	430	0.0010	0.51		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
4.1	175	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.2	705	Total			

Subcatchment SC-1C: SC-1C NORTH&EAST



Summary for Subcatchment SC-1D: SC-1D BERM

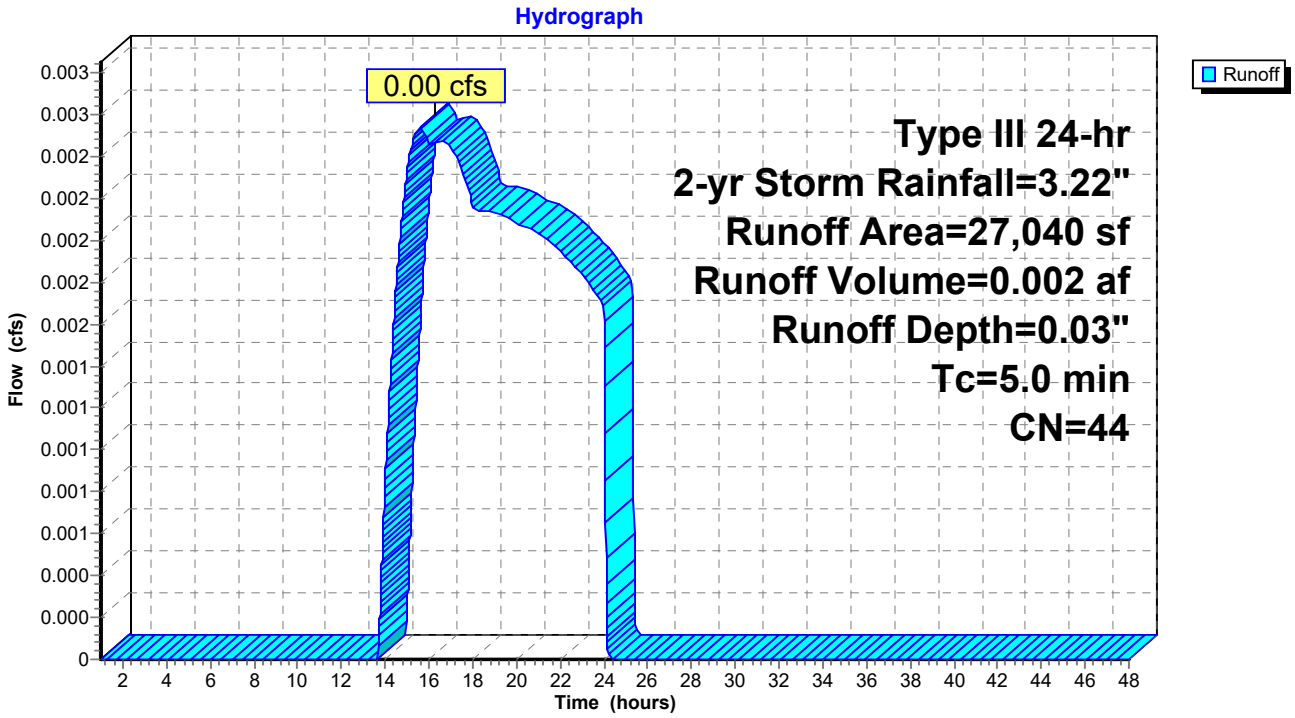
Runoff = 0.00 cfs @ 15.63 hrs, Volume= 0.002 af, Depth= 0.03"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
*	2,164	96	Gravel
	24,876	39	Pasture/grassland/range, Good, HSG A
	27,040	44	Weighted Average
	27,040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-1D: SC-1D BERM



Summary for Subcatchment SC-2: Silver Street

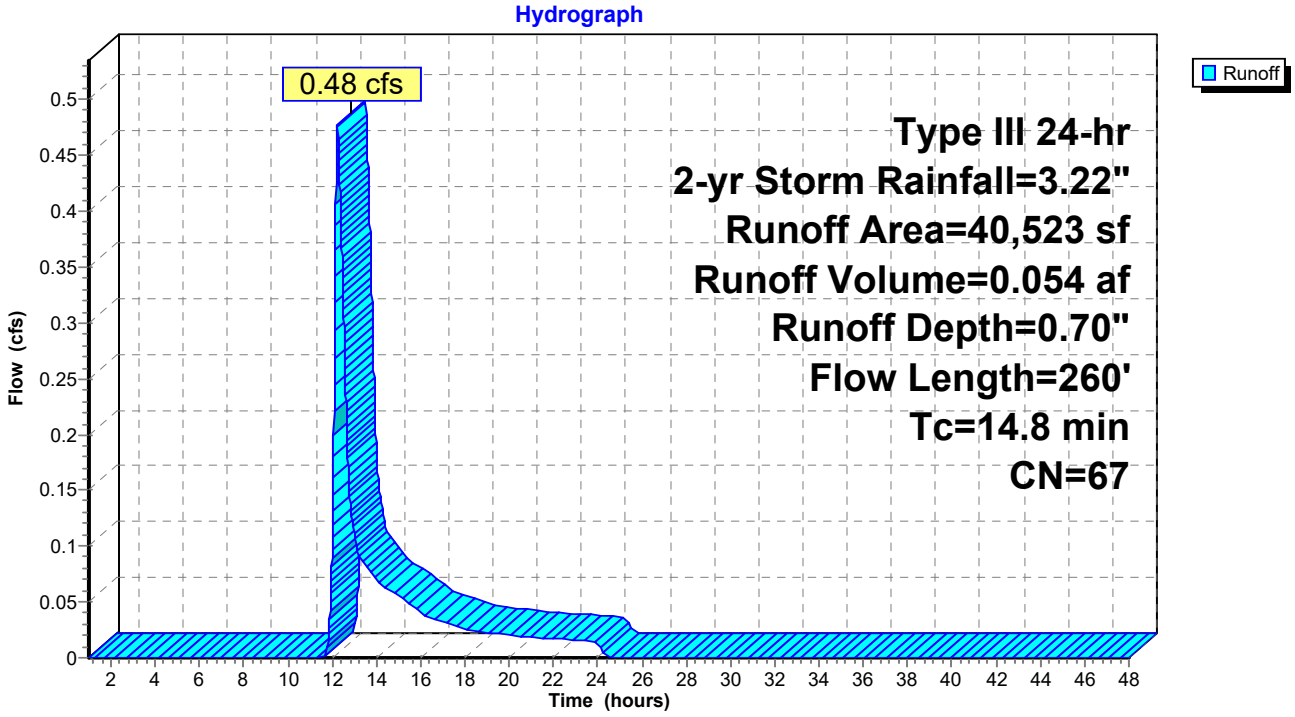
Runoff = 0.48 cfs @ 12.24 hrs, Volume= 0.054 af, Depth= 0.70"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

Area (sf)	CN	Description
15,815	98	Paved parking, HSG A
21,395	39	Pasture/grassland/range, Good, HSG A
3,313	98	Roofs, HSG A
40,523	67	Weighted Average
21,395		52.80% Pervious Area
19,128		47.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.9	160	0.0050	1.44		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.8	260	Total			

Subcatchment SC-2: Silver Street



Summary for Subcatchment SC-3: Southwest

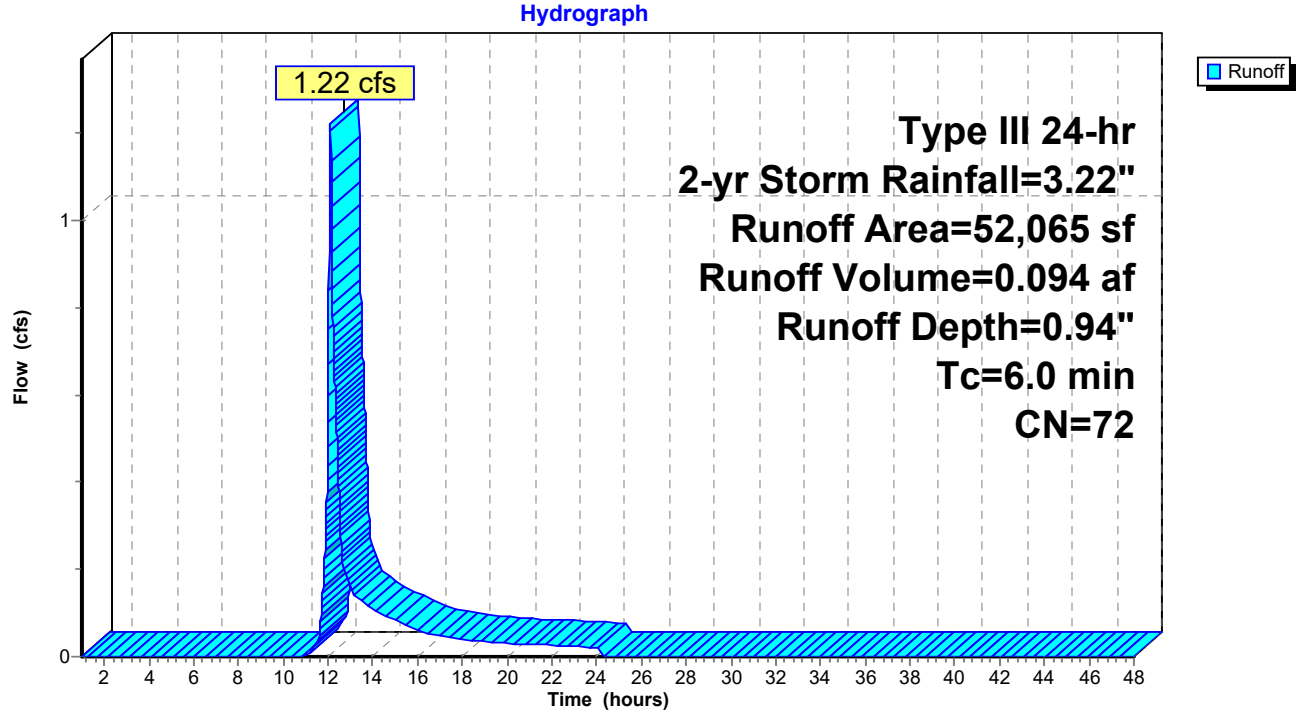
Runoff = 1.22 cfs @ 12.10 hrs, Volume= 0.094 af, Depth= 0.94"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
*	6,728	96	Gravel
	15,522	39	Pasture/grassland/range, Good, HSG A
	6,300	80	Pasture/grassland/range, Good, HSG D
	8,652	98	Paved parking, HSG A
	4,366	98	Roofs, HSG A
*	6,774	55	Topping Stone
*	3,723	98	Foundations/Equipment
	52,065	72	Weighted Average
	35,324		67.85% Pervious Area
	16,741		32.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3: Southwest



Summary for Pond 3P: Forebay

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 0.93" for 2-yr Storm event
Inflow = 4.37 cfs @ 12.35 hrs, Volume= 0.536 af
Outflow = 4.37 cfs @ 12.35 hrs, Volume= 0.518 af, Atten= 0%, Lag= 0.4 min
Primary = 4.37 cfs @ 12.35 hrs, Volume= 0.518 af
Routed to Pond 4P : Basin

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.08' @ 12.35 hrs Surf.Area= 1,318 sf Storage= 869 cf

Plug-Flow detention time= 24.7 min calculated for 0.518 af (97% of inflow)
Center-of-Mass det. time= 6.7 min (889.3 - 882.6)

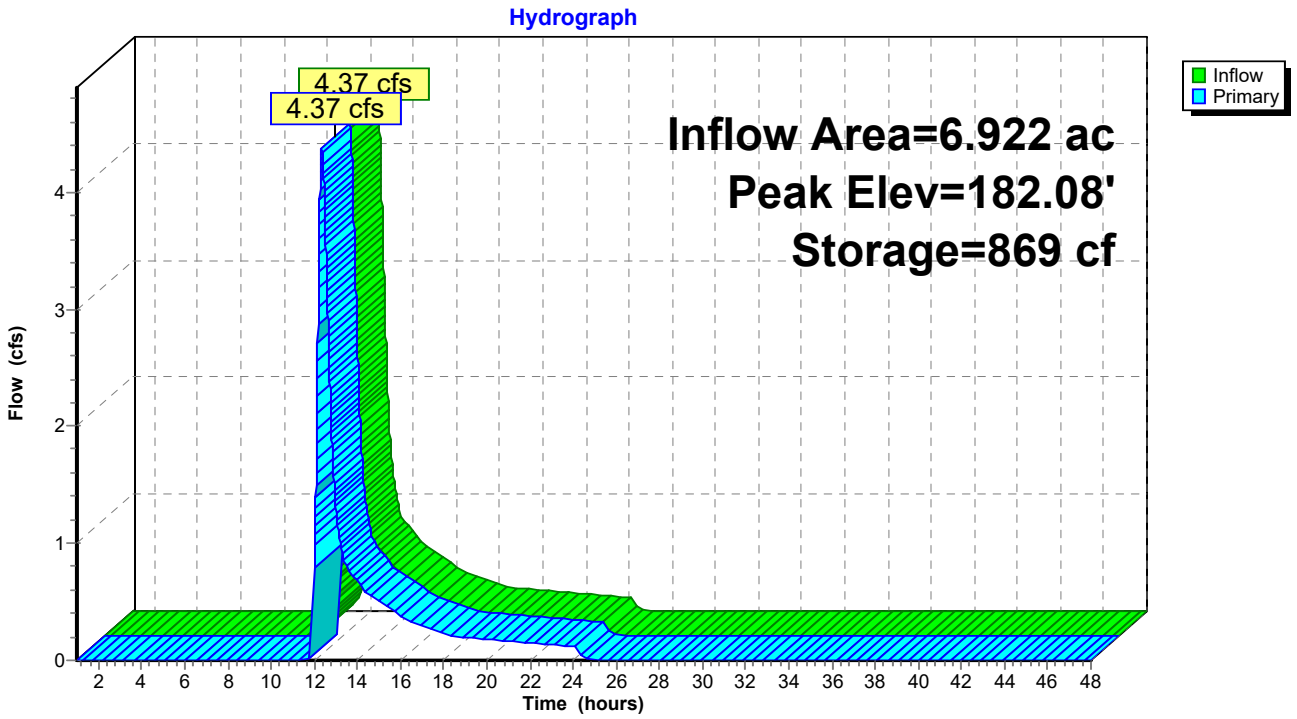
Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	2,650 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.00	323	0	0
182.00	1,219	771	771
182.50	1,856	769	1,540
183.00	2,584	1,110	2,650

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**85.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=4.36 cfs @ 12.35 hrs HW=182.08' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 4.36 cfs @ 0.66 fps)

Pond 3P: Forebay



Summary for Pond 4P: Basin

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 0.90" for 2-yr Storm event
Inflow = 4.37 cfs @ 12.35 hrs, Volume= 0.518 af
Outflow = 2.07 cfs @ 12.77 hrs, Volume= 0.440 af, Atten= 53%, Lag= 25.4 min
Primary = 2.07 cfs @ 12.77 hrs, Volume= 0.440 af
Routed to Link AP-1 : AP-1

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 181.48' @ 12.77 hrs Surf.Area= 4,164 sf Storage= 6,538 cf

Plug-Flow detention time= 137.4 min calculated for 0.440 af (85% of inflow)
Center-of-Mass det. time= 70.9 min (960.2 - 889.3)

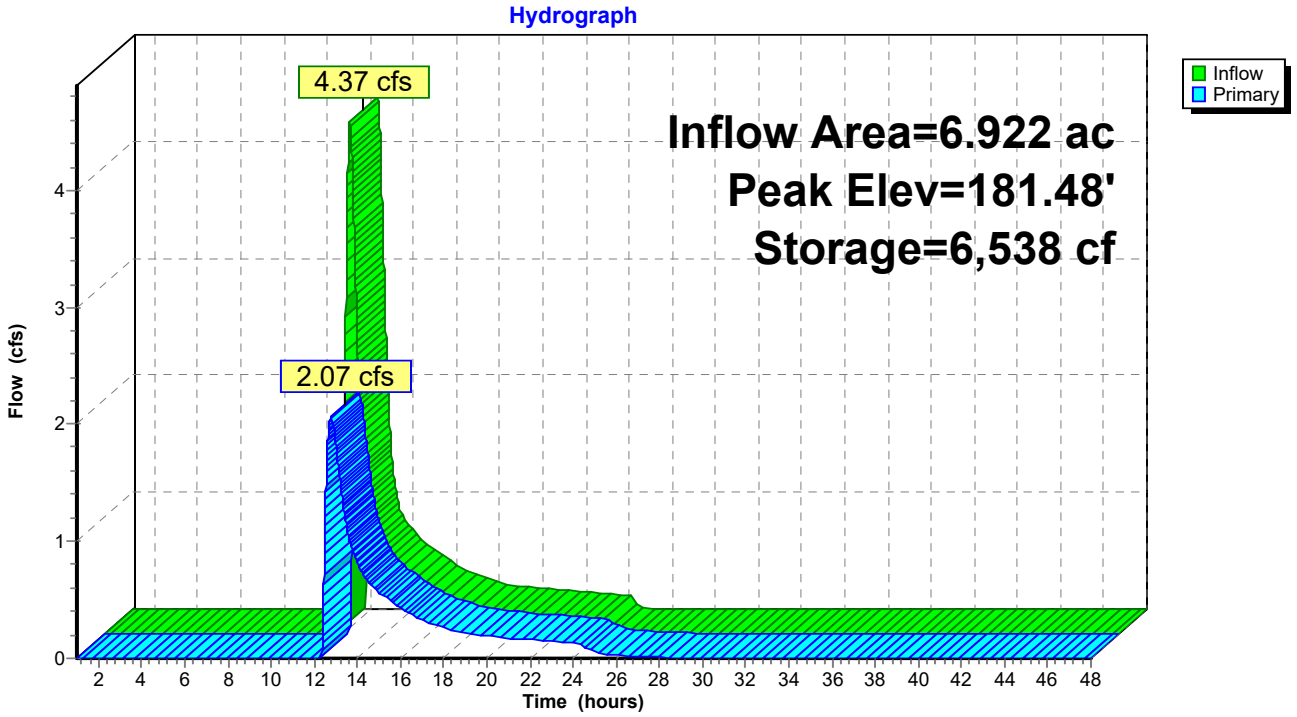
Volume	Invert	Avail.Storage	Storage Description
#1	179.00'	17,725 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
179.00	1,176	0	0
180.00	2,318	1,747	1,747
180.50	2,919	1,309	3,056
180.75	3,227	768	3,825
181.00	3,541	846	4,671
181.50	4,184	1,931	6,602
182.00	4,851	2,259	8,861
183.00	6,254	5,553	14,413
183.50	6,995	3,312	17,725

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**32.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	182.00'	**30.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Primary	180.60'	**12.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 180.60' / 180.40' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.07 cfs @ 12.77 hrs HW=181.48' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **3=Culvert** (Barrel Controls 2.07 cfs @ 3.74 fps)

Pond 4P: Basin

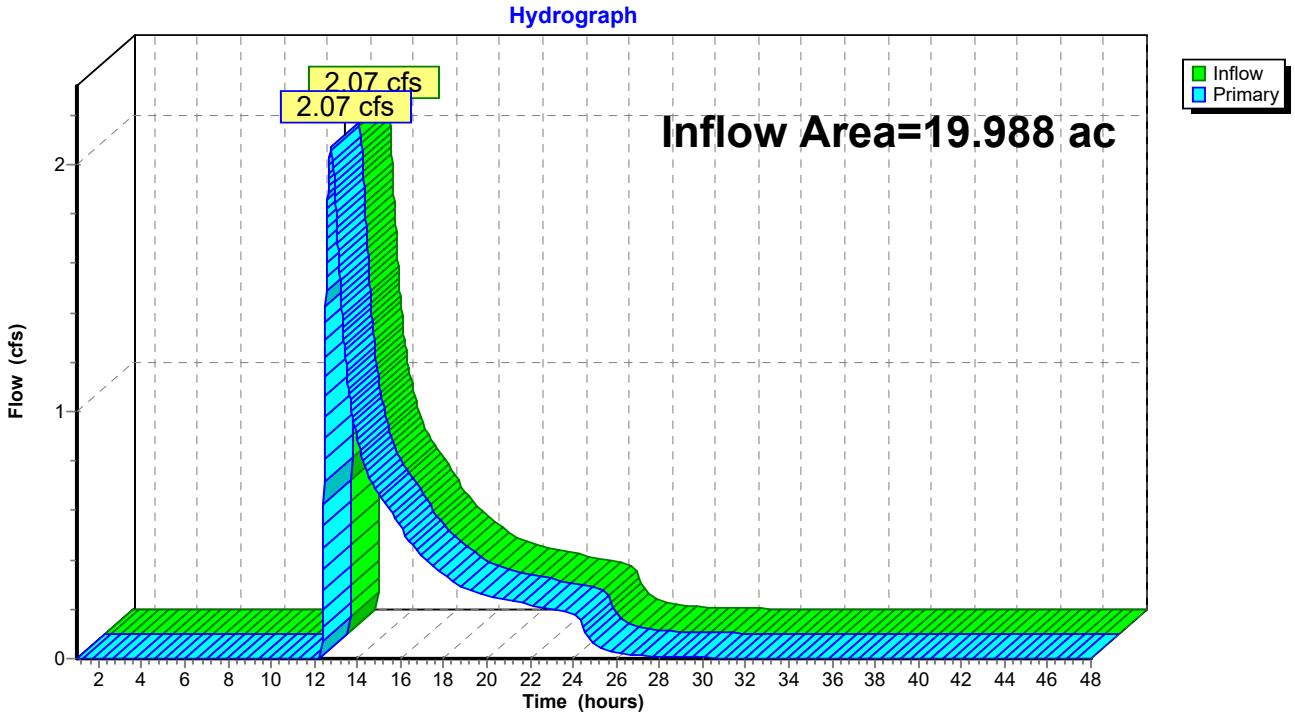


Summary for Link AP-1: AP-1

Inflow Area = 19.988 ac, 10.60% Impervious, Inflow Depth > 0.30" for 2-yr Storm event
Inflow = 2.07 cfs @ 12.77 hrs, Volume= 0.506 af
Primary = 2.07 cfs @ 12.77 hrs, Volume= 0.506 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

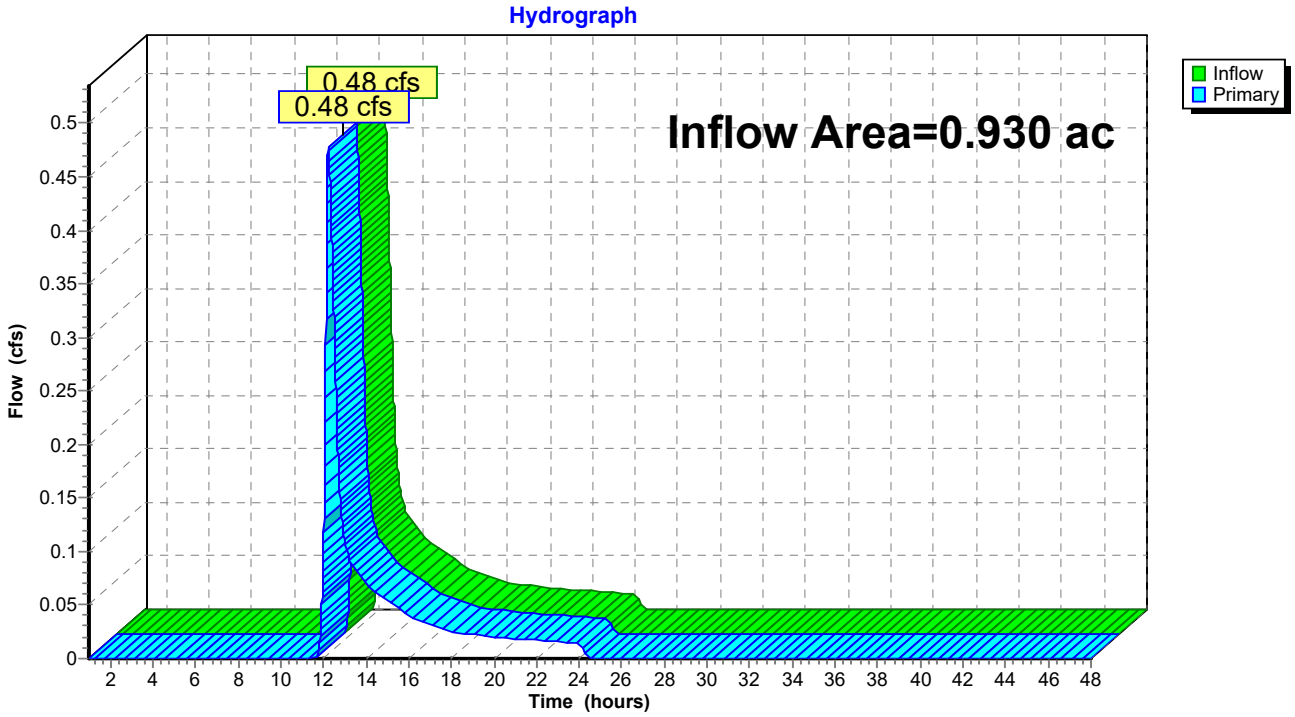


Summary for Link AP-2: AP-2

Inflow Area = 0.930 ac, 47.20% Impervious, Inflow Depth = 0.70" for 2-yr Storm event
Inflow = 0.48 cfs @ 12.24 hrs, Volume= 0.054 af
Primary = 0.48 cfs @ 12.24 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2

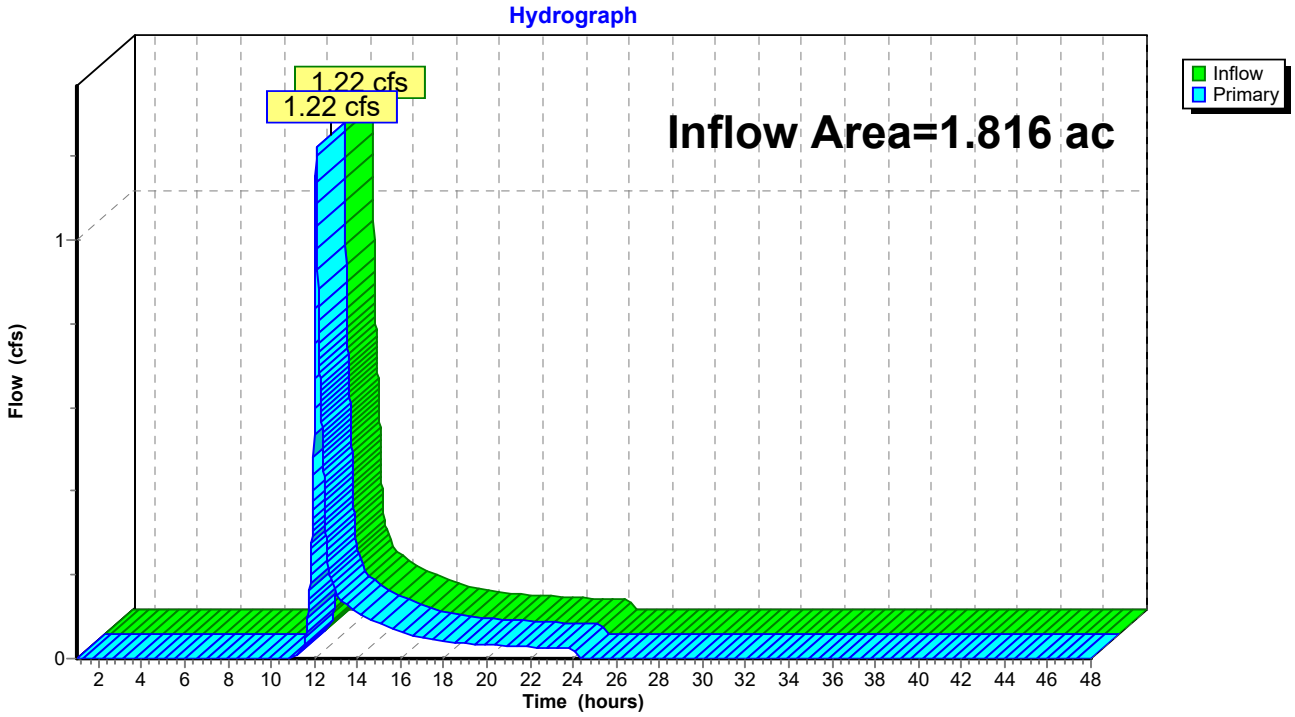


Summary for Link AP-3: AP-3

Inflow Area = 1.816 ac, 21.16% Impervious, Inflow Depth = 0.63" for 2-yr Storm event
Inflow = 1.22 cfs @ 12.10 hrs, Volume= 0.096 af
Primary = 1.22 cfs @ 12.10 hrs, Volume= 0.096 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-3: AP-3



Summary for Subcatchment SC-1A: SC-1A NORTH

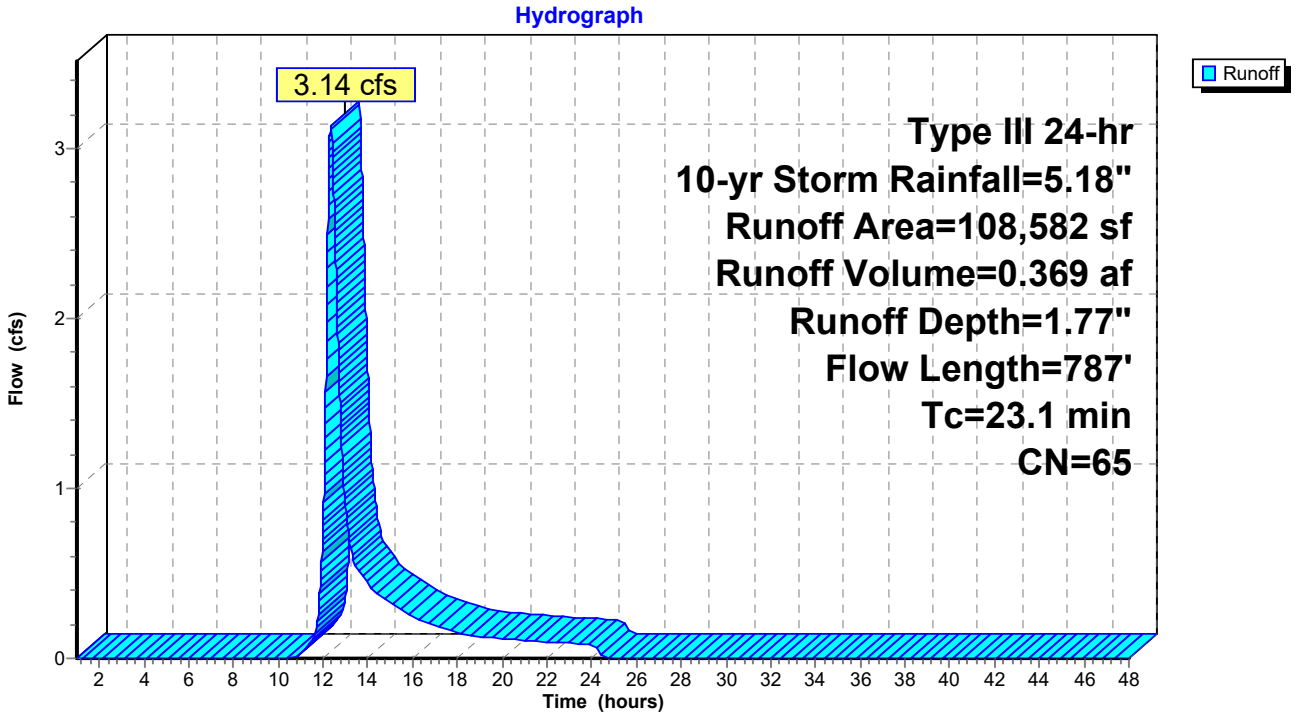
Runoff = 3.14 cfs @ 12.35 hrs, Volume= 0.369 af, Depth= 1.77"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
*	19,299	96	Gravel
	24,825	39	Pasture/grassland/range, Good, HSG A
	1,912	98	Paved parking, HSG A
*	48,595	55	Topping Stone
*	13,951	98	Foundations/Equipment
	108,582	65	Weighted Average
	92,719		85.39% Pervious Area
	15,863		14.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.7	157	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.6	385	0.0120	1.76		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
2.9	145	0.0030	0.82		**Shallow Concentrated Flow, D-E** Grassed Waterway Kv= 15.0 fps
23.1	787	Total			

Subcatchment SC-1A: SC-1A NORTH



Summary for Subcatchment SC-1B: SC-1B SOUTH

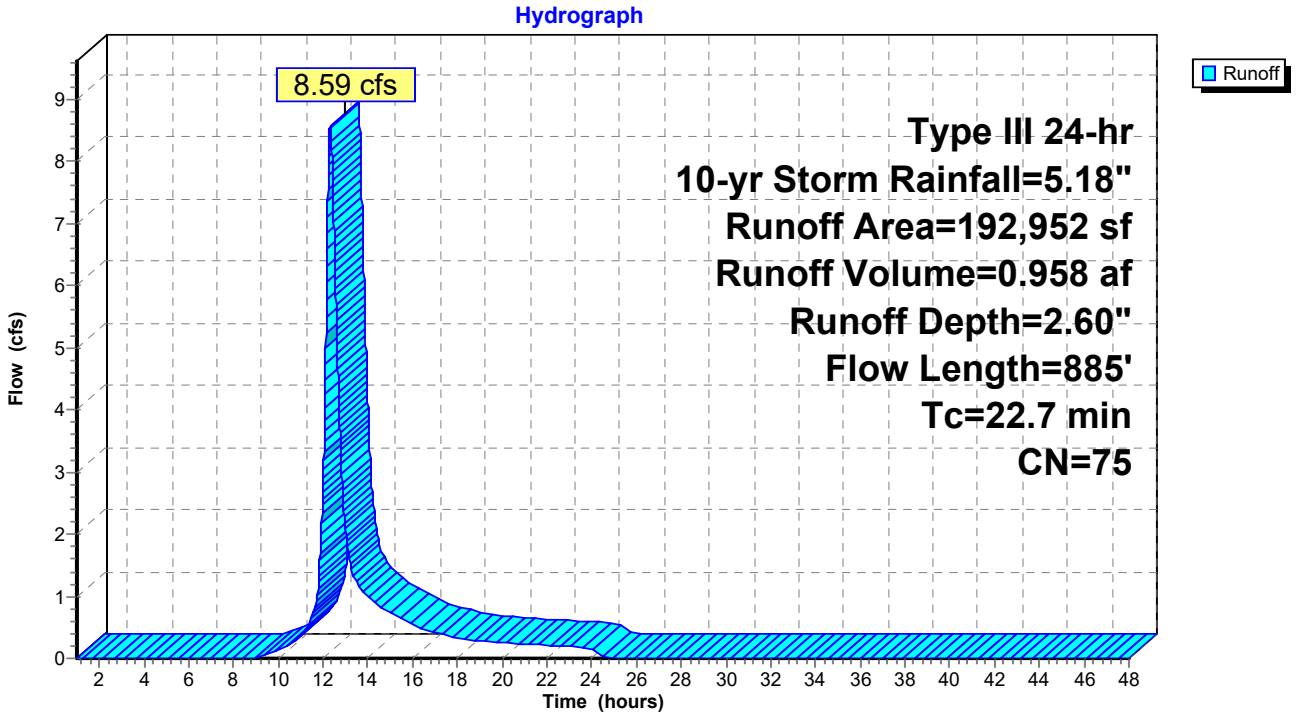
Runoff = 8.59 cfs @ 12.33 hrs, Volume= 0.958 af, Depth= 2.60"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
*	38,260	96	Gravel
	18,614	39	Pasture/grassland/range, Good, HSG A
	8,866	98	Roofs, HSG A
*	73,911	55	Topping Sonte
	9,866	98	Paved parking, HSG A
*	43,435	98	Foundations/Equipment
	192,952	75	Weighted Average
	130,785		67.78% Pervious Area
	62,167		32.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
0.8	75	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
1.8	83	0.0120	0.77		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
4.3	440	0.0110	1.69		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
2.9	187	0.0050	1.06		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
22.7	885	Total			

Subcatchment SC-1B: SC-1B SOUTH



Summary for Subcatchment SC-1C: SC-1C NORTH&EAST

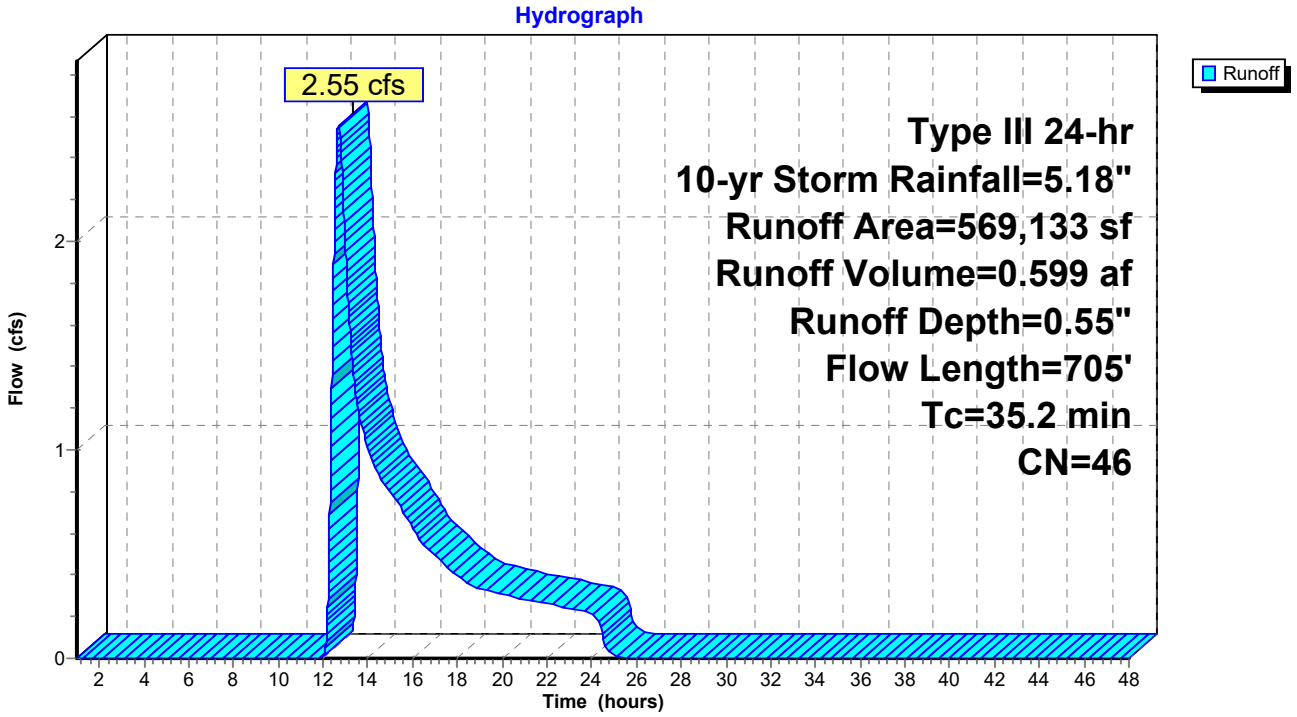
Runoff = 2.55 cfs @ 12.71 hrs, Volume= 0.599 af, Depth= 0.55"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
	264,412	39	Pasture/grassland/range, Good, HSG A
	207,341	30	Woods, Good, HSG A
	2,581	98	Paved parking, HSG A
*	83,152	96	Gravel
	11,647	98	Roofs, HSG A
	569,133	46	Weighted Average
	554,905		97.50% Pervious Area
	14,228		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0050	0.10		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
14.1	430	0.0010	0.51		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
4.1	175	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.2	705	Total			

Subcatchment SC-1C: SC-1C NORTH&EAST



Summary for Subcatchment SC-1D: SC-1D BERM

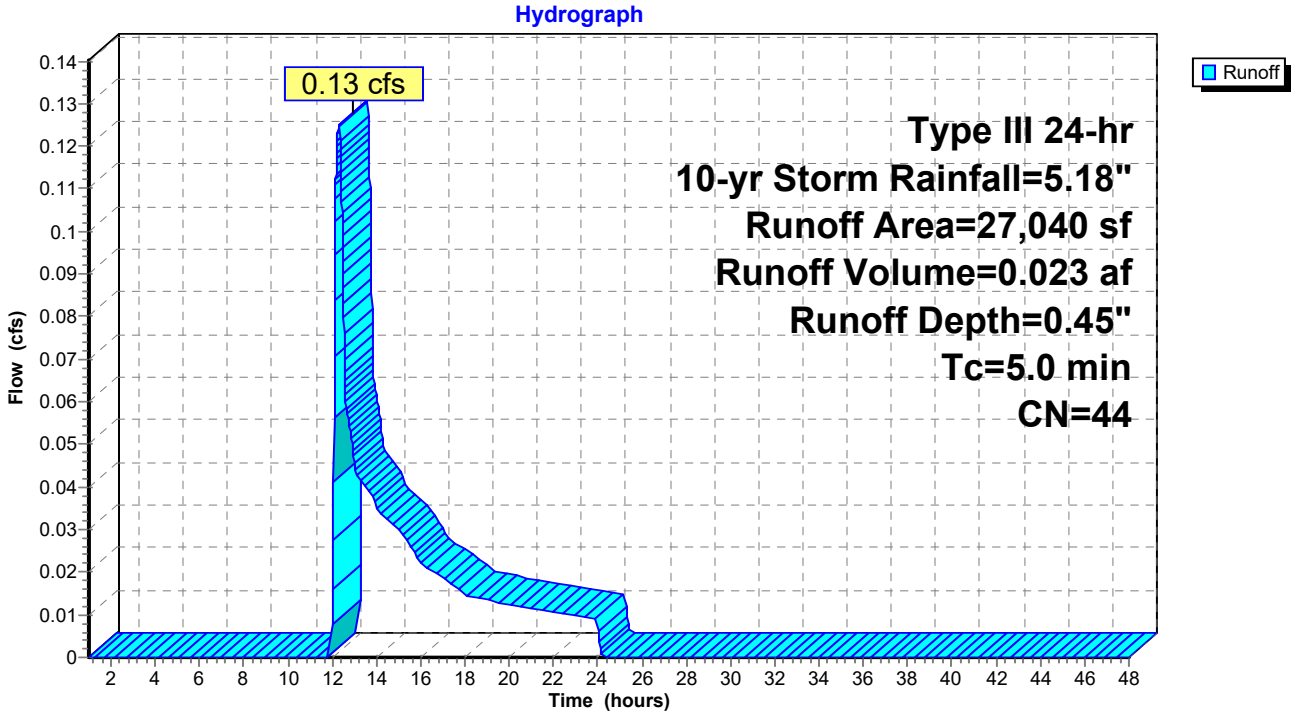
Runoff = 0.13 cfs @ 12.29 hrs, Volume= 0.023 af, Depth= 0.45"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
*	2,164	96	Gravel
	24,876	39	Pasture/grassland/range, Good, HSG A
	27,040	44	Weighted Average
	27,040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-1D: SC-1D BERM



Summary for Subcatchment SC-2: Silver Street

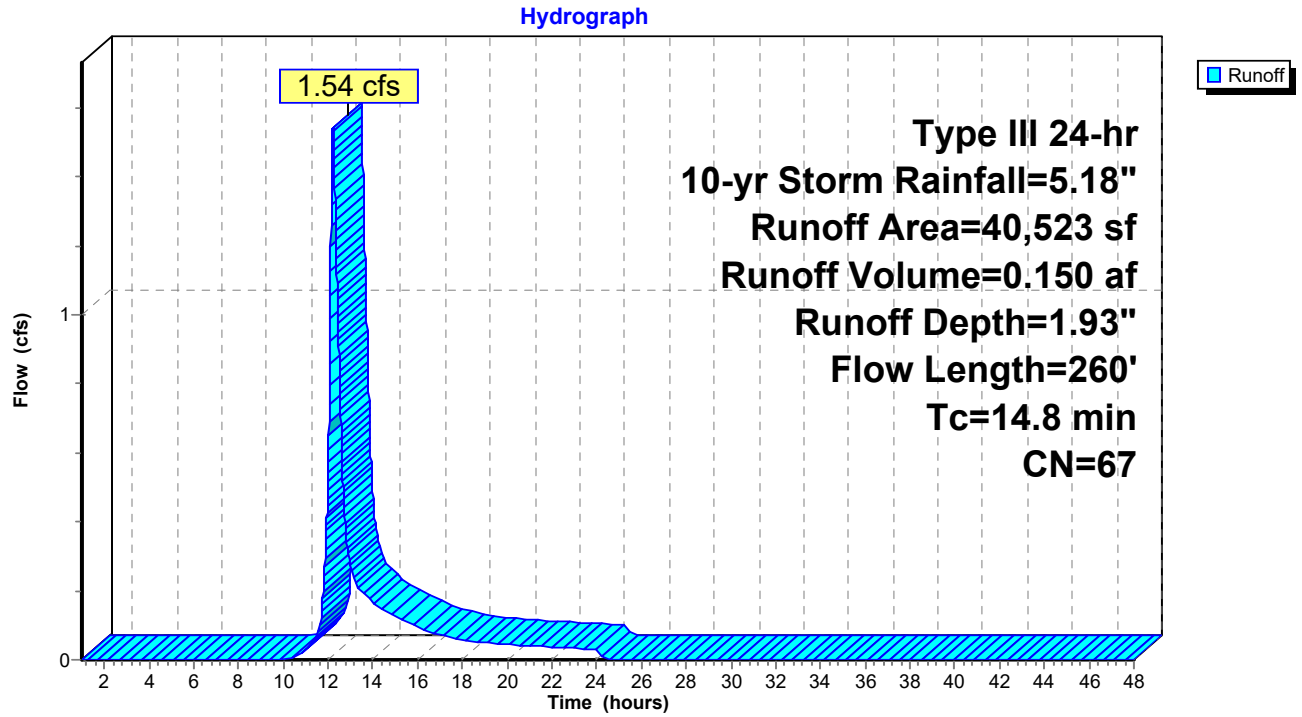
Runoff = 1.54 cfs @ 12.22 hrs, Volume= 0.150 af, Depth= 1.93"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

Area (sf)	CN	Description
15,815	98	Paved parking, HSG A
21,395	39	Pasture/grassland/range, Good, HSG A
3,313	98	Roofs, HSG A
40,523	67	Weighted Average
21,395		52.80% Pervious Area
19,128		47.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.9	160	0.0050	1.44		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.8	260	Total			

Subcatchment SC-2: Silver Street



Summary for Subcatchment SC-3: Southwest

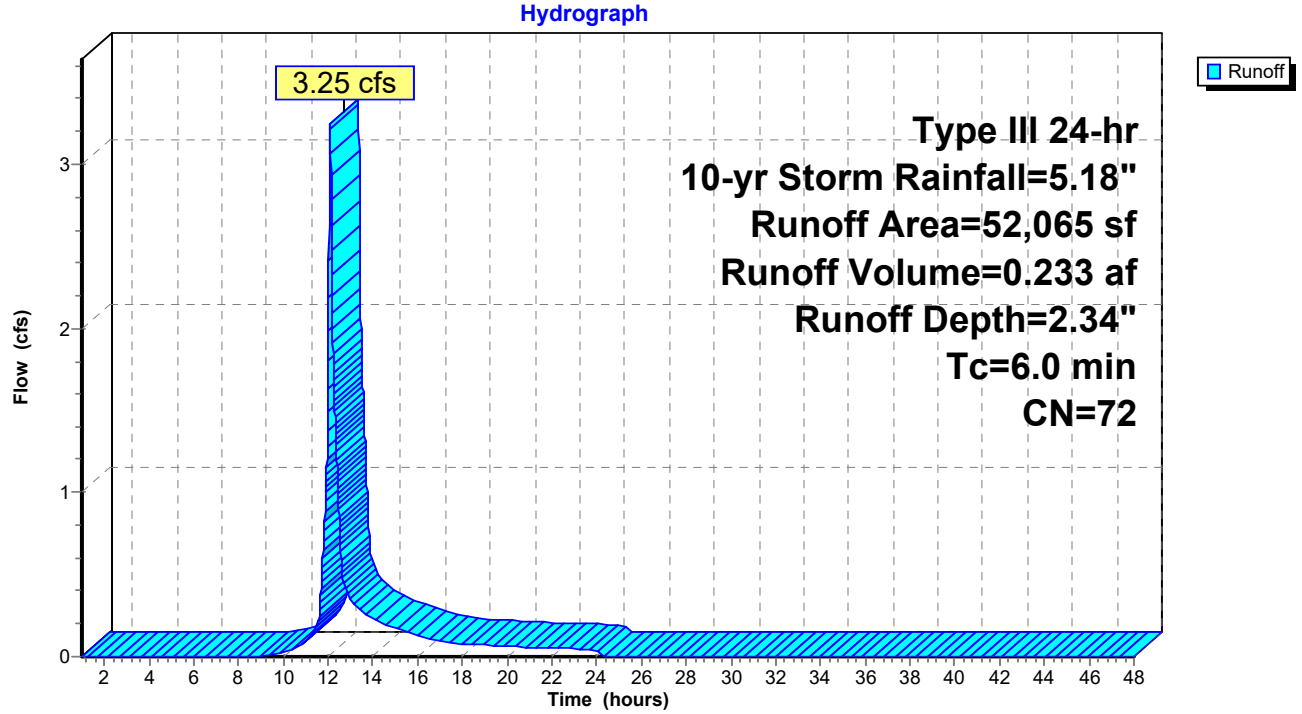
Runoff = 3.25 cfs @ 12.09 hrs, Volume= 0.233 af, Depth= 2.34"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
*	6,728	96	Gravel
	15,522	39	Pasture/grassland/range, Good, HSG A
	6,300	80	Pasture/grassland/range, Good, HSG D
	8,652	98	Paved parking, HSG A
	4,366	98	Roofs, HSG A
*	6,774	55	Topping Stone
*	3,723	98	Foundations/Equipment
	52,065	72	Weighted Average
	35,324		67.85% Pervious Area
	16,741		32.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3: Southwest



Summary for Pond 3P: Forebay

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 2.30" for 10-yr Storm event
Inflow = 11.71 cfs @ 12.33 hrs, Volume= 1.327 af
Outflow = 11.70 cfs @ 12.33 hrs, Volume= 1.309 af, Atten= 0%, Lag= 0.2 min
Primary = 11.70 cfs @ 12.33 hrs, Volume= 1.309 af
Routed to Pond 4P : Basin

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.15' @ 12.33 hrs Surf.Area= 1,409 sf Storage= 967 cf

Plug-Flow detention time= 11.6 min calculated for 1.309 af (99% of inflow)
Center-of-Mass det. time= 3.8 min (859.7 - 855.9)

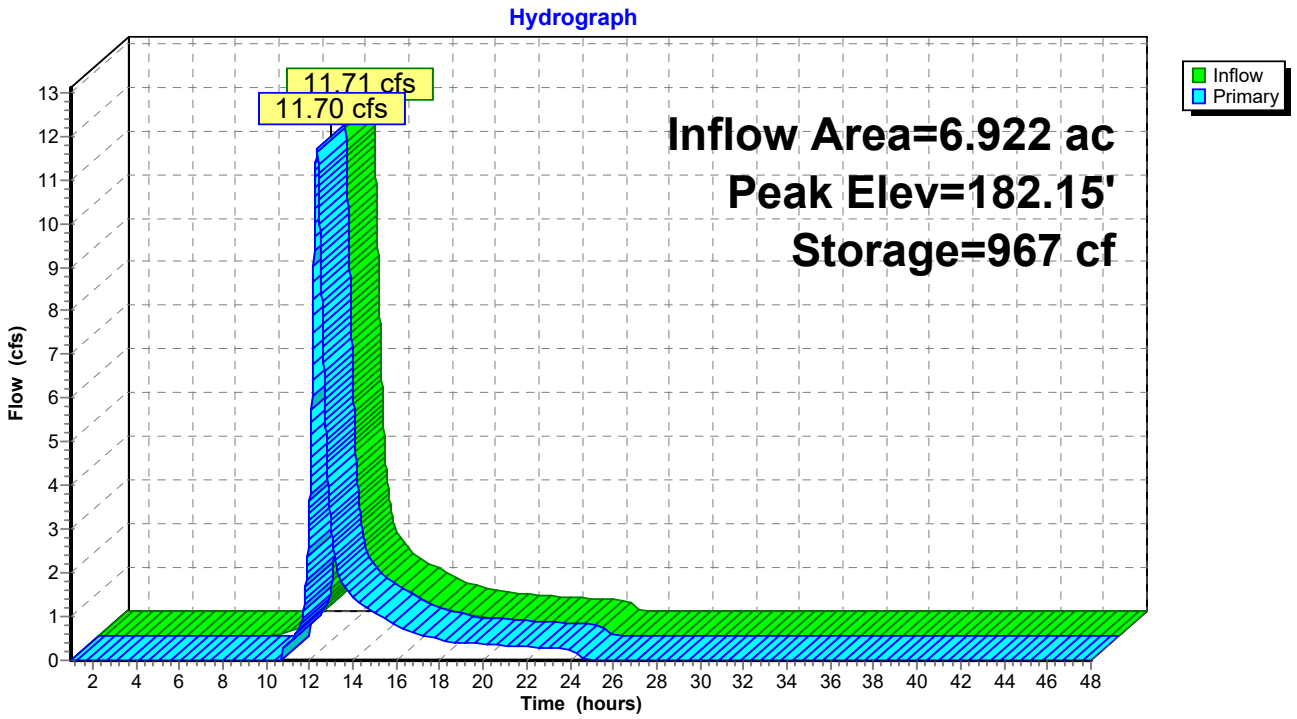
Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	2,650 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.00	323	0	0
182.00	1,219	771	771
182.50	1,856	769	1,540
183.00	2,584	1,110	2,650

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**85.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=11.68 cfs @ 12.33 hrs HW=182.15' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 11.68 cfs @ 0.92 fps)

Pond 3P: Forebay



Summary for Pond 4P: Basin

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 2.27" for 10-yr Storm event
Inflow = 11.70 cfs @ 12.33 hrs, Volume= 1.309 af
Outflow = 11.62 cfs @ 12.35 hrs, Volume= 1.232 af, Atten= 1%, Lag= 1.4 min
Primary = 11.62 cfs @ 12.35 hrs, Volume= 1.232 af
Routed to Link AP-1 : AP-1

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.14' @ 12.35 hrs Surf.Area= 5,050 sf Storage= 9,564 cf

Plug-Flow detention time= 69.0 min calculated for 1.232 af (94% of inflow)
Center-of-Mass det. time= 37.7 min (897.3 - 859.7)

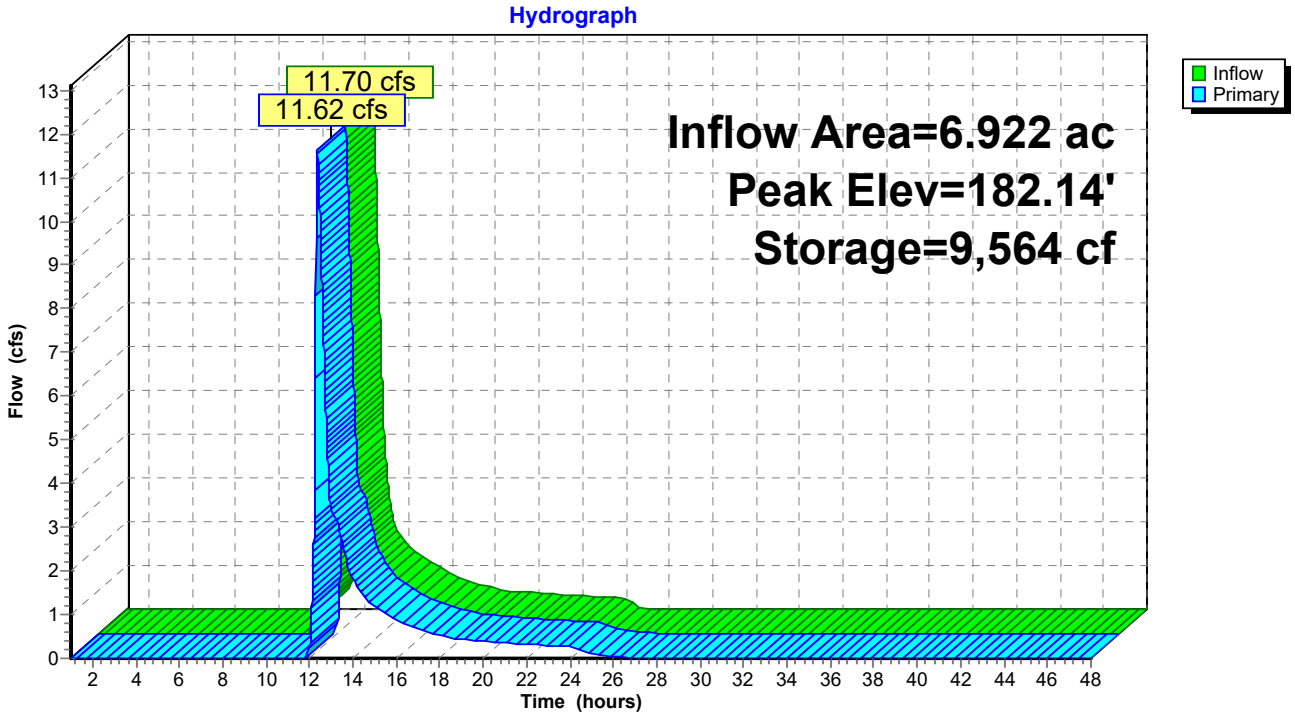
Volume	Invert	Avail.Storage	Storage Description
#1	179.00'	17,725 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
179.00	1,176	0	0
180.00	2,318	1,747	1,747
180.50	2,919	1,309	3,056
180.75	3,227	768	3,825
181.00	3,541	846	4,671
181.50	4,184	1,931	6,602
182.00	4,851	2,259	8,861
183.00	6,254	5,553	14,413
183.50	6,995	3,312	17,725

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**32.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	182.00'	**30.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Primary	180.60'	**12.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 180.60' / 180.40' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=11.57 cfs @ 12.35 hrs HW=182.14' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 4.01 cfs @ 0.88 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 3.76 cfs @ 0.88 fps)
- **3=Culvert** (Barrel Controls 3.81 cfs @ 4.85 fps)

Pond 4P: Basin

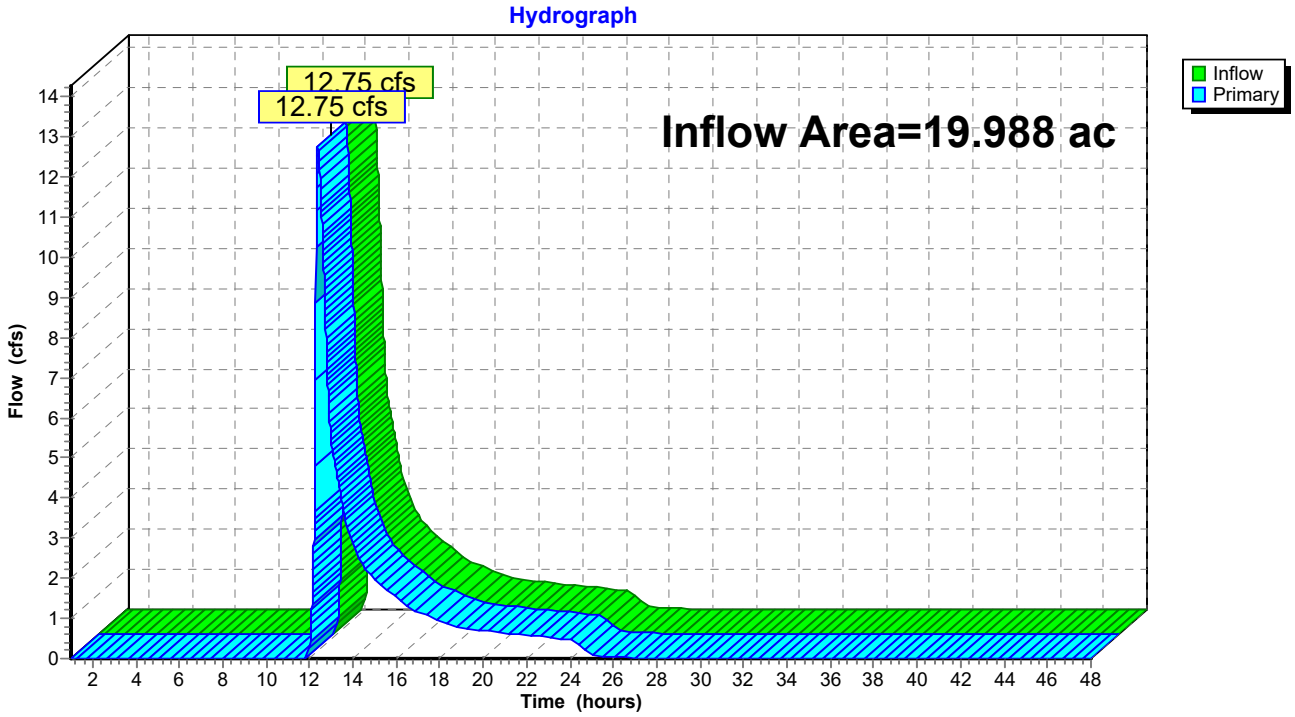


Summary for Link AP-1: AP-1

Inflow Area = 19.988 ac, 10.60% Impervious, Inflow Depth = 1.10" for 10-yr Storm event
Inflow = 12.75 cfs @ 12.38 hrs, Volume= 1.831 af
Primary = 12.75 cfs @ 12.38 hrs, Volume= 1.831 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

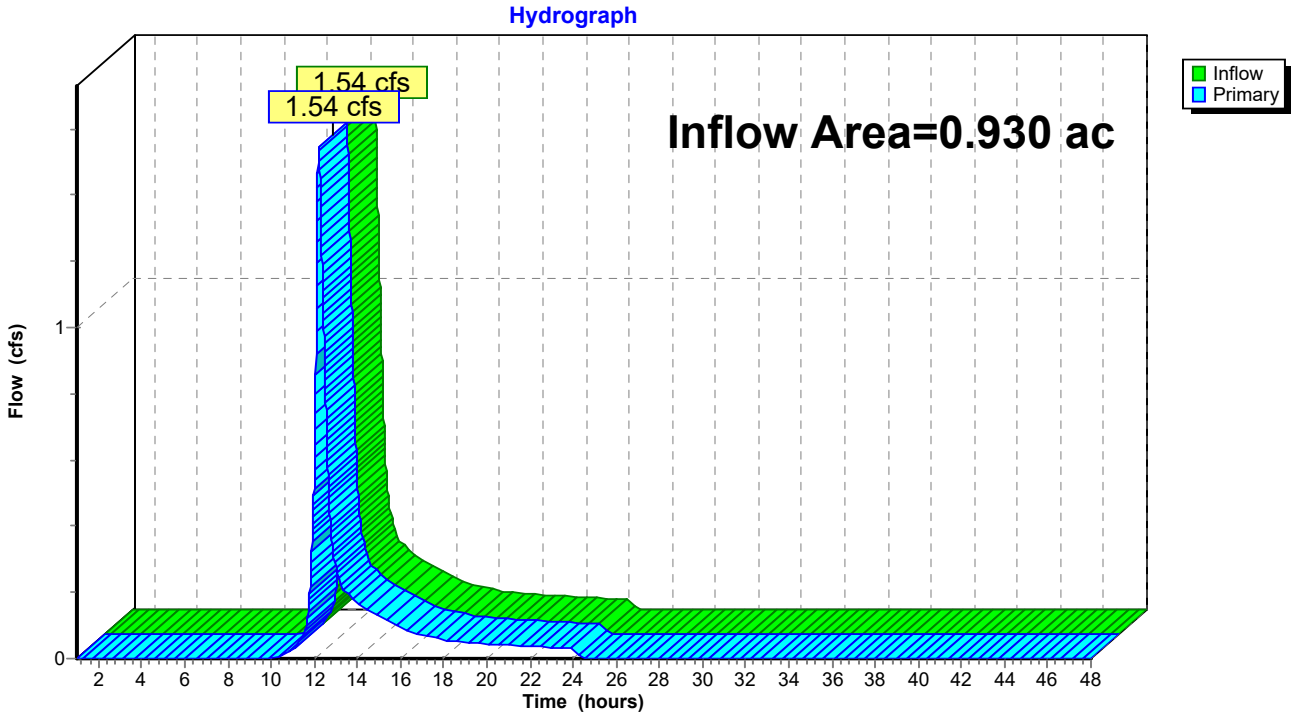


Summary for Link AP-2: AP-2

Inflow Area = 0.930 ac, 47.20% Impervious, Inflow Depth = 1.93" for 10-yr Storm event
Inflow = 1.54 cfs @ 12.22 hrs, Volume= 0.150 af
Primary = 1.54 cfs @ 12.22 hrs, Volume= 0.150 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2

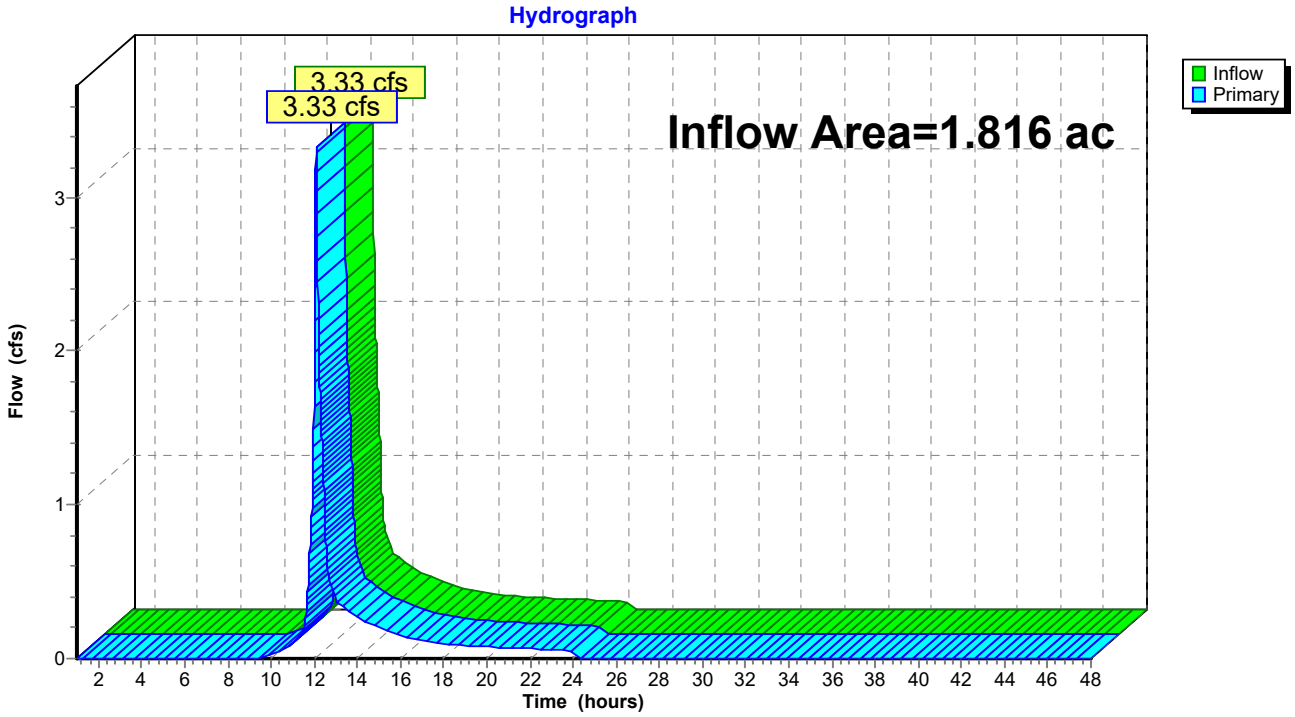


Summary for Link AP-3: AP-3

Inflow Area = 1.816 ac, 21.16% Impervious, Inflow Depth = 1.69" for 10-yr Storm event
Inflow = 3.33 cfs @ 12.09 hrs, Volume= 0.256 af
Primary = 3.33 cfs @ 12.09 hrs, Volume= 0.256 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-3: AP-3



Summary for Subcatchment SC-1A: SC-1A NORTH

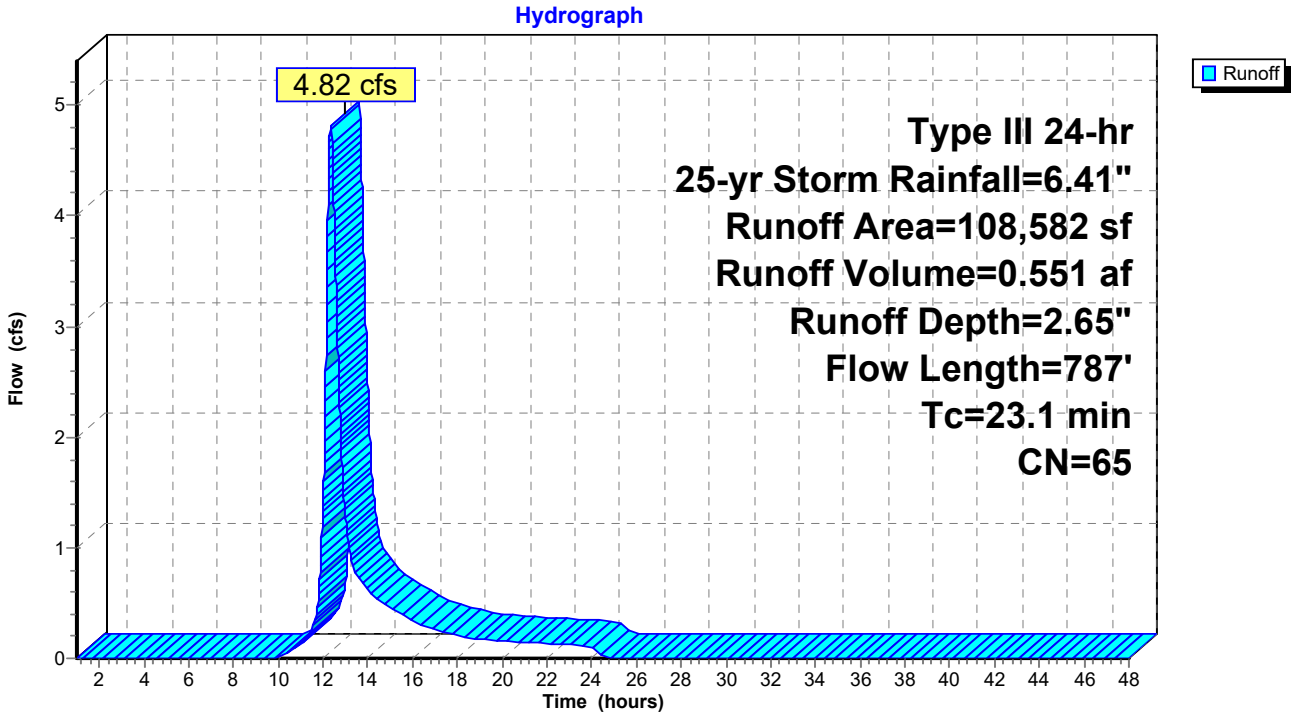
Runoff = 4.82 cfs @ 12.34 hrs, Volume= 0.551 af, Depth= 2.65"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
*	19,299	96	Gravel
	24,825	39	Pasture/grassland/range, Good, HSG A
	1,912	98	Paved parking, HSG A
*	48,595	55	Topping Stone
*	13,951	98	Foundations/Equipment
	108,582	65	Weighted Average
	92,719		85.39% Pervious Area
	15,863		14.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.7	157	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.6	385	0.0120	1.76		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
2.9	145	0.0030	0.82		**Shallow Concentrated Flow, D-E** Grassed Waterway Kv= 15.0 fps
23.1	787	Total			

Subcatchment SC-1A: SC-1A NORTH



Summary for Subcatchment SC-1B: SC-1B SOUTH

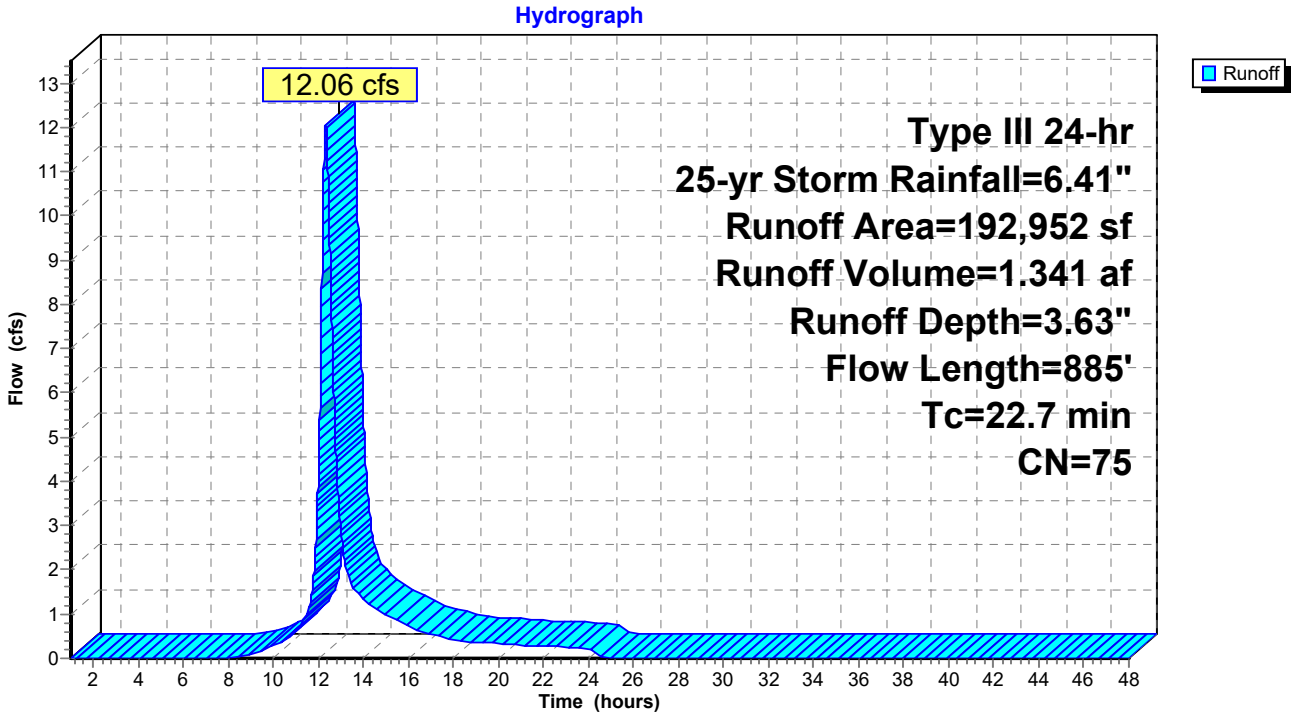
Runoff = 12.06 cfs @ 12.31 hrs, Volume= 1.341 af, Depth= 3.63"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
*	38,260	96	Gravel
	18,614	39	Pasture/grassland/range, Good, HSG A
	8,866	98	Roofs, HSG A
*	73,911	55	Topping Sonte
	9,866	98	Paved parking, HSG A
*	43,435	98	Foundations/Equipment
	192,952	75	Weighted Average
	130,785		67.78% Pervious Area
	62,167		32.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
0.8	75	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
1.8	83	0.0120	0.77		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
4.3	440	0.0110	1.69		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
2.9	187	0.0050	1.06		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
22.7	885	Total			

Subcatchment SC-1B: SC-1B SOUTH



Summary for Subcatchment SC-1C: SC-1C NORTH&EAST

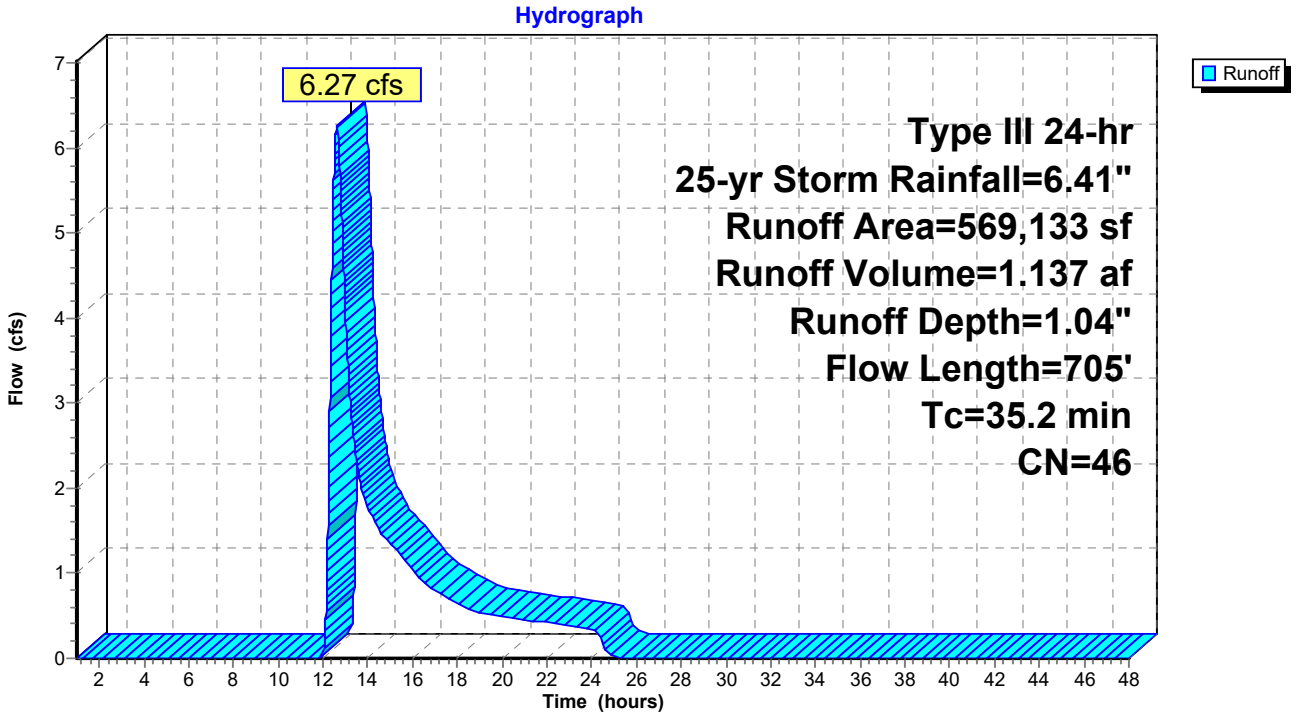
Runoff = 6.27 cfs @ 12.63 hrs, Volume= 1.137 af, Depth= 1.04"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
	264,412	39	Pasture/grassland/range, Good, HSG A
	207,341	30	Woods, Good, HSG A
	2,581	98	Paved parking, HSG A
*	83,152	96	Gravel
	11,647	98	Roofs, HSG A
	569,133	46	Weighted Average
	554,905		97.50% Pervious Area
	14,228		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0050	0.10		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
14.1	430	0.0010	0.51		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
4.1	175	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.2	705	Total			

Subcatchment SC-1C: SC-1C NORTH&EAST



Summary for Subcatchment SC-1D: SC-1D BERM

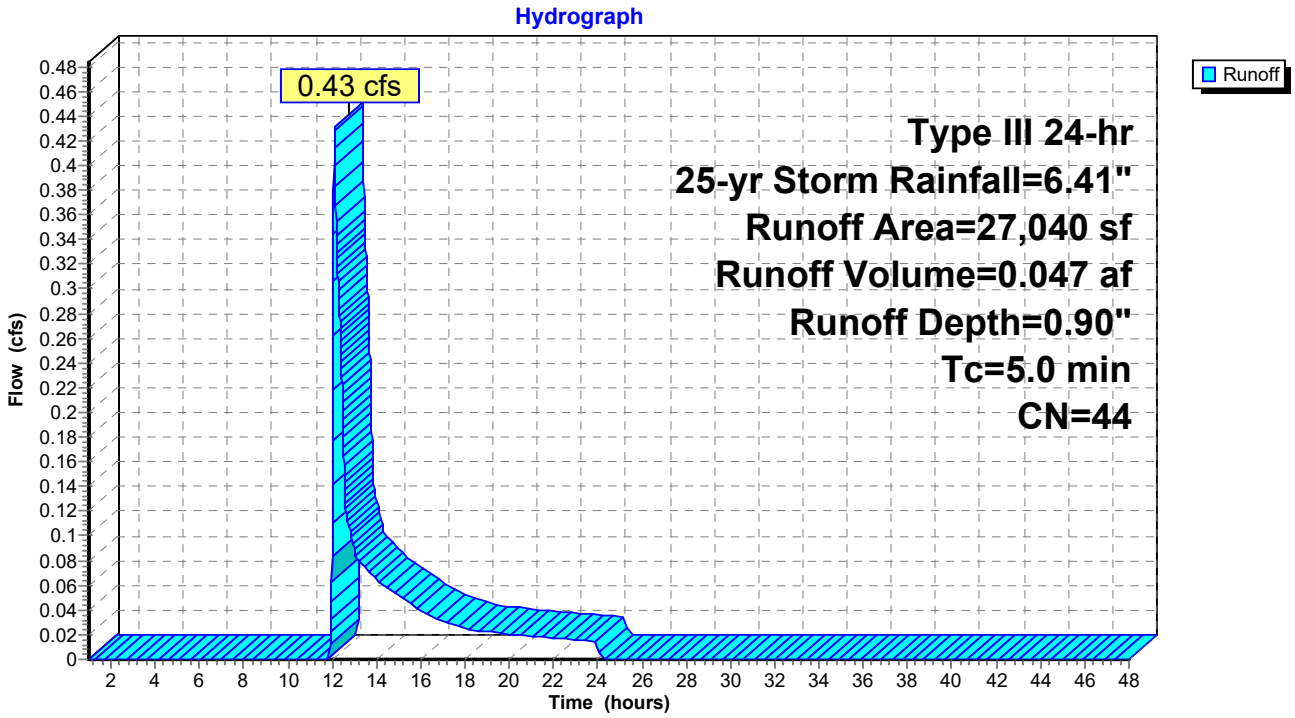
Runoff = 0.43 cfs @ 12.11 hrs, Volume= 0.047 af, Depth= 0.90"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
*	2,164	96	Gravel
	24,876	39	Pasture/grassland/range, Good, HSG A
	27,040	44	Weighted Average
	27,040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-1D: SC-1D BERM



Summary for Subcatchment SC-2: Silver Street

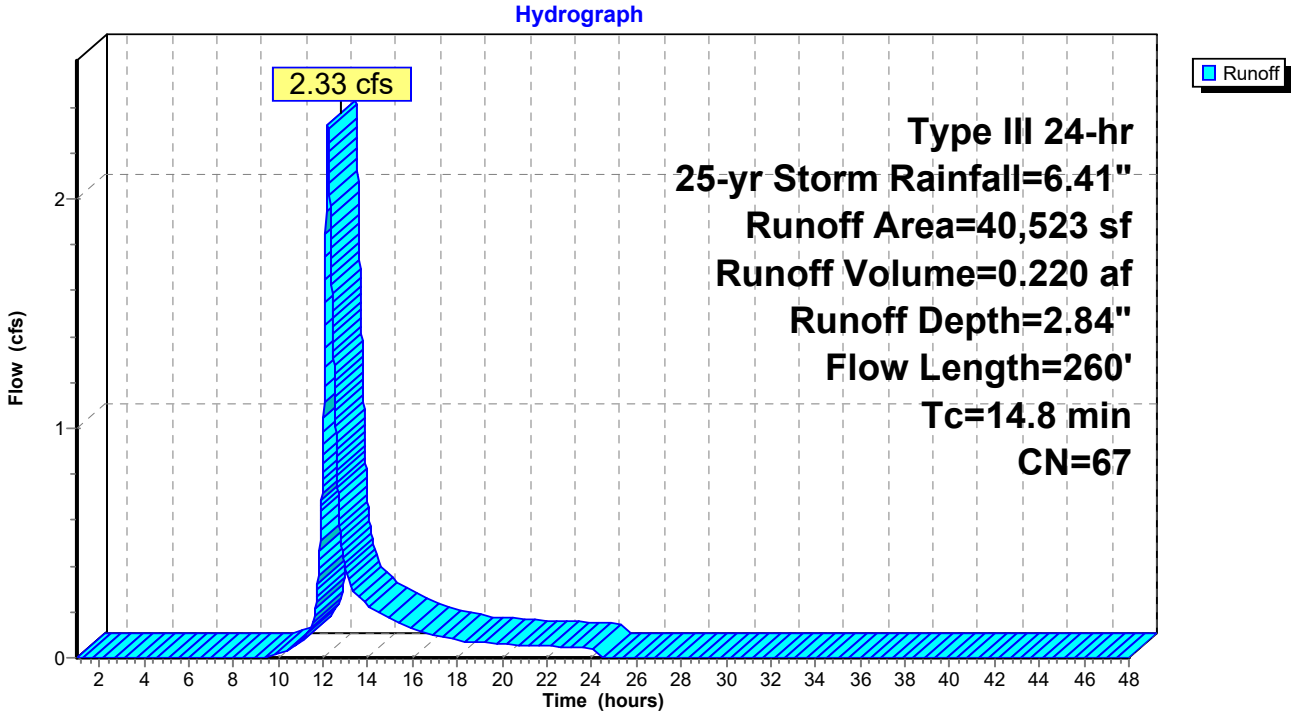
Runoff = 2.33 cfs @ 12.21 hrs, Volume= 0.220 af, Depth= 2.84"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

Area (sf)	CN	Description
15,815	98	Paved parking, HSG A
21,395	39	Pasture/grassland/range, Good, HSG A
3,313	98	Roofs, HSG A
40,523	67	Weighted Average
21,395		52.80% Pervious Area
19,128		47.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.9	160	0.0050	1.44		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.8	260	Total			

Subcatchment SC-2: Silver Street



Summary for Subcatchment SC-3: Southwest

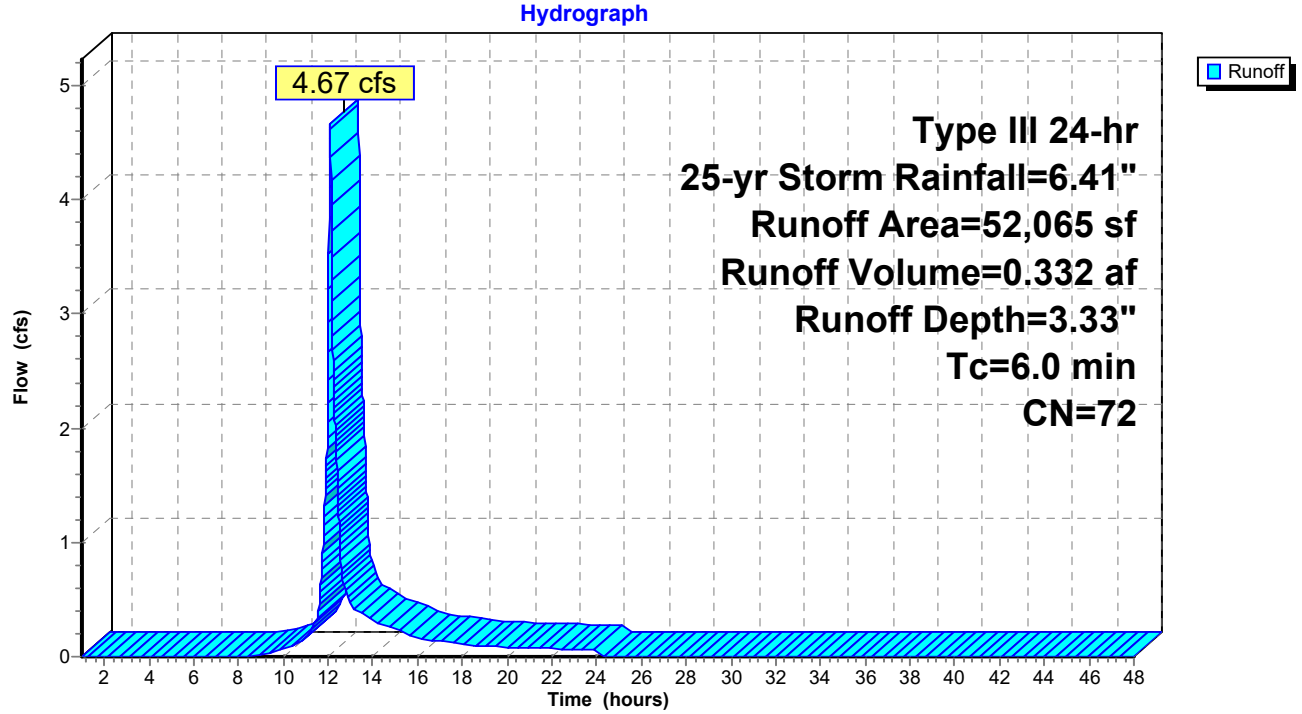
Runoff = 4.67 cfs @ 12.09 hrs, Volume= 0.332 af, Depth= 3.33"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
*	6,728	96	Gravel
	15,522	39	Pasture/grassland/range, Good, HSG A
	6,300	80	Pasture/grassland/range, Good, HSG D
	8,652	98	Paved parking, HSG A
	4,366	98	Roofs, HSG A
*	6,774	55	Topping Stone
*	3,723	98	Foundations/Equipment
	52,065	72	Weighted Average
	35,324		67.85% Pervious Area
	16,741		32.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3: Southwest



Summary for Pond 3P: Forebay

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 3.28" for 25-yr Storm event
Inflow = 16.86 cfs @ 12.32 hrs, Volume= 1.893 af
Outflow = 16.86 cfs @ 12.33 hrs, Volume= 1.875 af, Atten= 0%, Lag= 0.1 min
Primary = 16.86 cfs @ 12.33 hrs, Volume= 1.875 af
Routed to Pond 4P : Basin

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.19' @ 12.33 hrs Surf.Area= 1,462 sf Storage= 1,027 cf

Plug-Flow detention time= 8.7 min calculated for 1.875 af (99% of inflow)
Center-of-Mass det. time= 3.1 min (848.9 - 845.8)

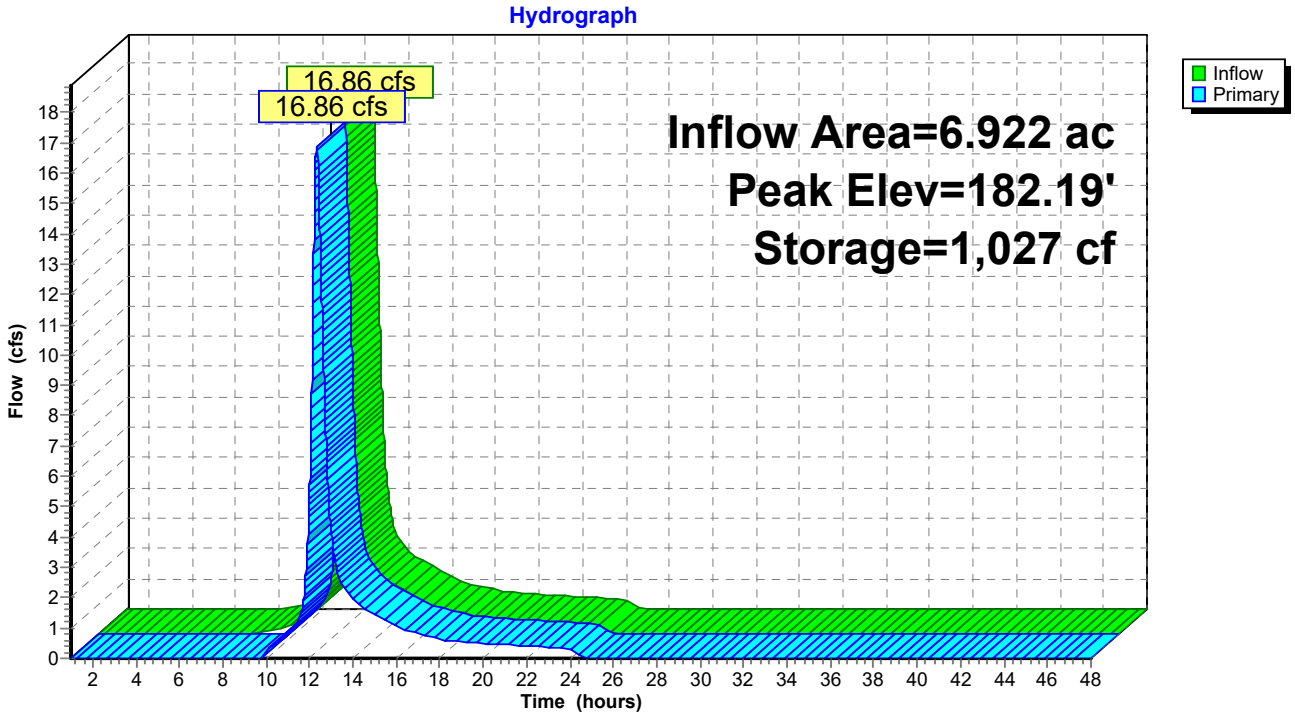
Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	2,650 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.00	323	0	0
182.00	1,219	771	771
182.50	1,856	769	1,540
183.00	2,584	1,110	2,650

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**85.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=16.84 cfs @ 12.33 hrs HW=182.19' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 16.84 cfs @ 1.04 fps)

Pond 3P: Forebay



Summary for Pond 4P: Basin

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 3.25" for 25-yr Storm event
Inflow = 16.86 cfs @ 12.33 hrs, Volume= 1.875 af
Outflow = 16.83 cfs @ 12.34 hrs, Volume= 1.798 af, Atten= 0%, Lag= 0.7 min
Primary = 16.83 cfs @ 12.34 hrs, Volume= 1.798 af
Routed to Link AP-1 : AP-1

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.20' @ 12.34 hrs Surf.Area= 5,130 sf Storage= 9,852 cf

Plug-Flow detention time= 54.0 min calculated for 1.798 af (96% of inflow)
Center-of-Mass det. time= 31.1 min (880.0 - 848.9)

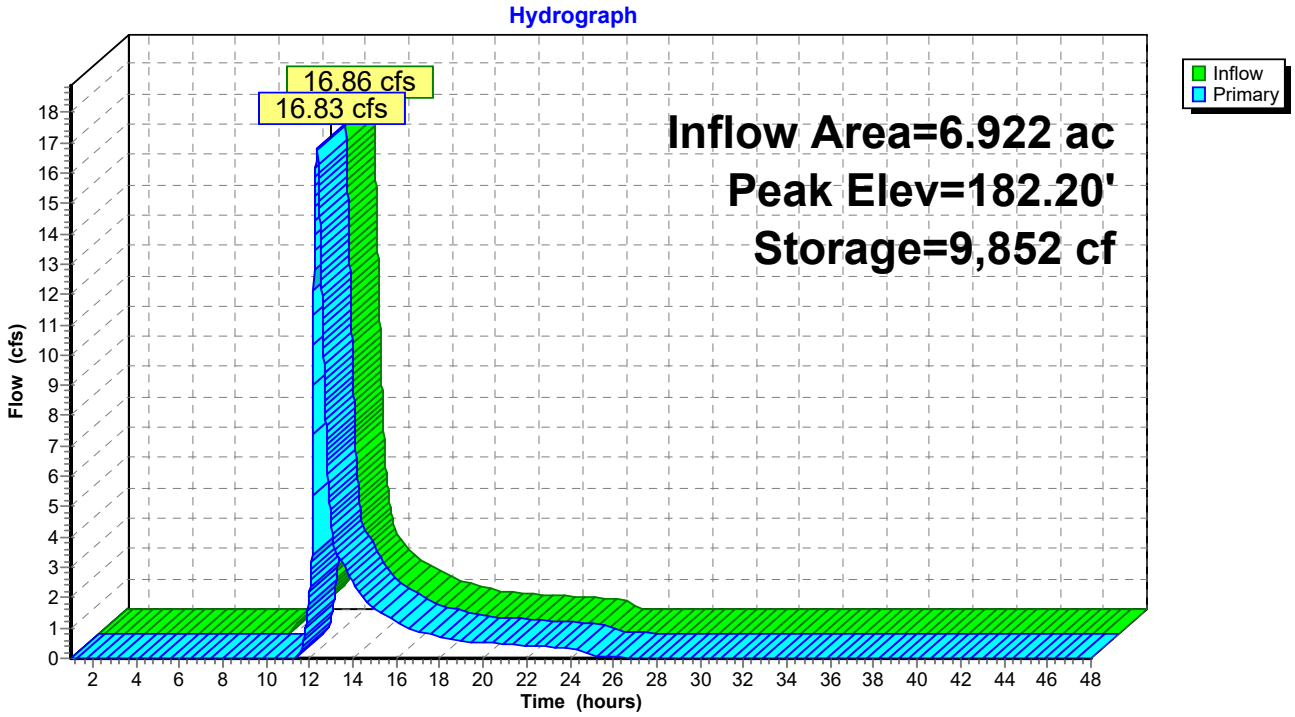
Volume	Invert	Avail.Storage	Storage Description
#1	179.00'	17,725 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
179.00	1,176	0	0
180.00	2,318	1,747	1,747
180.50	2,919	1,309	3,056
180.75	3,227	768	3,825
181.00	3,541	846	4,671
181.50	4,184	1,931	6,602
182.00	4,851	2,259	8,861
183.00	6,254	5,553	14,413
183.50	6,995	3,312	17,725

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**32.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	182.00'	**30.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Primary	180.60'	**12.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 180.60' / 180.40' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=16.79 cfs @ 12.34 hrs HW=182.20' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 6.63 cfs @ 1.04 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 6.22 cfs @ 1.04 fps)
- **3=Culvert** (Barrel Controls 3.95 cfs @ 5.03 fps)

Pond 4P: Basin

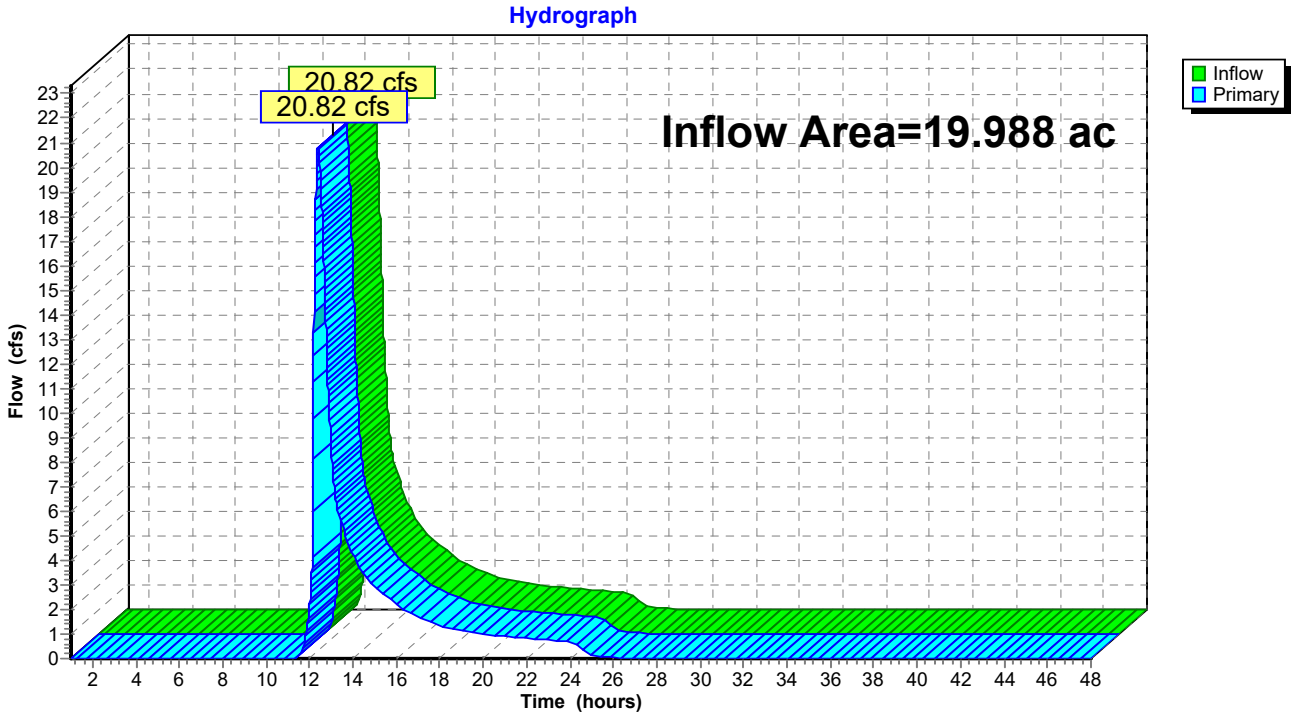


Summary for Link AP-1: AP-1

Inflow Area = 19.988 ac, 10.60% Impervious, Inflow Depth = 1.76" for 25-yr Storm event
Inflow = 20.82 cfs @ 12.39 hrs, Volume= 2.935 af
Primary = 20.82 cfs @ 12.39 hrs, Volume= 2.935 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

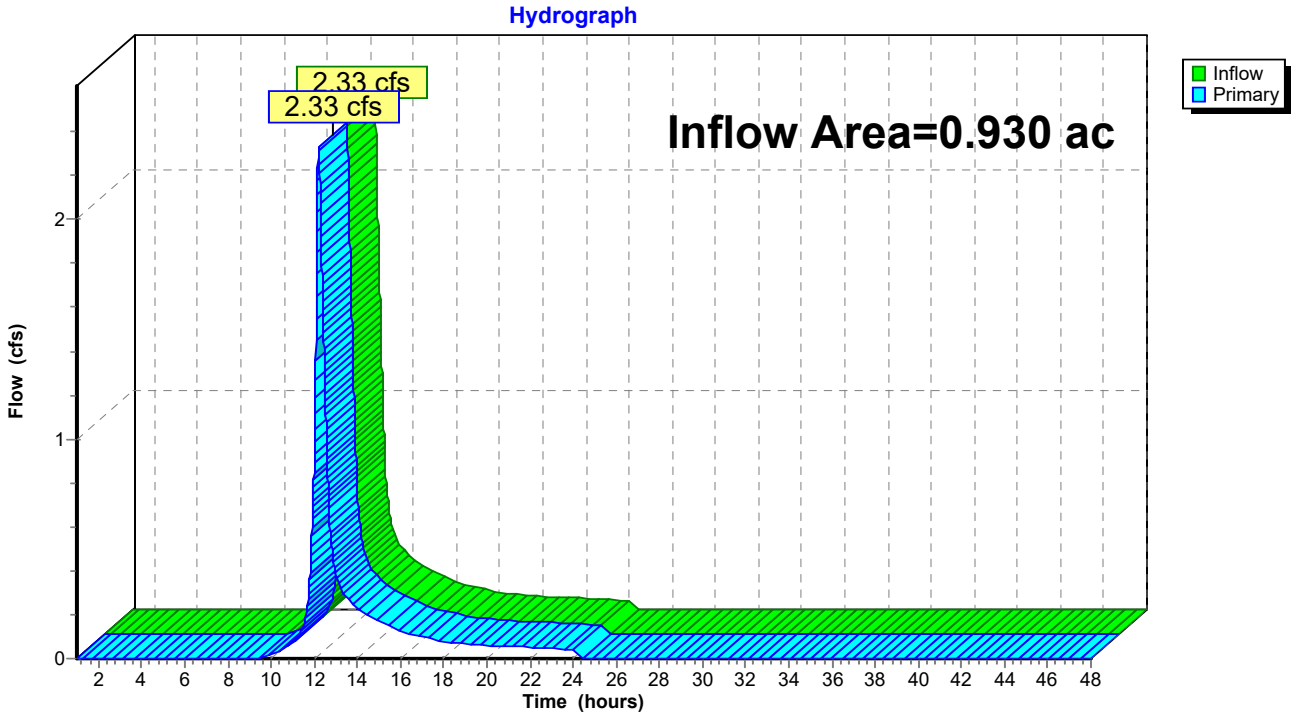


Summary for Link AP-2: AP-2

Inflow Area = 0.930 ac, 47.20% Impervious, Inflow Depth = 2.84" for 25-yr Storm event
Inflow = 2.33 cfs @ 12.21 hrs, Volume= 0.220 af
Primary = 2.33 cfs @ 12.21 hrs, Volume= 0.220 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2

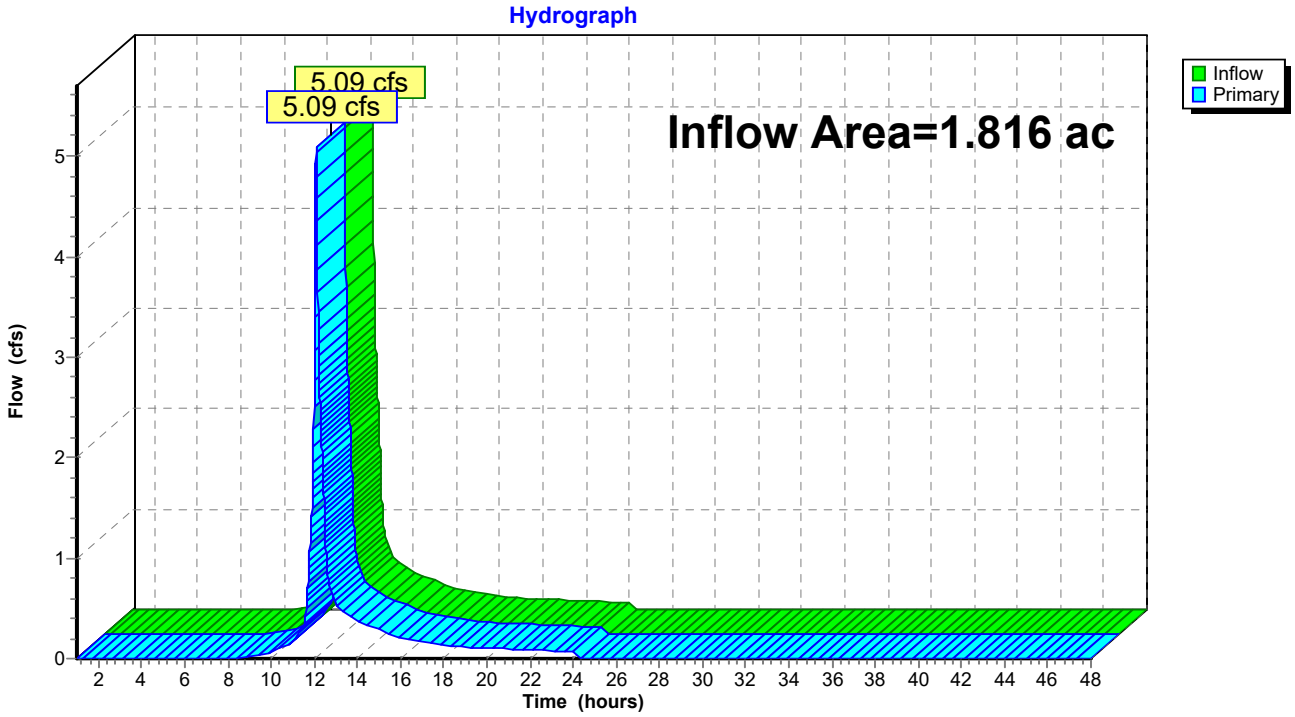


Summary for Link AP-3: AP-3

Inflow Area = 1.816 ac, 21.16% Impervious, Inflow Depth = 2.50" for 25-yr Storm event
Inflow = 5.09 cfs @ 12.09 hrs, Volume= 0.378 af
Primary = 5.09 cfs @ 12.09 hrs, Volume= 0.378 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-3: AP-3



Summary for Subcatchment SC-1A: SC-1A NORTH

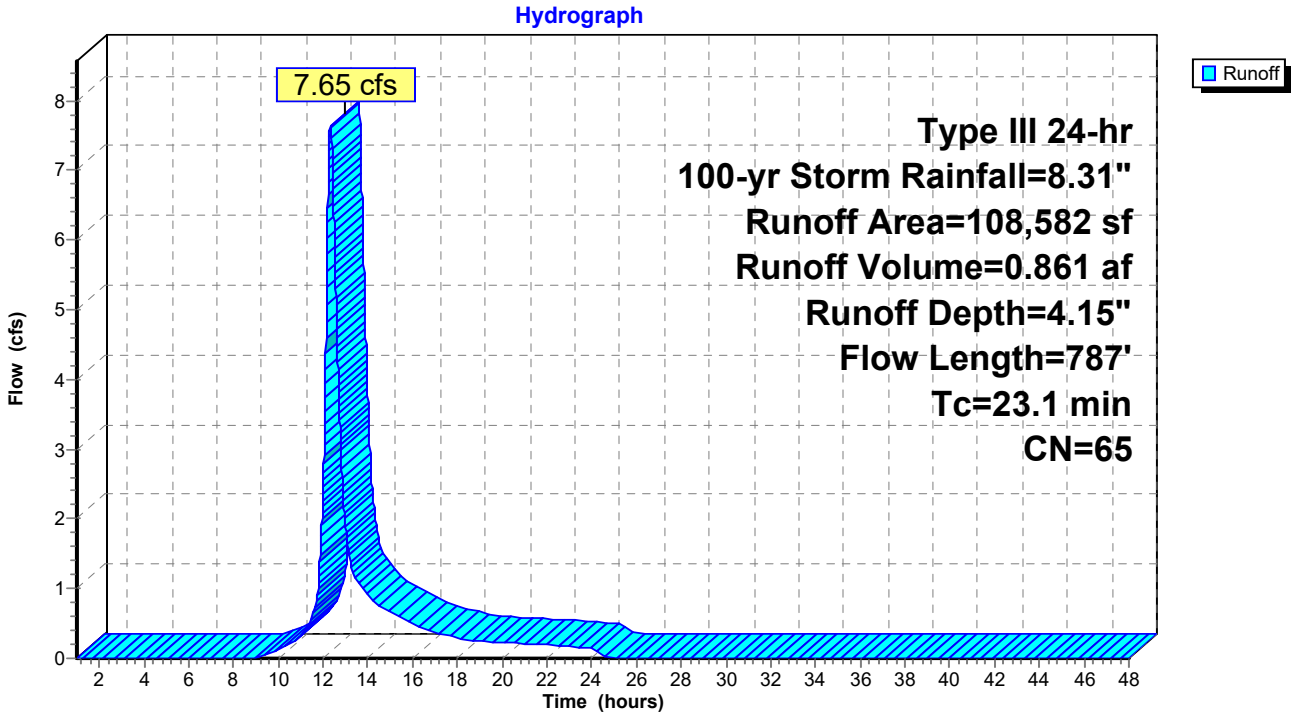
Runoff = 7.65 cfs @ 12.32 hrs, Volume= 0.861 af, Depth= 4.15"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
*	19,299	96	Gravel
	24,825	39	Pasture/grassland/range, Good, HSG A
	1,912	98	Paved parking, HSG A
*	48,595	55	Topping Stone
*	13,951	98	Foundations/Equipment
	108,582	65	Weighted Average
	92,719		85.39% Pervious Area
	15,863		14.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.7	157	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.6	385	0.0120	1.76		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
2.9	145	0.0030	0.82		**Shallow Concentrated Flow, D-E** Grassed Waterway Kv= 15.0 fps
23.1	787	Total			

Subcatchment SC-1A: SC-1A NORTH



Summary for Subcatchment SC-1B: SC-1B SOUTH

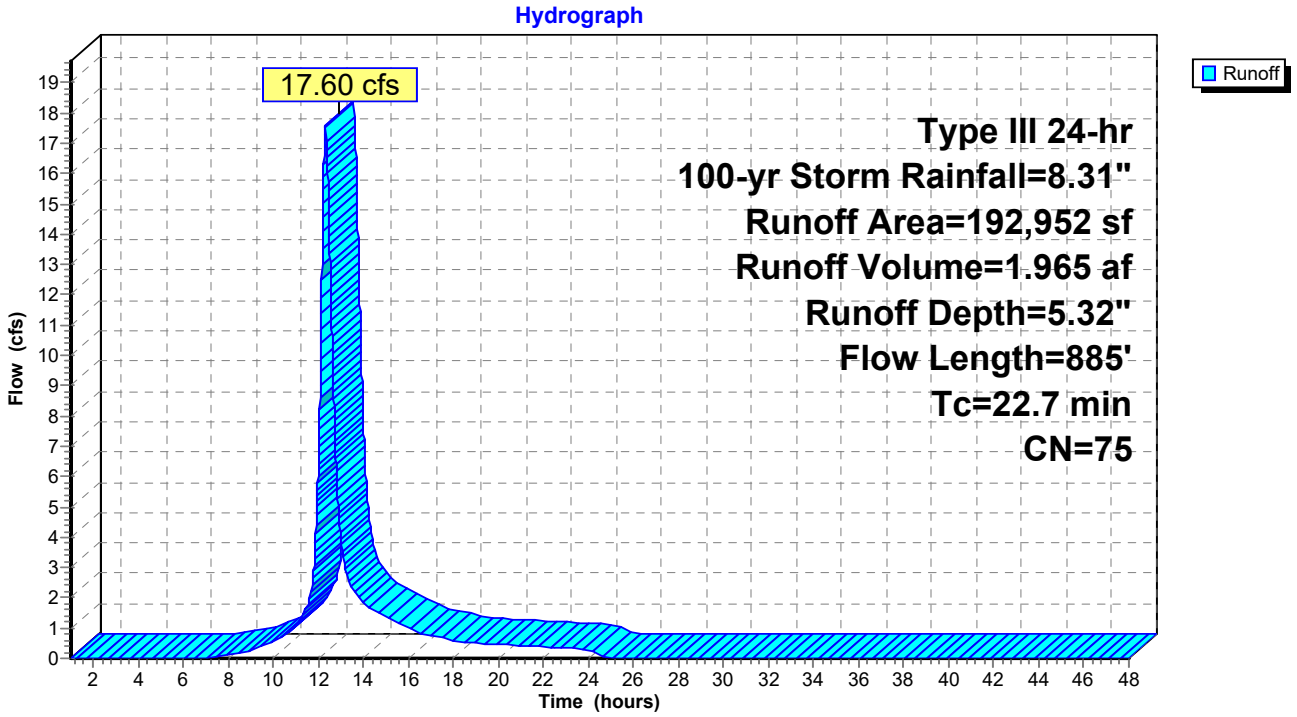
Runoff = 17.60 cfs @ 12.31 hrs, Volume= 1.965 af, Depth= 5.32"
Routed to Pond 3P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
*	38,260	96	Gravel
	18,614	39	Pasture/grassland/range, Good, HSG A
	8,866	98	Roofs, HSG A
*	73,911	55	Topping Sonte
	9,866	98	Paved parking, HSG A
*	43,435	98	Foundations/Equipment
	192,952	75	Weighted Average
	130,785		67.78% Pervious Area
	62,167		32.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
0.8	75	0.0060	1.57		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
1.8	83	0.0120	0.77		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
4.3	440	0.0110	1.69		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
2.9	187	0.0050	1.06		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
22.7	885	Total			

Subcatchment SC-1B: SC-1B SOUTH



Summary for Subcatchment SC-1C: SC-1C NORTH&EAST

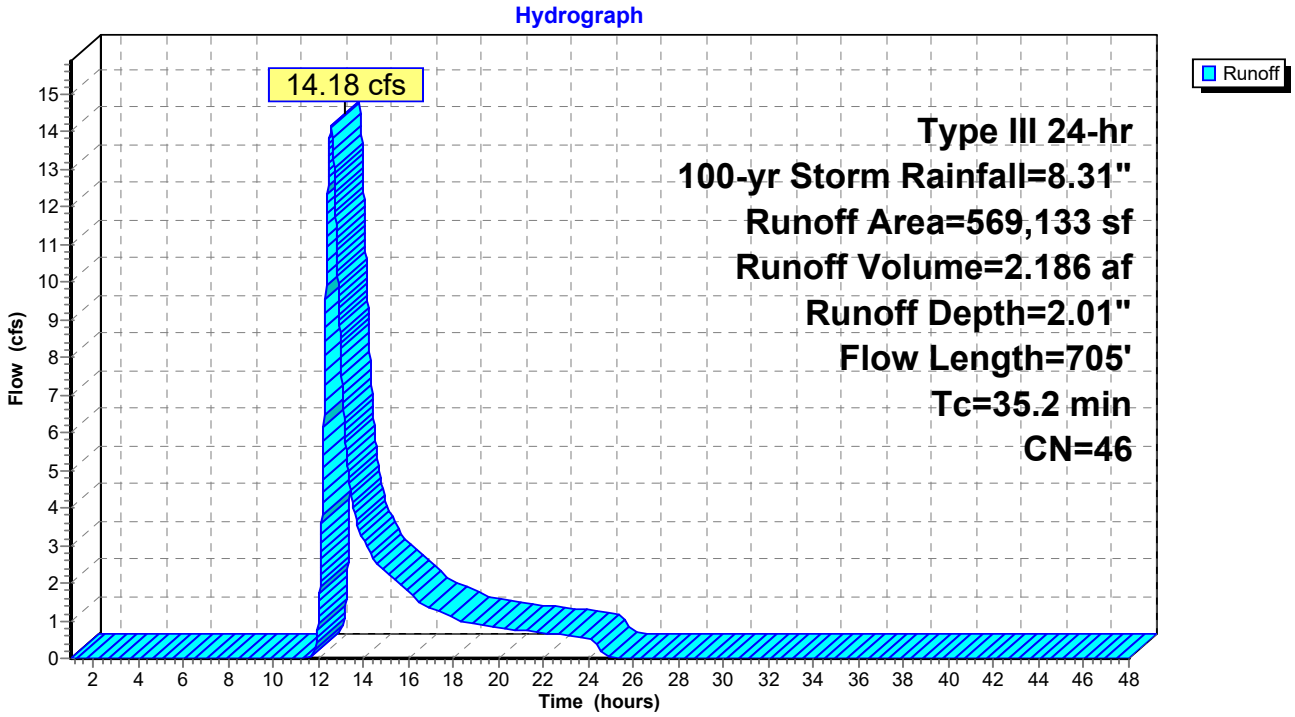
Runoff = 14.18 cfs @ 12.56 hrs, Volume= 2.186 af, Depth= 2.01"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
	264,412	39	Pasture/grassland/range, Good, HSG A
	207,341	30	Woods, Good, HSG A
	2,581	98	Paved parking, HSG A
*	83,152	96	Gravel
	11,647	98	Roofs, HSG A
	569,133	46	Weighted Average
	554,905		97.50% Pervious Area
	14,228		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0050	0.10		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
14.1	430	0.0010	0.51		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
4.1	175	0.0200	0.71		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.2	705	Total			

Subcatchment SC-1C: SC-1C NORTH&EAST



Summary for Subcatchment SC-1D: SC-1D BERM

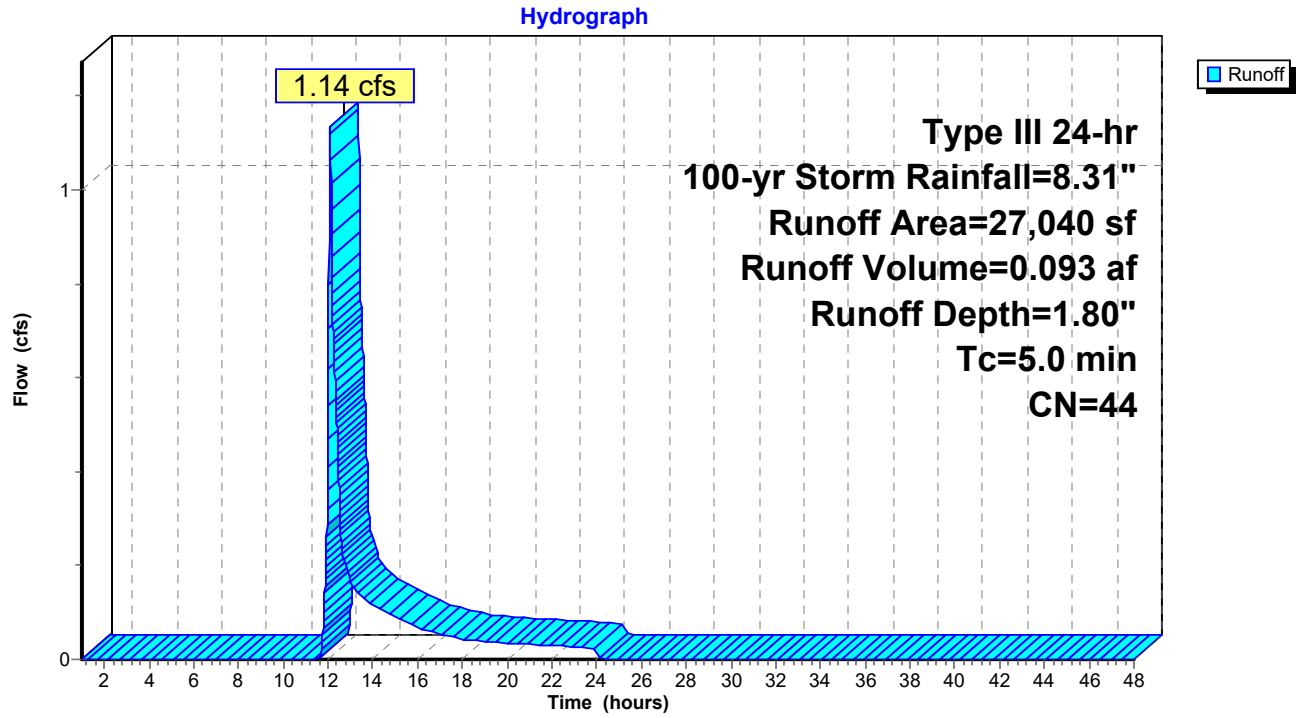
Runoff = 1.14 cfs @ 12.09 hrs, Volume= 0.093 af, Depth= 1.80"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
*	2,164	96	Gravel
	24,876	39	Pasture/grassland/range, Good, HSG A
	27,040	44	Weighted Average
	27,040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-1D: SC-1D BERM



Summary for Subcatchment SC-2: Silver Street

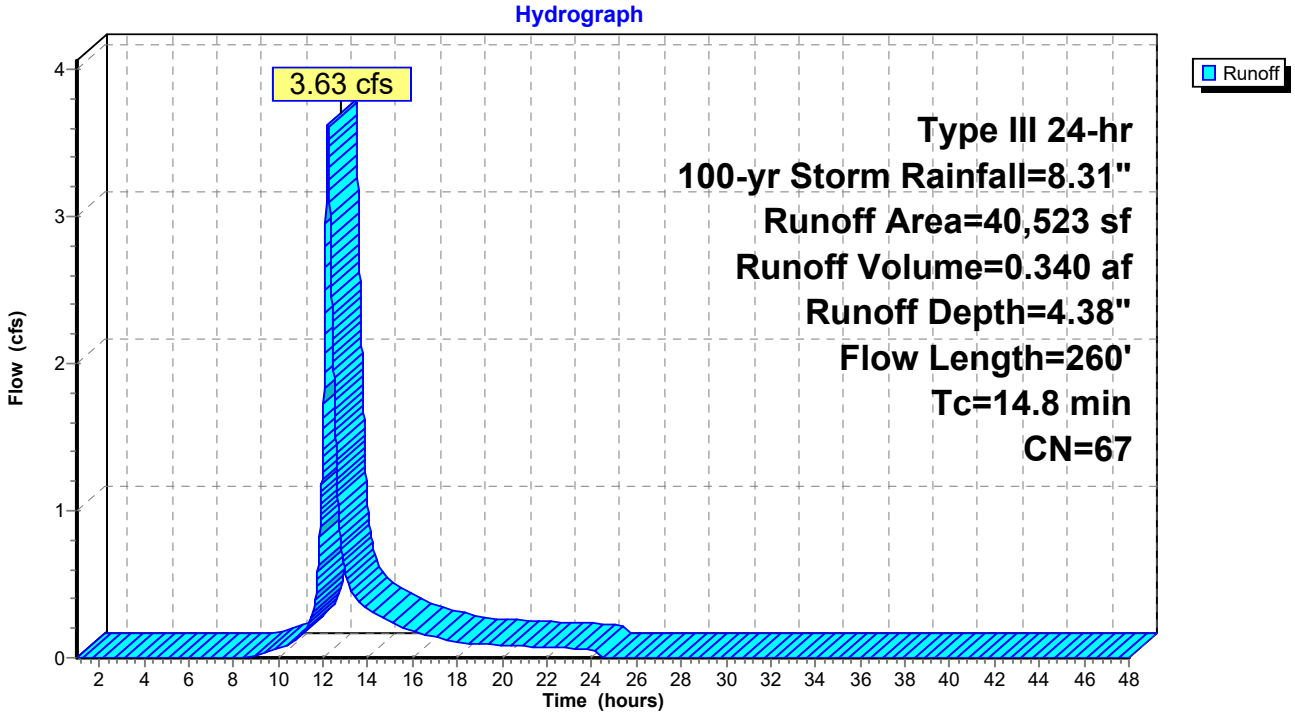
Runoff = 3.63 cfs @ 12.21 hrs, Volume= 0.340 af, Depth= 4.38"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

Area (sf)	CN	Description
15,815	98	Paved parking, HSG A
21,395	39	Pasture/grassland/range, Good, HSG A
3,313	98	Roofs, HSG A
40,523	67	Weighted Average
21,395		52.80% Pervious Area
19,128		47.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
1.9	160	0.0050	1.44		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
14.8	260	Total			

Subcatchment SC-2: Silver Street



Summary for Subcatchment SC-3: Southwest

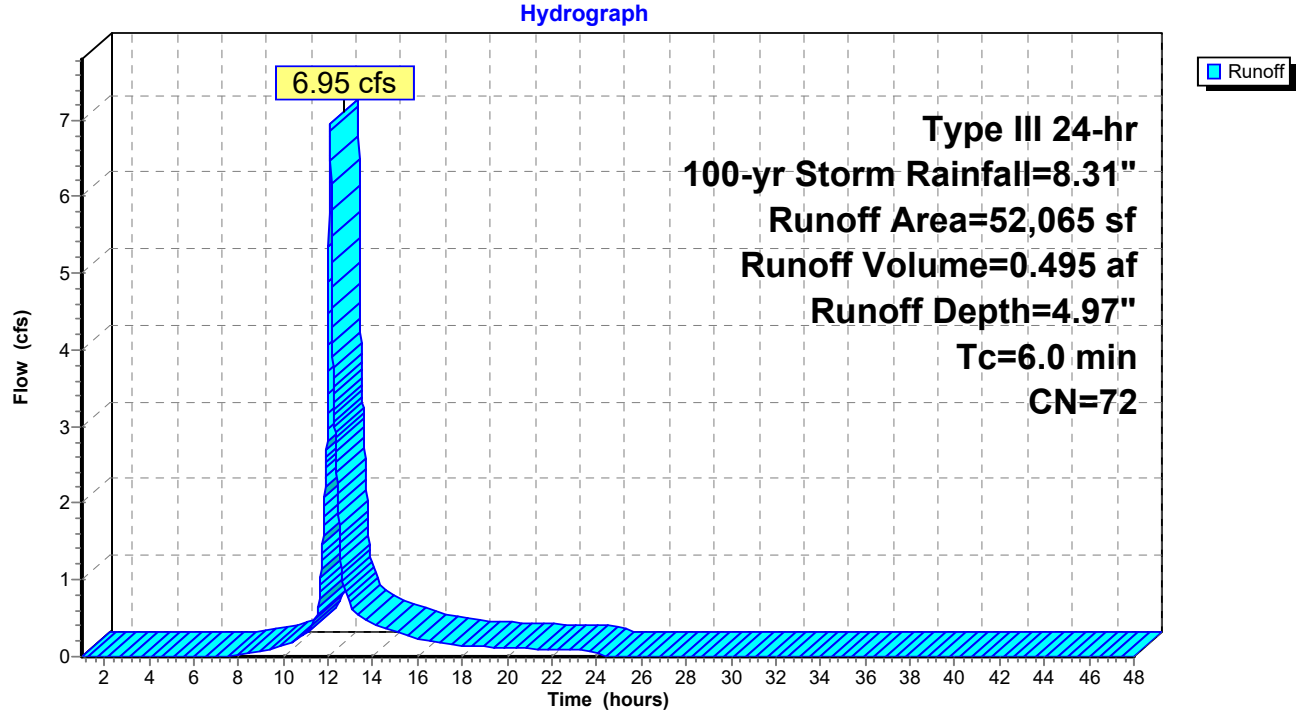
Runoff = 6.95 cfs @ 12.09 hrs, Volume= 0.495 af, Depth= 4.97"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
*	6,728	96	Gravel
	15,522	39	Pasture/grassland/range, Good, HSG A
	6,300	80	Pasture/grassland/range, Good, HSG D
	8,652	98	Paved parking, HSG A
	4,366	98	Roofs, HSG A
*	6,774	55	Topping Stone
*	3,723	98	Foundations/Equipment
	52,065	72	Weighted Average
	35,324		67.85% Pervious Area
	16,741		32.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment SC-3: Southwest



Summary for Pond 3P: Forebay

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 4.90" for 100-yr Storm event
Inflow = 25.24 cfs @ 12.31 hrs, Volume= 2.826 af
Outflow = 25.24 cfs @ 12.32 hrs, Volume= 2.808 af, Atten= 0%, Lag= 0.2 min
Primary = 25.24 cfs @ 12.32 hrs, Volume= 2.808 af
Routed to Pond 4P : Basin

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.25' @ 12.32 hrs Surf.Area= 1,534 sf Storage= 1,111 cf

Plug-Flow detention time= 6.4 min calculated for 2.808 af (99% of inflow)
Center-of-Mass det. time= 2.5 min (837.1 - 834.6)

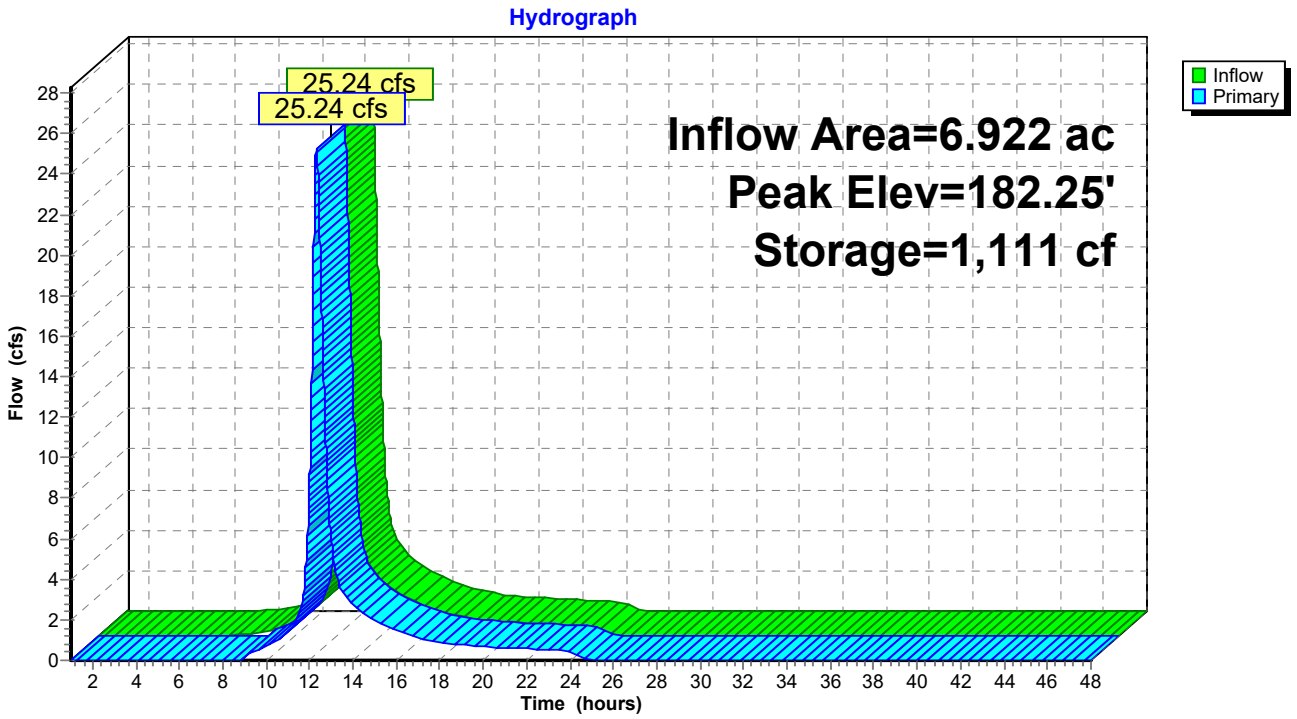
Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	2,650 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.00	323	0	0
182.00	1,219	771	771
182.50	1,856	769	1,540
183.00	2,584	1,110	2,650

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**85.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=25.21 cfs @ 12.32 hrs HW=182.25' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 25.21 cfs @ 1.20 fps)

Pond 3P: Forebay



Summary for Pond 4P: Basin

Inflow Area = 6.922 ac, 25.88% Impervious, Inflow Depth = 4.87" for 100-yr Storm event
Inflow = 25.24 cfs @ 12.32 hrs, Volume= 2.808 af
Outflow = 25.21 cfs @ 12.33 hrs, Volume= 2.731 af, Atten= 0%, Lag= 0.8 min
Primary = 25.21 cfs @ 12.33 hrs, Volume= 2.731 af
Routed to Link AP-1 : AP-1

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.27' @ 12.33 hrs Surf.Area= 5,232 sf Storage= 10,230 cf

Plug-Flow detention time= 41.9 min calculated for 2.731 af (97% of inflow)
Center-of-Mass det. time= 25.8 min (862.9 - 837.1)

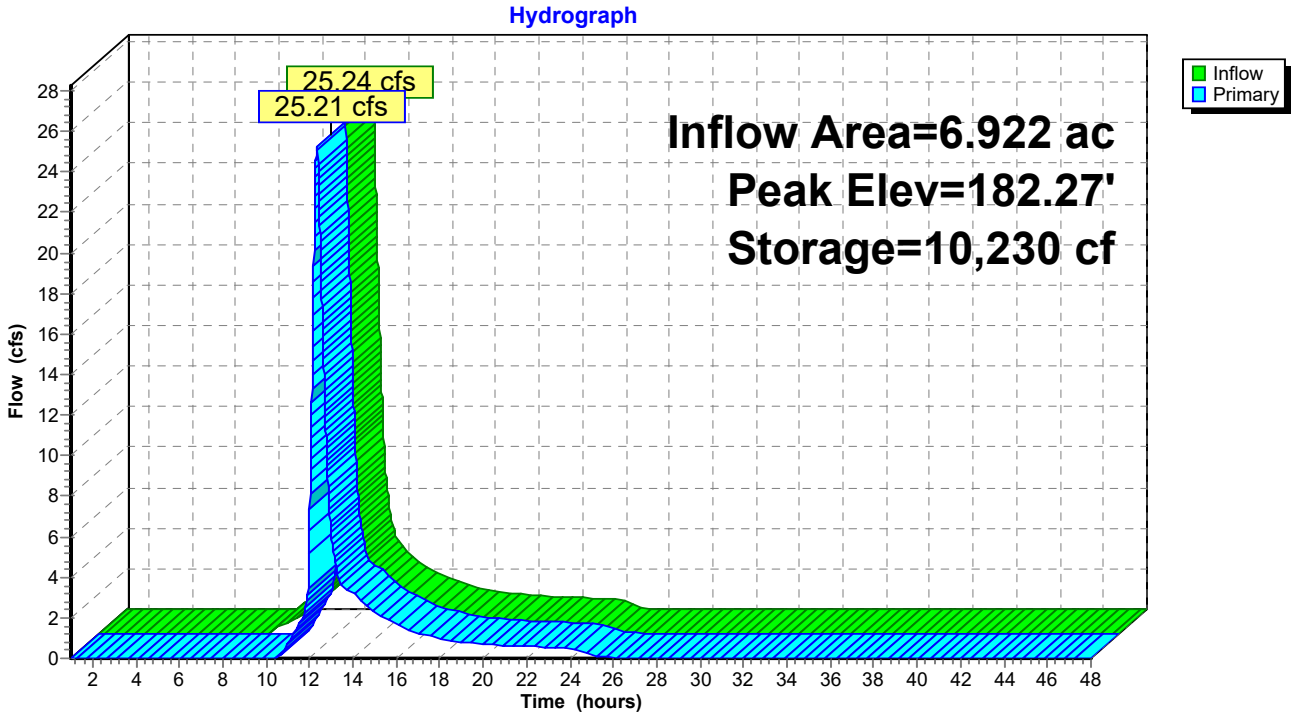
Volume	Invert	Avail.Storage	Storage Description
#1	179.00'	17,725 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
179.00	1,176	0	0
180.00	2,318	1,747	1,747
180.50	2,919	1,309	3,056
180.75	3,227	768	3,825
181.00	3,541	846	4,671
181.50	4,184	1,931	6,602
182.00	4,851	2,259	8,861
183.00	6,254	5,553	14,413
183.50	6,995	3,312	17,725

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**32.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	182.00'	**30.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Primary	180.60'	**12.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 180.60' / 180.40' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=25.14 cfs @ 12.33 hrs HW=182.27' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 10.86 cfs @ 1.25 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 10.19 cfs @ 1.25 fps)
- **3=Culvert** (Inlet Controls 4.09 cfs @ 5.21 fps)

Pond 4P: Basin

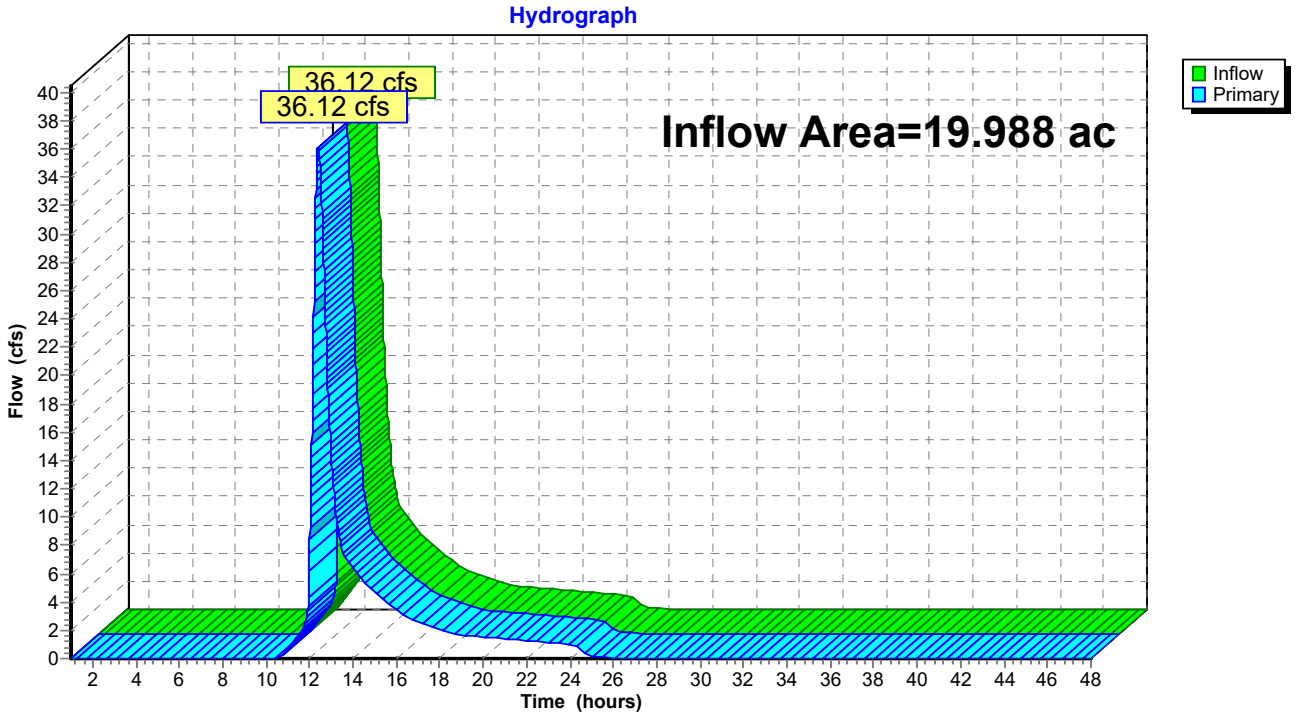


Summary for Link AP-1: AP-1

Inflow Area = 19.988 ac, 10.60% Impervious, Inflow Depth = 2.95" for 100-yr Storm event
Inflow = 36.12 cfs @ 12.39 hrs, Volume= 4.917 af
Primary = 36.12 cfs @ 12.39 hrs, Volume= 4.917 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

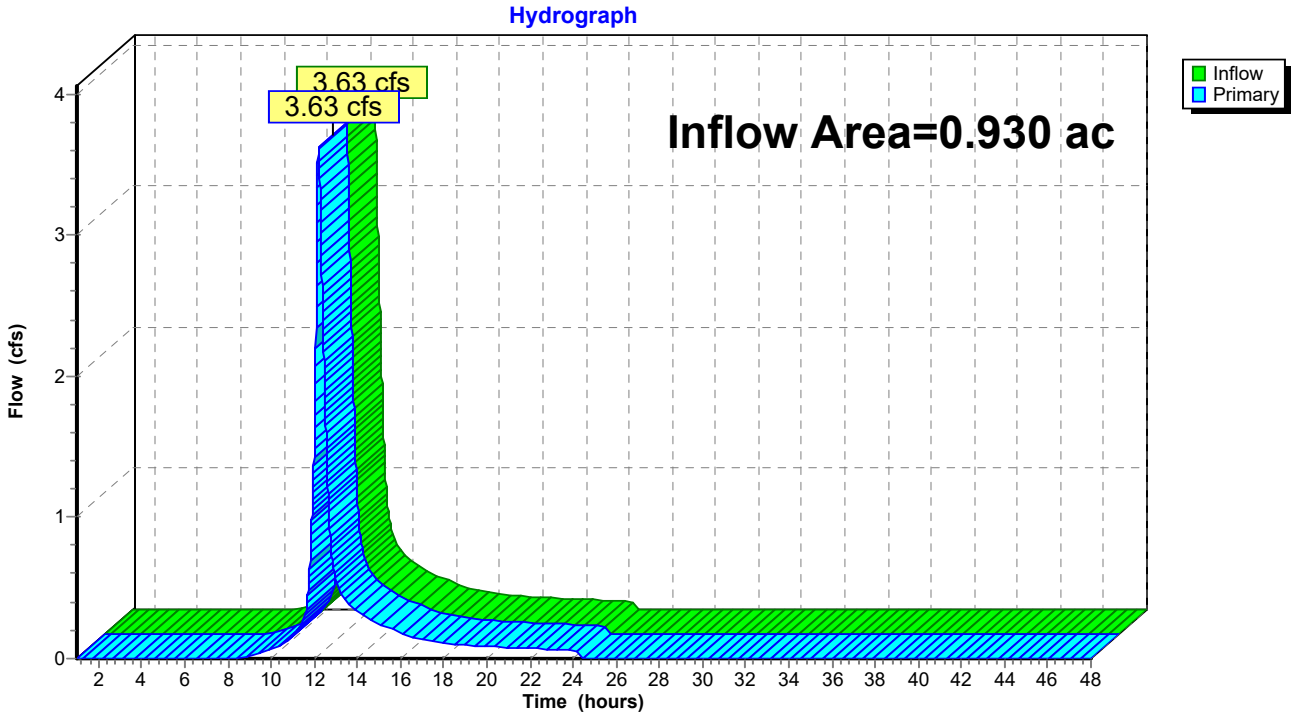


Summary for Link AP-2: AP-2

Inflow Area = 0.930 ac, 47.20% Impervious, Inflow Depth = 4.38" for 100-yr Storm event
Inflow = 3.63 cfs @ 12.21 hrs, Volume= 0.340 af
Primary = 3.63 cfs @ 12.21 hrs, Volume= 0.340 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2

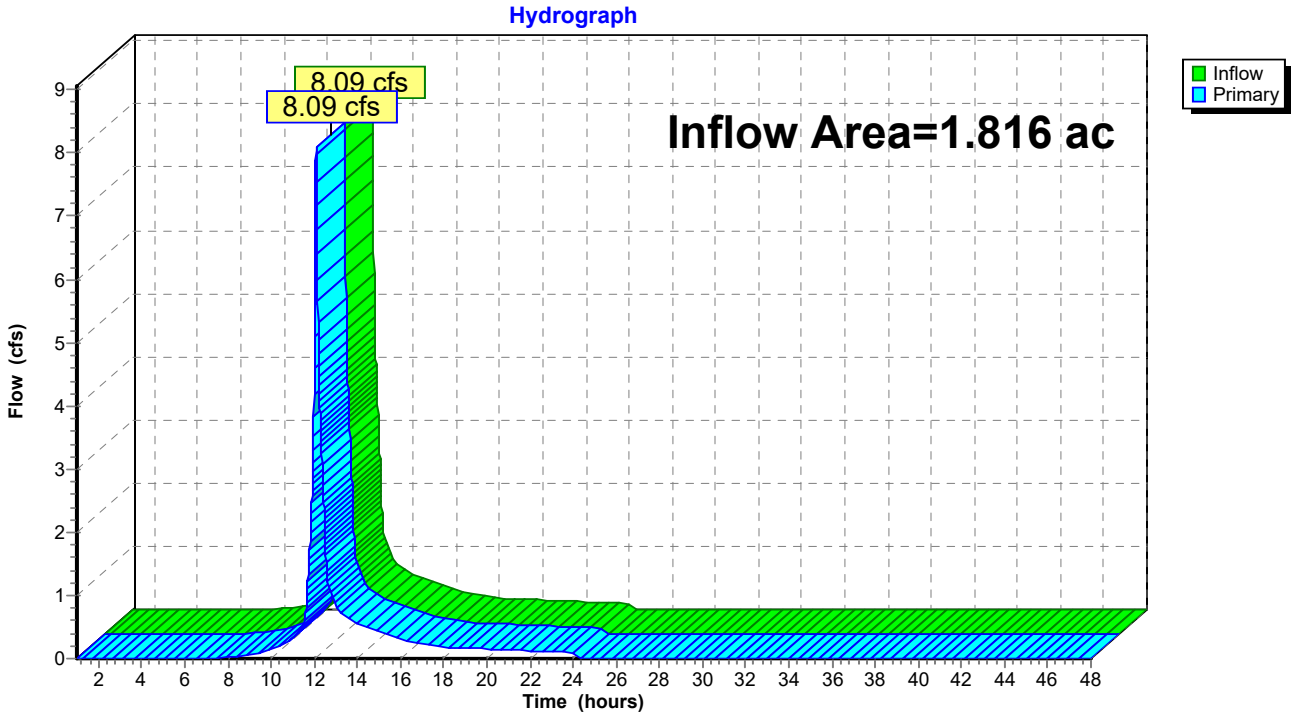


Summary for Link AP-3: AP-3

Inflow Area = 1.816 ac, 21.16% Impervious, Inflow Depth = 3.88" for 100-yr Storm event
Inflow = 8.09 cfs @ 12.09 hrs, Volume= 0.588 af
Primary = 8.09 cfs @ 12.09 hrs, Volume= 0.588 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-3: AP-3



ATTACHMENT E

TREATMENT VOLUME CALCULATIONS

SME
SEVEE & MAHER
ENGINEERS

DETENTION POND TREATMENT VOLUME

	Gravel/Pavement Area (SF)	Treatment Volume (CF)
North Area (SC1A-North)		
GRAVEL (R0AD)	19,299	804
PAVED PARKING/ROAD	1,912	80
South Area (SC1A-South)		
GRAVEL (R0AD)	38,260	1,594
PAVED PARKING/ROAD	9,866	411
ROOFS, HSG A	8,866	369
	Total Treatment Volume (CF)	**3,258**

Note: Treatment Depth (in) = 0.5

FOREBAY TREATMENT VOLUME

	Gravel/Pavement Area (SF)	Treatment Volume (CF)
North Area (SC1A-North)		
GRAVEL (R0AD)	19,299	
PAVED PARKING/ROAD	1,912	
South Area (SC1A-South)		
GRAVEL (R0AD)	38,260	
PAVED PARKING/ROAD	9,866	
ROOFS, HSG A	8,866	
Total Area (SF)	78,203	
Total Area (Acre)	1.80	**652**

Note: Treatment Depth (in/arcre)= 0.1

FORE BAY STORAGE SUMMARY

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
181.00	323	0
181.05	368	17
181.10	413	37
181.15	457	59
181.20	502	83
181.25	547	109
181.30	592	137
181.35	637	168
181.40	681	201
181.45	726	236
181.50	771	274
181.55	816	313
181.60	861	355
181.65	905	399
181.70	950	446
181.75	995	494
181.80	1,040	545
181.85	1,085	598
181.90	1,129	654
181.95	1,174	711
182.00	1,219	771

DETENTION BASIN STORAGE SUMMARY

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
179.00	1,176	0
179.10	1,290	123
179.20	1,404	258
179.30	1,519	404
179.40	1,633	562
179.50	1,747	731
179.60	1,861	911
179.70	1,975	1,103
179.80	2,090	1,306
179.90	2,204	1,521
180.00	2,318	1,747
180.10	2,438	1,985
180.20	2,558	2,235
180.30	2,679	2,496
180.40	2,799	2,770
180.50	2,919	3,056
180.60	3,042	3,354

ATTACHMENT F

LONG TERM POLLUTION PREVENTION PLAN

SME
SEVEE & MAHER
ENGINEERS

Long Term Pollution Prevention Plan

Standard #4 of the MassDEP Stormwater Management Handbook requires that a Long Term Pollution Prevention Plan (LTPPP) be prepared and incorporated into the long term operation and maintenance plan of the projects stormwater management system. The purpose of the LTPPP is to identify potential sources of pollution that may affect the quality of stormwater discharges and to describe suggested practices to reduce pollutants in stormwater discharges.

This document should be used in conjunction with the operation and maintenance plan for the facility.

Good housekeeping practices - The Property Owner is to keep the site in a neat and orderly condition so that pollutants are not conveyed to the storm drainage system and adjacent wetlands. Materials swept, blown or washed into the sites detention pond decreases the system's effectiveness and could eventually be conveyed into the adjacent wetland resource area. Some examples of good housekeeping practices are litter control and protected material storage areas. The Property Owner should assign responsibilities to personnel to keep the site in a neat and orderly condition at regular intervals.

Provisions for storing materials and waste products inside or under cover – A dedicated dumpster area should be provided if and when necessary. The trash and waste program should include regular pickup to avoid an overflowing dumpster condition. The water tight dumpster lid should be maintained closed when not actively loading or unloading. A trash disposal company, hired by the Property Owner(s), is to properly dispose the trash at a state approved disposal facility.

Requirements for routine inspections and maintenance of stormwater BMP's - Consistent with Standard 9 of the Massachusetts Stormwater Management Regulations, an Operation and Maintenance Plan has been prepared. The plan details routine inspection and maintenance along with associated record keeping forms.

Spill prevention and response plans – A spill containment and countermeasure plan (SPPC) will be prepared for the site. Beyond the measures for oil containing equipment, exterior spill hazards are to be minimized. Exterior spill hazards have the potential to enter the stormwater drainage system and are to be addressed as follows:

1) Spill hazards of pesticides, paints, and solvents shall be remediated using the

Manufacturers' recommended spill cleanup protocol

2) Vehicle fluid and fuel spills shall be remediated according to local and state regulations governing fuel spills. Spills are to be immediately cleaned up with absorbent materials and properly disposed.

3) The Property Owners shall have the following equipment and materials on hand to address a spill clean-up: brooms, dust-pans, mops, rags, gloves, trash bags, trash containers, and absorptive materials such as sand, sawdust, or kitty litter.

4) Spills of toxic or hazardous materials shall be reported to the Massachusetts Department of Environmental Protection at 1-888-304-1133.

Provisions for maintenance of lawns, garden, and other landscaped areas - It should be a general goal of the Property Owner to achieve a high quality of well-groomed and stable landscape that evolves throughout the changing seasons and overall condition of the property. All landscaped areas are to be maintained with dense vegetative growth or a layer of mulch so as to minimize sediment transport associated with erosion. Litter and waste are to be removed weekly from the landscaped areas and adjoining parking lots and disposed of in an appropriate receptacle.

Requirements for storage and use of fertilizer, herbicides, and pesticides - Fertilizers, herbicides, and pesticides will not to be stored on site. Chemical controls should be used as a last resort to organic and biological control methods.

Snow disposal and deicing chemicals – The parking lot and access road is designed to provide ample snow storage along the perimeter. If necessary, snow removal to an offsite location will occur to remain reasonable access and parking. No snow is to be moved to within 100 feet of a wetland resource area.

The use of de-icing agent such as salt or potassium chloride may be required to maintain a safe driving and walking surface. The de-icing agent for the walkways and building entrances may be kept on site within the building. De-icing agents are not to be stored outside.

ATTACHMENT G

ILLICIT DISCHARGE STATEMENT

SME
SEVEE & MAHER
ENGINEERS

ILLICIT DISCHARGE COMPLIANCE STATEMENT

I verify that no illicit discharges exist from the Agawam Energy Center. Through the implementation of a Long Term Pollution Prevention Plan and Operation and Maintenance Plan, measures are set forth to prevent illicit discharges from entering the stormwater management drainage system.

Signature	**Print Name**	**Date**
Title	**Company**	

Signature	**Print Name**	**Date**
Title	**Company**	

Note: This certification must be signed before stormwater is conveyed to the proposed stormwater drainage system in accordance with Standard 10 of the Massachusetts Stormwater Management Standards.

ATTACHMENT H

POST-CONSTRUCTION STORMWATER INSPECTION & MAINTENANCE PLAN

SME
SEVEE & MAHER
ENGINEERS

POST-CONSTRUCTION STORMWATER INSPECTION AND MAINTENANCE PLAN
AGAWAM ENERGY CENTER
769 SILVER STREET
AGAWAM, MASSACHUSETTS

Prepared for

AGAWAM ENERGY CENTER, LLC
C/O Longroad Development Company, LLC
125 High Street
Boston, MA 02210

February 2026

4 Blanchard Road
P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 sme-engineers.com

SME
SEVEE & MAHER
ENGINEERS

TABLE OF CONTENTS

Section No.	Title	Page No.
1.0	**SITE DESCRIPTION**	**1-1**
2.0	**FACILITY CONTACTS**	**2-1**
3.0	**POST-CONSTRUCTION STORMWATER INSPECTION AND MAINTENANCE PLAN OVERVIEW AND OBJECTIVES**	**3-1**
3.1	Site Management Practices	3-1
3.2	Inspections	3-2
3.3	Routine Maintenance and Corrective Actions	3-2
3.4	Housekeeping	3-3
3.5	Maintenance Records	3-4

LIST OF FIGURES

Figure No.	Title	Page No.
1	SITE LOCATION MAP	1-2

LIST OF TABLES

Table No.	Title	Page No.
1	LONG-TERM INSPECTION AND MAINTENANCE PLAN	3-5

POST-CONSTRUCTION STORMWATER INSPECTION AND MAINTENANCE PLAN
AGAWAM ENERGY CENTER
769 SILVER STREET
AGAWAM, MASSACHUSETTS

1.0 SITE DESCRIPTION

Agawam Energy Center, LLC (Applicant) proposes to develop an approximately 250 megawatt (MW), 1,000 megawatt hour (MWh), battery energy storage system (BESS) on the 17.2 acre Site located at 769 Silver Street (Map G6, Block 2, Lot 6) in Agawam, Massachusetts (the Project). The Project will utilize lithium-ion (Li-ion) chemistry and will interconnect at Eversource's South Agawam 115 kV switchyard located to the southeast, approximately 600 feet from the Project.

The BESS Project is intended to charge during hours where electricity demand is low and discharge energy to the electrical grid during seasonal peak periods and monthly peak hours. By strategically charging and discharging, the Project will serve to displace fossil fuel generation in the Northeast and reduce carbon intensity of generation in Massachusetts.

The site was identified for proximity to a utility substation available for connection, its large open area and the historic commercial/industrial use of the site and neighboring properties. The location of the project is shown in Figure 1, Site Location Map. More details on the project site are shown in the engineering drawing set attached to this application.

The project area is a previously developed commercial site with large amounts of impervious and disturbed areas; bound by developed commercial property to the north and south, a combination of undeveloped forested land and developed industrial property to the east and Silver Street to the west. The BESS site will be accessed by a paved driveway and parking area near the entrance, transitioning to a gravel access road within the fenced in BESS yard. The access roads are designed to accommodate emergency vehicles.

The array will be enclosed by a combination of a 8-foot-high chain link fence and sound walls. The fence will include sliding vehicle gates at four access points. Approximately 6.8 acres of land in the BESS yard, within the fence line and approximately one acre within the substation fence. All areas not utilized for BESS yard, site access and parking or the substation will be revegetated.

Construction of the BESS facility will include installation of BESS modules on foundations, installation of underground cables, new gravel access road, substation equipment, and new utility poles with an interconnection point at the adjacent Eversource Substation.



0 1000 2000 4000

1 INCH = 2000 FEET

FIGURE 1
SITE LOCATION MAP
LONGROAD ENERGY
AGAWAM ENERGY CENTER
AGAWAM, MASSACHUSETTS

SME
SEVEE & MAHER ENGINEERS

DWG: SITE LOCATION PLAN LMN: NONE CTB: SME-STD.CTB JOB#: 250579.01 REV: 12/17/2025

The project will include the installation of the supports for BESS units, concrete equipment foundations, excavation of the utility trench, road improvements, construction of the substation and the gravel access road and improvements at the site entrance. The developed area of the BESS yard will include approximately 128,000 SF of gravel access road and 60,800 square feet of electrical equipment and concrete foundations, resulting in 4.3 acres of impervious area.

Erosion control measures are shown on the Layout and Grading with details included on the Erosion Control Notes and Details Drawing (AW1-C-300), included in the permit application.

The stormwater management system as referenced within this document refers to the entire project area. This Post-Construction Stormwater Management Plan is applicable to the areas of the site encompassed by the areas developed.

2.0 FACILITY CONTACTS

Facility:	Agawam Energy Center 769 Silver Street Agawam, Massachusetts
Owner Representative:	C/O Agawam Energy Center, LLC 125 High Street Boston, MA 02210 Contact: Chad Allen Telephone: 207-210-1175 Email: Sydney.allen@longroadenergy.com
Consultant/Designer:	Sevee & Maher Engineers, Inc. 4 Blanchard Road Cumberland, ME 04021 Thomas Henaghen, PE Email: Thomas.henaghen@sme-engineers.com BSC Group 180 Glastonbury Boulevard, Suite 305 Glastonbury, CT 06033 Melissa Kaplan, PWS Telephone: 860-652-8227 Email: mkaplan@bscgroup.com

3.0 POST-CONSTRUCTION STORMWATER INSPECTION AND MAINTENANCE PLAN OVERVIEW AND OBJECTIVES

The Post-Construction Stormwater Inspection and Maintenance Plan (PSWIMP) is an important component of the overall stormwater management system for the site. PSWIMP addresses various maintenance activities that should occur after construction and site stabilization. Proper implementation of the PSWIMP can minimize pollutant generation and transport and maintain the stormwater treatment system to ensure proper operation. This PSWIMP includes three primary components:

1. Site Management Practices;
2. Inspections; and
3. Routine Maintenance and Corrective Actions.

3.1 Site Management Practices

Site management practices are aimed at reducing pollutants by minimizing use of certain materials, using alternative materials, or removing pollutants prior to discharge to the stormwater management system. These practices shall include:

1. Use slow-release sulfur or plastic coated ureaform fertilizers (e.g., Nutralene);
2. Do not fertilize vegetated swales once vegetation is established;
3. Minimize use of pesticides by using a sound integrated pest management (IPM) approach to monitor and control the actual pests present;
4. Collect and remove autumn leaves to minimize transport to the stormwater treatment system;
5. Minimize use of de-icing materials and sand and keep a log of materials used;
6. Routine sweeping of paved parking areas and driveways;
7. Fertilizers, pesticides, and other hazardous materials should be stored in enclosed areas to avoid exposure to precipitation; and
8. Material handling should be conducted to minimize risk of spillage and release to the stormwater treatment system.

3.2 Inspections

A series of routine inspections shall be completed to allow for the early identification of potential problems and to guide routine maintenance activities. Inspections shall be carried out in accordance with the Long-Term Inspection and Maintenance Plan (Table 1). Dates and observations shall be recorded for each inspection on the attached Inspection Log.

3.3 Routine Maintenance and Corrective Actions

Routine maintenance activities are designed to ensure proper function of the stormwater management system and minimize pollutant transport from the site. Routine maintenance activities must be completed according to the schedule (Table 1) provided in this plan. This schedule is the minimum amount of maintenance required; maintenance that is more frequent may be needed when indicated by the inspections. Corrective actions (supplemental maintenance activities or repairs) should be completed within seven days of the inspection identifying the problem. Each maintenance activity will be recorded on the attached 'Maintenance and Repair Log.'

During construction, the Sitework Contractor (not yet selected) shall be responsible for cleaning and maintaining stormwater components on the schedule outlined in Table 1 and in accordance with the notes and details on the Erosion Control Notes and Details Drawing (AW1-C-300), included in the permit package.

Following completion of construction, Agawam Energy Center, LLC will be responsible for cleaning and maintaining stormwater components on the schedule outlined in Table 1.

The following describes specific stormwater facilities maintenance requirements and minimum schedule of inspection and maintenance.

- Open swales and ditches need to be inspected in the spring and fall, or after a major rainfall event, to assure that debris or sediments do not reduce the effectiveness of the system. Debris needs to be removed at that time. Sign of erosion or blockage shall be immediately repaired to assure a vigorous growth of vegetation for the stability of the structure and proper functioning. Swales that show newly formed channels or gullies will be immediately repaired by reseeding/sodding of bare spots, removal of trash, leaves and/or accumulated sediments, and the control of woody or other undesirable vegetation.
- Vegetated swales and ditches should be mowed at least once during the growing season. Larger brush or trees must not be allowed to become established in the swales or ditches. Any areas where the vegetation fails will be subject to erosion and should be repaired and revegetated. Mowing activities should comply with the conditions and time of year

requirements of the issued permits. Per the issued NHESP permit, a visual walking inspection shall be conducted prior to mowing between April 1 and October 31st to check for presence of rare turtles.

- If sediment in culverts or outlet pipes exceeds 20 percent of the diameter of the pipe, it should be removed. This may be accomplished by hydraulic flushing or other mechanical means and Storm pipes should be inspected on an annual basis.
- Paved surfaces shall be swept or vacuumed at least annually in the spring to remove winter sand and periodically during the year on an as-needed basis to minimize the transportation of sediment during rainfall events.
- The surface of the basin may clog with fine sediments over time. Maintenance of good grass cover will minimize this. Grass should be mowed not more than two times per season. Any bare areas should be seeded or sodded, as necessary. Inspect the basin's drainage area semi-annually for eroding soil and other sediment sources. Repair eroding areas using appropriate erosion control BMPs immediately. Control sediment sources, such as stockpiles of winter sand, by removing them from the basin's drainage area or surrounding them with sediment control BMPs. Prohibit vehicle access to all filtration areas. Heavy equipment used to maintain or rehabilitate the basins should work from the basin's perimeter.

3.4 Housekeeping

- Spill prevention. Provide controls to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.
- Groundwater protection. Do not handle or store, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater in areas of the site draining to an infiltration area. An “infiltration area” is any area of the site that by design or as a result of soils, topography, and other relevant factors accumulates runoff that infiltrates into the soil. Provide dikes, berms, sumps, and other forms of secondary containments that prevent discharge to groundwater to isolate portions of the site for the purposes of storage and handling of these materials.
- Fugitive sediment and dust. Provide measures to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control. If off-site tacking occurs, roadway must be swept immediately and no less than once a week prior to significant stormwater event.
- Debris and other materials. Prevent litter, construction debris, and chemicals exposed to stormwater from becoming a pollutant source.

- Trench or foundation de-watering. Trench dewatering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. Remove the collected water from the ponded area and dispose of in accordance with notes on Drawings C-300 and the project specifications.
- Non–stormwater discharges. Identify and prevent contamination by non-stormwater discharges.
- Additional requirements. Additional requirements may be applied on a site-specific basis.

3.5 Maintenance Records

Use the following inspection log to record the inspection and any required repair or maintenance of the stormwater management system.

1. *Identification and repair of erosion problems*. All areas of the project site have been inspected for areas of erosion and appropriate steps have been taken to permanently stabilize these areas, including placement of any removed sediment in an area of low erosion potential, either on-site or off-site, and seed with erosion control seed mix.;
2. *Inspection and repair of stormwater management system*. All aspects of the stormwater management system have been inspected for damage, wear, and malfunction and appropriate steps have been taken to repair or replace the system, or portions of the system;
3. *Maintenance*. The Post-Construction Stormwater Inspection and Maintenance Plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by Sevee & Maher, and the maintenance log is being maintained;
4. *Documentation.* Photographs documenting the conditions at the time of each inspection are taken and kept with the Inspection Log;

TABLE 1

POST-CONSTRUCTION STORNWATER INSPECTION AND MAINTENANCE PLAN
AGAWAM ENERGY CENTER
769 SILVER STRET
AGAWAM, MASSACHUSETTS

	Spring	Fall	After a Major Storm	Every 2-5 Years
Vegetated Areas				
Inspect all slopes and embankments.	X		X	
Replant bare areas or areas with sparse growth.	X		X	
Armor areas with rill erosion with an appropriate lining or divert the erosive flows to on-site areas able to withstand concentrated flows.	X		X	
Maintain 85% vegetative cover uniformly distributed on all areas permanently stabilized with vegetation.		X		
Stormwater Swales and Basins				
Inspect all slopes and embankments	X	X	X	
Inspect riprap outlets	X		X	
Repair erosion around outlets and embankments	X	X	X	
Remove debris and sediment	X	X	X	

STORMWATER INSPECTION LOG
AGAWAM ENERGY CENTER
769 SILVER STRET
AGAWAM, MASSACHUSETTS

Date	Device/Area Inspected	Inspected By	Observations, Deficiencies & Recommended Corrective Actions

ATTACHMENT I

TSS REMOVAL CALCULATIONS

SME
SEVEE & MAHER
ENGINEERS

Location: Agawam Energy Center

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Grass Channel	0.50	1.00	0.50	0.50
Sediment Forebay	0.25	0.50	0.13	0.38
Extended Dry Detention Basin	0.50	0.38	0.19	0.19
	0.00	0.19	0.00	0.19
	0.00	0.19	0.00	0.19

Total TSS Removal = 81%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Agawam Energy Center
Prepared By: TMH
Date: 2/27/2026

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Location: Agawam Energy Center

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Sediment Forebay	0.25	1.00	0.25	0.75
Extended Dry Detention Basin	0.50	0.75	0.38	0.38
	0.00	0.38	0.00	0.38
	0.00	0.38	0.00	0.38
	0.00	0.38	0.00	0.38

Total TSS Removal = 63%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Agwam Energy Center
Prepared By: TMH
Date: 2/27/2026

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

ATTACHMENT J

HYDRAULIC CONDUCTIVITY AND DRAWDOWN CALCULATION

SME
SEVEE & MAHER
ENGINEERS

HYDRAULIC CONDUCTIVITY AND DRAWDOWN CALCULATION

GOAL: Drain water quality depth within 72 hours.

KNOWN FACTORS:

Basin Bottom Area (A_b) = 1,176 SF

WQ Depth ~ 1.6 FT

WQ Volume (V) ~ 3,260 CF, Volume below invert out = 3,354 CF

HYDRAULIC CONDUCTIVITY DETERMINATION:

Native soils are loose sand with some silt

Typical Hydraulic Conductivity Values Range for sand can range from .5 to 5.0 in/hr.

Using a value of 1.42 in/hr taken from Engineering Manual EM 1110-2-1901 – Seepage Analysis and Control for Dams (shown below) to represent a sand with some silt.

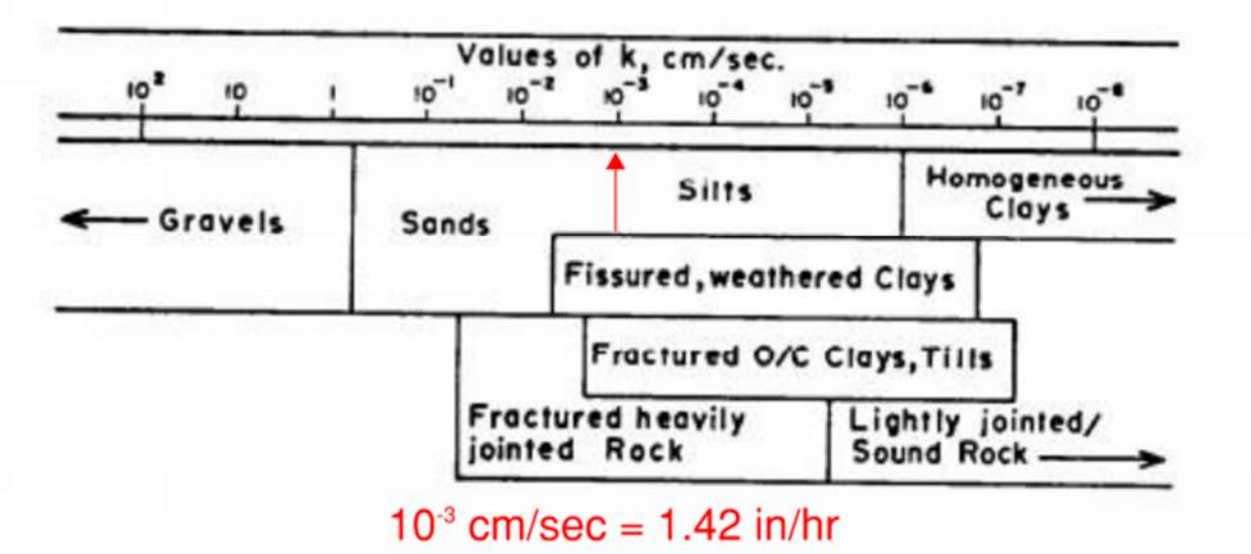


Figure 2-5. Approximate range in coefficient of permeability of soils and rocks (from Milligan[224])

FACTOR OF SAFETY (FS)

Due to lack of site-specific testing and use of typical values we will add a FS of 2 to determine our design value for K.

$K_{design}=K_{typical}/FS$

K_{design} = 1.42/2 = 0.71in/hr OR 1.42 ft/day

CALCULATE INFILTRATION RATE

$Q_{inf} = K_{design} \times A_b$

Q_{inf} = 1.42 ft/day x 1,176SF

Q_{inf} =1669.92 ft^3/Day

CALCULATE DRAWDOWN TIME

T= V/Qinf

T= 3354 CF/1669.92 ft^3/Day = 2.01 DayS OR ~ 48 hours

Confirmed Drawdown Time of 48 hours < 72 hours

SUMMARY OF TEST PIT AND BORING INFORMATION

Location	Elev	Depth to GW (ft)	GW (elev)	Material Description
B-1	182	15	167	Loose, Silty Sand
B-2	182.5	10	172.5	Loose Sand, Some Silt
B-3	187	10	177	
B-4	188	10	178	
B-5	187	10	177	
B-6	186	10	176	
B-7	183	10	173	Loose Sand, Trace Silt
B-8	185	10	175	
B-9	185	10	175	
TP-1	185	9	176	
TP-2	182	9	173	
TP-3	182	10	172	Fine Gravel over silty Sand
TP-4	183	9	174	
TP-5	187	9	178	
TP-6	187	10+	177	
TP-7	186	9	177	
TP-8	185	9	176	
TP-9	185	9	176	
TP-10	186	10+	176	

Notes:

1) Highlighted Locations are closes to the stormwater pond.
2) Elevation represents approximate elevation at ground surface at boring location.
3) Material description is summary of material anticipated at approximate bottom of basin elev.
4) GW elevation indicates approximate elevation of groundwater observation at the time of exploration.

ATTACHMENT K

RIP RAP SIZING CALCULATION FOR PIPE OUTLETS

SME
SEVEE & MAHER
ENGINEERS

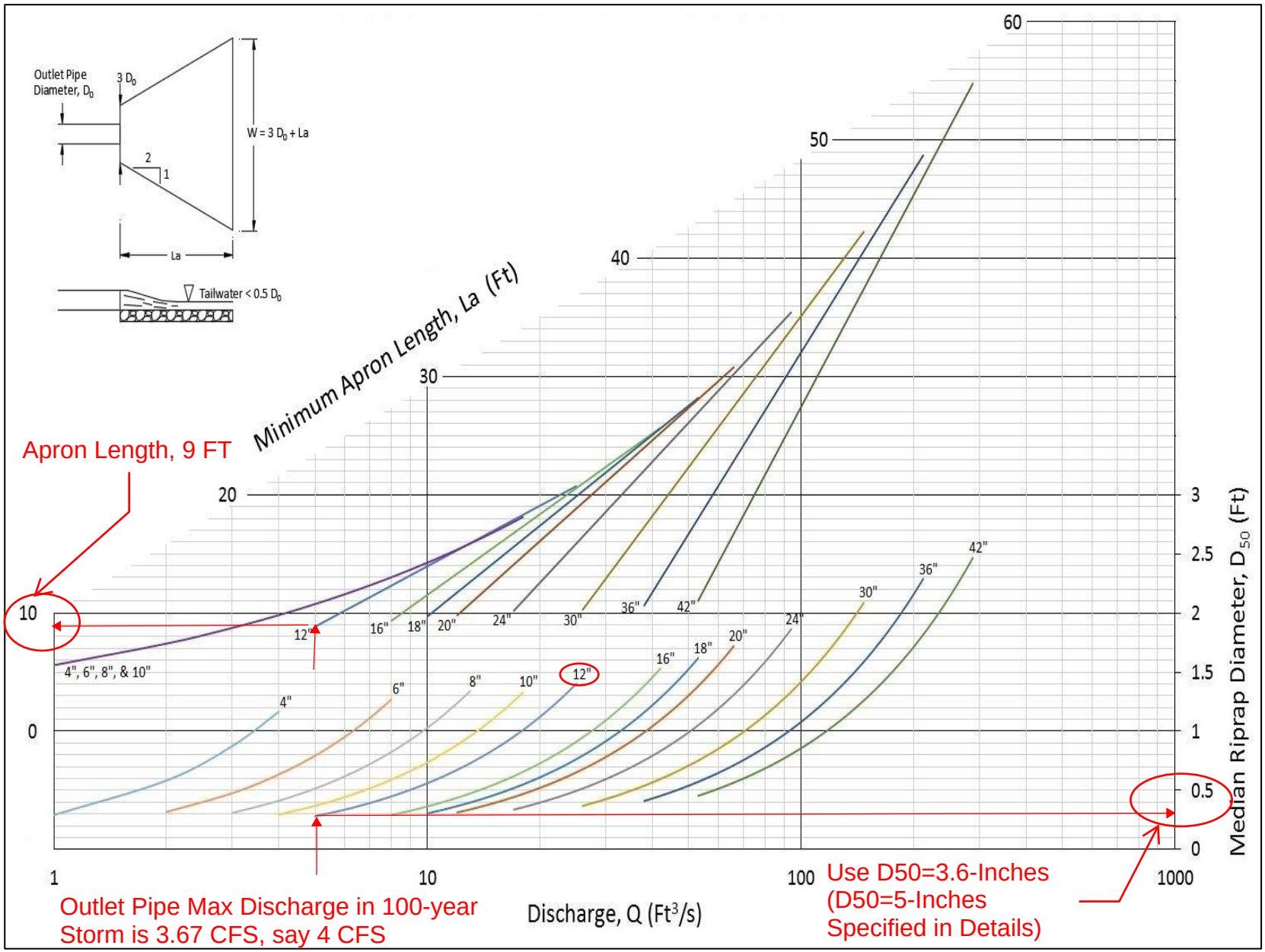


Figure 1a: Minimum Tailwater Condition

ATTACHMENT L

GEOTECHNICAL REPORT

SME
SEVEE & MAHER
ENGINEERS

REPORT

25-1685 S

December 16, 2025

Explorations and Geotechnical Engineering Services

Proposed BESS and Substation
769 Silver Street
Agawam, Massachusetts

Prepared For:
Longroad Energy, LLC
Attention: Kevin Hutchinson
125 High-Street High-Street Tower Suite 1705
Boston, MA 02110

Prepared By:
S. W. Cole Engineering, Inc.
227 Wampanoag Trail
Riverside, RI 02915
T: 401-438-7711

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Scope and Purpose 1
1.2 Site and Proposed Construction 1
2.0 EXPLORATION AND TESTING 2
2.1 Explorations 2
2.2 Field Testing 2
2.3 Field Resistivity 3
2.4 Laboratory Testing 3
3.0 SUBSURFACE CONDITIONS 4
3.1 Soil and Bedrock 4
3.2 Groundwater 4
4.0 EVALUATION AND RECOMMENDATIONS 4
4.1 General Findings 4
4.2 Site and Subgrade Preparation 5
4.3 Excavation and Dewatering 5
4.4 Foundations 6
4.5 Corrosion Protection and Cement Type 7
4.6 Frost Susceptibility and Protection 7
4.7 Fill, Backfill and Compaction 7
4.8 Weather Considerations 9
4.9 Roadways 9
4.10 Design Review and Construction Testing 9
5.0 CLOSURE 10

Appendix A Limitations
Appendix B Figures
Appendix C Exploration Logs & Key
Appendix D Laboratory Test Results
Appendix E Resistivity Data Sheets

25-1685 S

December 16, 2025

Longroad Energy, LLC
Attention: Kevin Hutchnison
125 High-Street Tower Suite 1705
Boston, MA 02110

Subject: Explorations and Geotechnical Engineering Services
Proposed BESS and Substation
769 Silver Street
Agawam, Massachusetts

Dear Kevin:

In accordance with our Proposal, dated September 2, 2025, we have performed subsurface explorations for the subject project. This report summarizes our findings and geotechnical recommendations and its contents are subject to the limitations set forth in Appendix A.

1.0 INTRODUCTION

1.1 Scope and Purpose

The purpose of our services was to obtain subsurface information at the site in order to develop geotechnical recommendations relative to foundations, earthwork and pavement associated with the proposed construction. Our scope of services included a test boring explorations, test pit explorations, soils laboratory testing, a geotechnical analysis of the subsurface findings and preparation of this report.

1.2 Site and Proposed Construction

The site is located at 769 Silver Street in Agawam, Massachusetts. The site is located within a commercial district. We understand the site occupies approximately 17 acres and is primarily used as a lumber yard business developed with several buildings and gravel laydown yards. The eastern border of the site includes densely wooded areas. An

overhead transmission line crosses the southern portion of the site in an east-west alignment. Based on existing aerial imagery site grades descend from Silver Street at an elevation of approximately 190 feet to the site in the northwest at an elevation of approximately 180 feet in southeast.

Details regarding the locations of the BESS, Substation, Equipment's Pads and Foundations loads are unknown at this time, however anticipate the site will be accessed from Silver Street and Moylan Lane. We understand associated electrical equipment will be supported by concrete pads. Details regarding proposed grading are unknown, however we anticipate that finish grade will be near existing grades requiring minor cuts and fills.

Proposed and existing site features are shown on the "Exploration Location Plan" attached in Appendix B.

2.0 EXPLORATION AND TESTING

2.1 Explorations

Nine test borings (B-1 through B-9) made at the site on October 13 and 14, 2025 by Seaboard Drilling, LLC. under subcontract to S. W. Cole Engineering, Inc. (S.W.COLE). Ten test pits (TP-1 through TP-10) were made at the site on October 13, 2025 by Seaboard Drilling. under subcontract to S.W.COLE. The exploration locations were selected by S.W.COLE. Exploration locations were established in the field by S.W.COLE personnel using a mapping-grade GPS.

The approximate exploration locations are shown on the "Exploration Location Plan" attached in Appendix B. Logs of the explorations and a key to the notes and symbols used on the logs are attached in Appendix C.

2.2 Field Testing

The test borings were drilled using hollow stem auger boring techniques. The soils were sampled at 2 to 5 foot intervals using a split spoon sampler and Standard Penetration Testing (SPT) methods. SPT blow counts results are shown on the logs.

2.3 Field Resistivity

A field soil electrical resistivity test spread (LRA-ER-1) was performed at the site on October 17, 2025 by S.W.COLE. The test spread included two mutually perpendicular test lines identified as A and B. The approximate location of the test spreads are shown on the "Exploration Location Plan," attached in Appendix B.

Field soil electrical resistivity testing was performed using a fixed-center Wenner Array, with an AGI SuperSting R1 resistivity meter. We conducted the electrical resistivity testing at two mutually perpendicular test spreads at the site substation. The maximum A-spacing tested was 60 feet. Instrument settings included automatic current and voltage settings and the use of interference compensation settings (for power at 60 Hz), which helps to reduce interferences to testing from nearby electrical fields. The apparent resistivity testing results are tabulated and graphed on the Resistivity Computation Data Sheets included as Appendix E.

As shown on the Resistivity Computation Data Sheets, the apparent resistivity ranged from approximately 742 ohm-meters (Ωm) at spread LRA-ER-1A (1 foot A-spacing) to 2120 Ωm (60 foot A-spacing). Variations in apparent resistivity between test locations and spread locations are interpreted as being due to variations in surficial and bedrock geology, moisture content and depth to water, and proximal unknown interferences.

The resistivity data should be reviewed by a grounding design engineer, in combination with the boring logs, to confirm that they are acceptable for the design of the grounding grid. It should be noted that these apparent resistivity measurements may be higher during drier seasonal conditions.

2.4 Laboratory Testing

Soil samples obtained from the explorations were returned to our laboratory for further classification and testing. Soil gradation, moisture content testing and soil proctor analysis were performed. Moisture content test results are noted on the logs.

Five soil samples were submitted to Testing Engineers International (TEI) for determination of pH, water soluble chloride, water soluble sulfate, water soluble sulfide, reduction-oxidation potential, electrical resistivity and alkalinity testing.

3.0 SUBSURFACE CONDITIONS

3.1 Soil and Bedrock

Below a surficial layer of topsoil, the subsurface profile generally consisted of subsoil; underlain uncontrolled and deposits of sands with varying amounts of silt. The principal strata encountered in the test borings are summarized below. Refer to the attached boring logs for detailed subsurface information.

Subsoil: A layer of brown, sandy Silt, with rootlets and organics was encountered from approximately 3 inches to 3 feet below the ground surface (bgs). Based on SPT blow counts, the subsoil layer was typically medium dense.

Uncontrolled Fill: A layer uncontrolled fill of encountered within boring B-1 and test pit TP-3. The reddish brown fill was encountered to depth between 5.5 and 11 feet below ground surface. Based on SPT blow counts the uncontrolled fill layer was typically medium dense.

Sand: Underlying the subsoil is a deposit of sand. The sand consisted of grayish tan fine sand with silt increasing with depth. Based on SPT N-Values, the sand was typically loose.

3.2 Groundwater

The soils encountered at the test borings and test pits were moist to wet from the ground surface. Saturated soils were encountered at depths varying from 9 to 15 feet. Long term groundwater information is not available. It should be anticipated that groundwater levels will fluctuate, particularly in response to periods of snowmelt and precipitation, as well as changes in site use.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

Based on the subsurface findings, the proposed construction appears feasible from a geotechnical standpoint. The principal geotechnical considerations include:

- Mat foundations or footing and pier foundations bearing on properly prepared subgrades appear suitable for the BESS Yard and Substation. The foundations

should bear on at least 6-inches of compacted Crushed overlying undisturbed native non-organic soils.

- All topsoil, subsoils and uncontrolled fill must be completely removed from beneath the BESS Yard and Substation and replaced with properly compacted granular borrow.

- Subgrades across the site will consist of subsoils, uncontrolled fill and sands. Earthwork and grading activities should occur during drier, non-freezing weather of Spring, Summer and Fall. Excavation of bearing surfaces should be completed with a smooth-edged bucket to lessen subgrade disturbance.

4.2 Site and Subgrade Preparation

We recommend that site preparation begin with the construction of an erosion control system to protect adjacent drainage ways and areas outside the construction limits. Surficial organics, roots and topsoil should be completely removed from areas of proposed fill and construction. As much vegetation as possible should remain outside the construction areas to lessen the potential for erosion and site disturbance.

All uncontrolled fills and subsoils must be completely removed from beneath the proposed BESS Yard and Substation. The extent of removal should extend 1 foot laterally outward from outside edge of the mat foundation for every 1-foot of excavation depth (1H:1V bearing splay). The overexcavated area should be backfilled with compacted Structural Fill.

We recommend that foundation be excavated using a smooth-edged bucket and that footings be underlain by at least 6 inches of Crushed Stone.

4.3 Excavation and Dewatering

Excavation work will generally encounter uncontrolled fills and sand. Care must be exercised during construction to limit disturbance of the bearing soils. Earthwork and grading activities should occur during drier, non-freezing weather of Spring, Summer and Fall. Low ground pressure tracked equipment may be needed and temporary haul roads overlying geotextile fabric may be necessary. Final cuts to subgrade should be performed with a smooth-edged bucket to help reduce strength loss from soil disturbance.

Vibrations from construction should be controlled below threshold limits of 0.5 in/sec for structures, water supply wells and infrastructure within 500 feet of the project site. More restrictive vibration limits may be warranted in specific cases with sensitive equipment, historic structures or artifacts on-site or within close proximity.

Based on the depth of observed water level in the test pit, we do not anticipate encountering water in shallow frost-depth foundations. Deeper foundations may require dewatering. Controlling the water levels to at least one foot below planned excavation depths will help stabilize subgrades during construction. Excavations must be properly shored or sloped in accordance with OSHA Regulations to prevent sloughing and caving of the sidewalls during construction. Care must be taken to preclude undermining adjacent structures, utilities and roadways. The design and planning of excavations, excavation support systems, and dewatering is the responsibility of the contractor.

4.4 Foundations

We recommend the proposed BESS Yard and Substation Foundations be supported on spread footing and pier foundations or mat foundations founded on at least 6-inches of crushed stone. For foundations bearing on properly prepared subgrades, we recommend the following geotechnical parameters for design consideration:

Geotechnical Parameters for Mat Foundation	
Design Frost Depth (MSBC)	4.0 feet
Net Allowable Soil Bearing Pressure	2.0 ksf
Base Friction Factor	0.35
Total Unit Weight of Backfill	125 pcf
At-Rest Lateral Earth Pressure Coefficient	0.5
Internal Friction Angle of Backfill	30°
Estimated Total Settlement	1-inch
Differential Settlement	½-inch

Mat foundations placed shallower than 4 feet from finish grade should either be frost protected incorporating insulation or incorporate the use of non-frost susceptible No. 57 crushed stone from the underside of the mat to the frost depth.

4.5 Corrosion Protection and Cement Type

A sample was submitted for laboratory of pH, water soluble chloride, water soluble sulfate, sulfide, reduction-oxidation potential, and electrical resistivity testing. The results of the testing are included in Appendix E.

Considering the corrosivity test results, we interpret the site soils score to be about 7 points on the "10-Point System" provided in the ANSI/AWWA C105/A21.5 standard. This indicates the soil samples are considered nonaggressive to slightly corrosive to ductile iron and cast iron.

According to the Portland Cement Association (PCA) manual *Design and Control of Concrete Mixtures*, Type II cement is used when concrete is to be in an environment with "negligible" to "moderate" sulfate exposure (sulfate values between 0 and 1500 ppm). Laboratory sulfate content was less than 10 ppm and therefore, Type II or Type I/II cement is applicable.

4.6 Frost Susceptibility and Protection

The design-freezing index for the Agawam, Massachusetts area is approximately 1268 Fahrenheit degree-days according to the National Oceanic and Atmospheric Administration (NOAA) databases, corresponding to a design frost depth of 4.0 feet.

Based on visual observations and the results of the laboratory testing, the soils in the frost zone varying in silt content, but the higher silt content areas have a high frost susceptibility. The sample at bor9ing B-1 from 2 to 4 feet below the ground surface has 34.8 percent fines (percent passing the No. 200 sieve) with moisture contents ranging from about 9 percent.

Mat foundations placed shallower than 4 feet from finish grade should either be frost protected incorporating insulation or incorporate the use of non-frost susceptible No. 57 crushed stone from the underside of the mat to the frost depth.

4.7 Fill, Backfill and Compaction

We recommend the following fill and backfill materials: recycled products must also be tested in accordance with applicable environmental regulations and approved by a qualified environmental consultant.

Granular Borrow: Fill to raise site grades should be sand or silty sand meeting the following gradation:

Granular Borrow	
Sieve Size	**Percent Finer by Weight**
6 inch	100
Portion Passing 3 inch Sieve	
3 inch	--
No. 40	0 to 70
No. 200	0 to 20

In our opinion, MassDOT-SSHB, Division III, M1.03.0 Gravel Borrow, Type A meets the requirements of Granular Borrow.

Structural Fill: Backfill for foundations should be clean, non-frost susceptible sand and gravel meeting the gradation requirements for Structural Fill as given below:

Structural Fill	
Sieve Size	**Percent Finer by Weight**
4 inch	100
3 inch	90 to 100
¼ inch	25 to 90
#40	0 to 30
#200	0 to 6

In our opinion, MassDOT-SSHB, Division III, M1.03.0, Gravel Borrow Type B with less than 6 percent passing the #200 sieve meets requirements of Structural Fill.

Crushed Stone: Crushed Stone, used beneath foundations and to frost-protect shallow mat foundations should be clean, washed crushed stone meeting the requirements of MassDOT-SSHB, Division III, M2.01.4, ¾-inch Crushed Stone.

Reuse of Site Soils: The non-organic on-site soils are unsuitable for reuse in BESS Yard and Substation areas.

Placement and Compaction: Fill should be placed in horizontal lifts and compacted such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. Loose lift thicknesses for grading, fill and backfill activities should

not exceed 12 inches. We recommend that fill and backfill in building and paved areas be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Crushed Stone should be compacted with 3 to 5 passes of a vibratory plate compactor having a static weight of at least 500 pounds.

4.8 Weather Considerations

Construction activity should be limited during wet and freezing weather and the site soils may require drying or thawing before construction activities may continue. The contractor should anticipate the need for water to temper fills in order to facilitate compaction during dry weather. If construction takes place during cold weather, subgrades, foundations and floor slabs must be protected during freezing conditions. Concrete and fill must not be placed on frozen soil; and once placed, the concrete and soil beneath the structure must be protected from freezing.

4.9 Roadways

We anticipate gravel roadways will be subjected primarily to service vehicle truck traffic and in the event of emergency by a fire truck. Considering the site soils, and proposed usage, we offer the following pavement section for consideration.

GRAVEL ROADWAY SECTIONS		
Material Type	**Minimum Thickness (Pick Up Truck Access)**	**Minimum Thickness (Emergency Truck Access)**
Base Course Gravel	3 inches	3 inches
Subbase Course Gravel	9 inches	15 inches

The base and subbase materials should be compacted to at least 95 percent of their maximum dry density as determined by ASTM D-1557.

4.10 Design Review and Construction Testing

S.W.COLE should be retained to review the construction documents prior to bidding to determine that our earthwork, foundation and pavement recommendations have been properly interpreted and implemented.

A construction materials testing and quality assurance program should be implemented during construction to observe compliance with the design concepts, plans, and specifications. S.W.COLE is available to observe earthwork activities, the preparation of

foundation bearing surfaces, as well as to provide testing and IBC Special Inspection services for soils, concrete, and steel construction materials.

5.0 CLOSURE

It has been a pleasure to be of assistance to you with this phase of your project. We look forward to working with you during the construction phase of the project.

Sincerely,

S. W. Cole Engineering, Inc.

Jethro Celamy, E.I.T
Project Geotechnical Engineer



Chad B Michaud, P.E.
Executive Vice President

JC:cbm

APPENDIX A

Limitations

This report has been prepared for the exclusive use of Long Road Energy for specific application to the proposed BESS and Substation on 769 Silver Street in Agawam, MA. S. W. Cole Engineering, Inc. (S.W.COLE) has endeavored to conduct our services in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

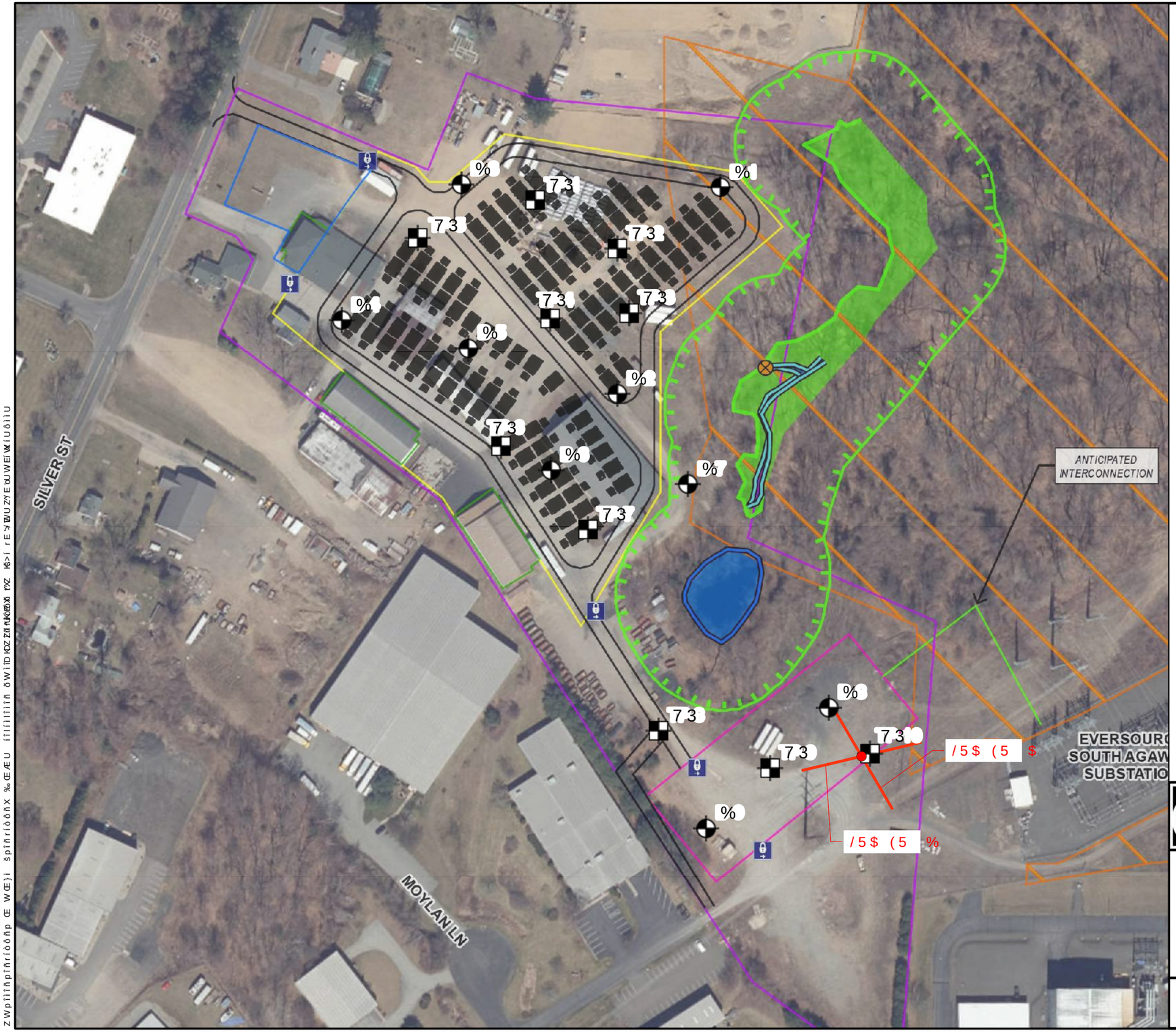
Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE's scope of services has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S.W.COLE should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S.W.COLE.

APPENDIX B

Figures



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APPENDIX C

Exploration Logs and Key

BORING LOG

CLIENT: Longroad Energy LLC
PROJECT: Proposed BESS and Substation
LOCATION: 769 Silver Street, Agawan, Massachusetts

BORING NO.: B-1
SHEET: 1 of 1
PROJECT NO. 25-1685
DATE START: 10/14/2025
DATE FINISH: 10/14/2025

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** N/A | **TOTAL DEPTH (FT):** 22.0 | **LOGGED BY:** Sean Patota
DRILLING CO.: Seaboard Drilling | **DRILLER:** Joe Nitsch | **DRILLING METHOD:** Hollow Stem Auger
RIG TYPE: Truck Mounted Mobile Drill B-53 | **AUGER ID/OD:** 2 1/4 in / 5 5/8 in | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic | **HAMMER WEIGHT (lbs):** 140 | **CASING ID/OD:** N/A /N/A | **CORE BARREL:** N/A
HAMMER CORRECTION FACTOR: | **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▽ 15 ft Saturated Soils Encountered at 15 ft
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/24	3-7-10-11			Moist, medium dense, red brown, SAND and SILT, some Gravel (Fill)		
			2D		2-4	24/14	4-11-11-9			Moist, medium dense, red brown, Gravelly SAND and SILT (Fill)		
	5		3D		5-7	24/19	8-12-12-11			Moist, medium dense, red brown, SILT and fine SAND, trace Gravel (Fill)		
	10		4D		10-12	24/22	3-3-4-4			Moist, loose, red brown, SILT and fine SAND, trace Gravel		
										11.0 Moist, loose, tan, Silty SAND		
	15		5D		15-17	24/5	5-4-7-14			Wet, medium dense, tan, SAND, trace Silt	▽	
	20		6D		20-22	24/18	3-3-4-5			Wet, loose, gray, SILT, trace fine Sand		

Bottom of Exploration at 22.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-1

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-2**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/13/2025
DATE FINISH:	10/13/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/21	3-6-6-5			Moist, medium dense, light brown and reddish, SAND, some Silt, trace Gravel		
			2D		2-4	24/18	3-4-2-3			Moist, loose, light brown, SAND, some Silt, trace Gavel		
										3.0		
	5		3D		5-7	24/14	5-4-3-4			Moist, loose, tan, SAND, some Silt		
	10		4D		10-12	24/20	2-3-3-4			Wet, loose, tan, SAND, some Silt	▽	
	15		5D		15-17	24/24	3-4-5-4			Wet, loose, tan, SAND, trace Silt		
	20		6D		20-22	24/19	3-3-3-5			20.0 Wet, loose, gray, SILT and fine SAND		

Bottom of Exploration at 22.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-2**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-3**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/13/2025
DATE FINISH:	10/13/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:

Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling

D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear

Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot

WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector

S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/20	4-3-4-3			Moist, loose, light brown, Silty medium to fine SAND (Subsoil)		
			2D		2-4	24/20	4-4-4-4			Moist, loose, light brown, Silty SAND		
										3.0		
	5		3D		5-7	24/18	3-2-3-4			Moist, loose, tan, Silty SAND		
	10		4D		10-12	24/14	2-2-2-1			10.0 Wet, very loose, tan, SILT, trace fine Sand	▽	
	15		5D		15-17	24/19	2-3-4-3			Wet, loose, tan Silty SAND		
	20		6D		20-22	24/12	11-7-6-7			Wet, medium dense, tan SAND, some Silt		
										Bottom of Exploration at 22.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-3**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-4**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/13/2025
DATE FINISH:	10/13/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0.25-2.3	24/16	7-8-7-7			Moist, medium dense, light brown, SAND, some Silt (Subsoil)		
			2D		2-4	24/16	5-5-4-5			Moist, loose, light brown, SAND, some Silt		
										3.0		
	5		3D		5-7	24/15	3-3-4-4			Moist, loose, tan, SAND, trace Silt		
	10		4D		10-12	24/20	5-7-8-11			10.0 Wet, medium dense, grayish tan, SILT and SAND	▽	
	15		5D		15-17	24/14	4-5-6-6			Wet, medium dense, grayish tan, SILT, some Sand		
	20		6D		20-22	24/13	2-2-3-3			Wet, loose, grayish tan, SILT, some Sand		
										Bottom of Exploration at 22.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-4**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-5**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/13/2025
DATE FINISH:	10/13/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:

Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling

D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear

Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot

WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector

S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/12	5-3-5-5			Moist, loose, light brown, Silty SAND, trace Gravel (Subsoil)		
			2D		2-4	24/18	3-4-3-3			Moist, loose, light brown, Silty SAND		
										3.0		
	5		3D		5-7	24/0	12-13-13-13			No recovery		
	10		4D		10-12	24/17	4-1-2-2			10.0 Wet, very loose, brown, SILT and fine SAND	▽	
	15		5D		15-17	24/13	2-3-2-3			Wet, loose, grayish brown, SILT and fine SAND		
	20		6D		20-22	24	2-2-2-2			Wet, very loose, grayish brown, SILT, some fine Sand		
										Bottom of Exploration at 22.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-5**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-6**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/13/2025
DATE FINISH:	10/13/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24	5-6-6-6			Moist, medium dense, brown, Silty SAND, trace Gravel		
			2D		2-4	24	5-5-5-5			2.0 Moist, loose, tan, SAND, some Silt		
	5		3D		5-7	24/18	3-3-3-4			Moist, loose, tan, Silty SAND, trace Gravel		
	10		4D		10-12	24/24	2-1-1-1			Wet, very loose, tann, SILT and SAND	▽	
	15		5D		15-17	24/20	4-6-6-7			15.0 Wet, medium dense, gray, SILT and SAND		
	20		6D		20-22	24/17	2-3-7-12			Wet, loose, gray, SILT and SAND		

Bottom of Exploration at 22.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-6**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-7**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/14/2025
DATE FINISH:	10/14/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/14	3-4-4-4			Moist, loose, dark brown Silty SAND, some gravel (Subsoil)		
			2D		2-4	24/16	4-4-3-3			Moist, loose, light brown, Silty SAND, some gravel (Subsoil)		
										3.0		
	5		3D		5-7	24/18	2-2-2-3			Moist, very loose, tan, SAND, trace Silt		
	10		4D		10-12	24/20	3-2-1-2			10.0 Wet, very loose, tan SAND, trace Silt	▽	
	15		5D		15-17	24/19	1-1-2-5			Wet, very loose, tan SAND, trace Silt		
	20		6D		20-22	24/10	3-2-1-3			20.0 Wet, very loose, gray, Silty SAND		
										Bottom of Exploration at 22.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-7**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-8**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/14/2025
DATE FINISH:	10/14/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/16	10-10-9-9			0.5 Moist, medium dense, black, Silty SAND, some Gravel		
										Moist, medium dense, tan, Silty SAND		
			2D		2-4	24/16	8-8-8-7			Moist, medium dense, tan, SAND, some Silt, trace Gravel		
	5		3D		5-7	24/17	2-3-3-4			Moist, loose, tan, SAND, trace Silt		
	10		4D		10-12	24/15	3-6-10-13			10.0 Wet, medium dense, grayish tan, Sandy SILT	▽	
	15		5D		15-17	24/12	4-2-4-3			Wet, loose, gray, SILT and SAND		
	20		6D		20-22	24/16	5-3-5-4			Wet, loose, gray, SILT, some Sand		
										Bottom of Exploration at 22.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-8**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

BORING LOG

CLIENT:	Longroad Energy LLC
PROJECT:	Proposed BESS and Substation
LOCATION:	769 Silver Street, Agawan, Massachusetts

BORING NO.:	**B-9**
SHEET:	1 of 1
PROJECT NO.	25-1685
DATE START:	10/14/2025
DATE FINISH:	10/14/2025

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Sean Patota

DRILLING CO.: Seaboard Drilling **DRILLER:** Joe Nitsch **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Truck Mounted Mobile Drill B-53 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A

HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 10 ft Saturated Soils Encountered at 10 ft

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/20	3-4-5-5			Moist, loose, brown and light brown, Silty SAND (Subsoil)		
			2D		2-4	24/18	4-4-4-4			2.0 Moist, loose, tan, Silty SAND		
	5		3D		5-7	24/20	2-2-2-3			Moist, very loose, tan, Silty SAND		
	10		4D		10-12	24/24	2-2-2-2			10.0 Wet, very loose, tan, SAND, trace Silt	▽	
	15		5D		15-17	24/24	4-3-3-4			Wet, loose, tan, SAND, trace Silt		
	20		6D		20-22	24/12	7-8-7-8			20.0 Wet, medium dense, gray, SILT and SAND		

Bottom of Exploration at 22.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-9**

BORING / WELL 10-12-2022 25-1685.GPJ SWCE TEMPLATE.GDT 12/15/25

TEST PIT LOGS

CLIENT: Longroad Energy LLC
PROJECT: Proposed BESS and Substation
LOCATION: 769 Silver Street, Agawan, Massachusetts

PROJECT NO.: 25-1685
LOGGED BY: Cassie Stelmash
CONTRACTOR: Seaboard Drilling
EQUIPMENT: Komat'su PC40MR Excavator

TEST PIT TP- 1

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		0.5 Moist, brown, fine GRAVEL, some Sand, some Silt Moist, tan, SAND, some Gravel, trace Silt					
		1.5 Moist, tan, SAND, trace Silt					
5		5.0 Moist, tan, Silty SAND					
		7.0 Moist, tan, Sandy SILT					
		9.0 Wet, light tan, Sandy SILT	9				
10		Bottom of Exploration at 10.0 feet					

TEST PIT TP- 2

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, brown, fine GRAVEL, some Sand, some Silt					
		1.0 Moist, tan, silty SAND, trace fine Gravel					
5		5.0 Moist, light tan, silty SAND					
		9.0 Wet, light tan, silty SAND	▽ 9				
10		Bottom of Exploration at 10.0 feet					

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

KEY TO NOTES AND SYMBOLS:

Water Level
▽ At time of Digging
▼ At Completion of Digging
▼ After Digging

q_p = Pocket Penetrometer Strength, kips/sq.ft.

TEST PIT 25-1685 TP.GPJ SWCE TEMPLATE.GDT 12/15/25

TEST PIT LOGS

CLIENT: Longroad Energy LLC
PROJECT: Proposed BESS and Substation
LOCATION: 769 Silver Street, Agawan, Massachusetts

PROJECT NO.: 25-1685
LOGGED BY: Cassie Stelmash
CONTRACTOR: Seaboard Drilling
EQUIPMENT: Komat'su PC40MR Excavator

TEST PIT TP- 3

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 10' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, browm fine GRAVEL, some Sand, some Silt, trace Organics					
		1.5 Moist, reddish brown, fine GRAVEL (FILL)					
5		5.5 Moist, light brown, Silty SAND, some Gravel					
		9.0 Moist, brown, coarse SAND, trace Silt					
10			▽ 10				

Bottom of Exploration at 10.0 feet

TEST PIT TP- 4

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, brown, fine GRAVEL, some sand, some silt, some organics					
		1.0 Moist, tan, Silty SAND, some Gravel					
		3.0 Moist, tan, Sandy SILT					
5		6.5 Moist, greyish tan, Sandy SILT					
		9.0 Wet, greyish tan, Sandy SILT	▽ 9				
10							

Bottom of Exploration at 10.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

KEY TO NOTES AND SYMBOLS:

Water Level
▽ At time of Digging
▼ At Completion of Digging
▼ After Digging

q_p = Pocket Penetrometer Strength, kips/sq.ft.

TEST PIT 25-1685 TP.GPJ SWCE TEMPLATE.GDT 12/15/25

TEST PIT LOGS

CLIENT: Longroad Energy LLC
PROJECT: Proposed BESS and Substation
LOCATION: 769 Silver Street, Agawan, Massachusetts

PROJECT NO.: 25-1685
LOGGED BY: Cassie Stelmash
CONTRACTOR: Seaboard Drilling
EQUIPMENT: Komat'su PC40MR Excavator

TEST PIT TP- 5

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observed at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, tannish brown, silty SAND, some Organics					
		1.0 Moist, dark tan, coarse Sand, some Silt, trace Organics					
		3.0 Moist, tan, Silty SAND					
5							
		8.0 Moist, tan, Silty SAND, trace Organics					
		9.0 Wet, tan, Silty SAND, trace Organics	▽ 9				
10		Bottom of Exploration at 10.0 feet					

TEST PIT TP- 6

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils not Encountered **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, reddish brown, GRAVEL, some Sand, trace Silt, trace Organics					
		1.5 Moist, tan, course Sand, some Silt					
5		5.0 Moist, light tan, Silty SAND					
10		Bottom of Exploration at 10.0 feet					

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

KEY TO NOTES AND SYMBOLS:

Water Level
▽ At time of Digging
▼ At Completion of Digging
▼ After Digging

q_p = Pocket Penetrometer Strength, kips/sq.ft.

TEST PIT 25-1685 TP.GPJ SWCE TEMPLATE.GDT 12/15/25

TEST PIT LOGS

CLIENT: Longroad Energy LLC
PROJECT: Proposed BESS and Substation
LOCATION: 769 Silver Street, Agawan, Massachusetts

PROJECT NO.: 25-1685
LOGGED BY: Cassie Stelmash
CONTRACTOR: Seaboard Drilling
EQUIPMENT: Komat'su PC40MR Excavator

TEST PIT TP- 7

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, dark brown, fine GRAVEL, some Sand, some Silt, trace Organics					
		1.5 Moist, tan, Silty SAND					
		3.5 Moist, tan, Sandy SILT					
5							
		9.0 Wet, greyish tan, Sandy SILT	▽ 9				
10		Bottom of Exploration at 10.0 feet					

TEST PIT TP- 8

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, brown, Silty SAND, some Gravel, some Organics (TOPSOIL)					
		0.5 Moist, tan, Silty SAND					
		1.5 Moist, tan., coarse SAND, some Silt					
5							
		9.0 Wet, tan, course SAND, some Silt	▽ 9				
10		Bottom of Exploration at 10.0 feet					

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

KEY TO NOTES AND SYMBOLS:

Water Level
▽ At time of Digging
▼ At Completion of Digging
▼ After Digging

q_p = Pocket Penetrometer Strength, kips/sq.ft.

TEST PIT 25-1685 TP.GPJ SWCE TEMPLATE.GDT 12/15/25

TEST PIT LOGS

CLIENT: Longroad Energy LLC
PROJECT: Proposed BESS and Substation
LOCATION: 769 Silver Street, Agawan, Massachusetts

PROJECT NO.: 25-1685
LOGGED BY: Cassie Stelmash
CONTRACTOR: Seaboard Drilling
EQUIPMENT: Komat'su PC40MR Excavator

TEST PIT TP- 9

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils observated at 9' **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		0.2 Moist, Brown, silty SAND and Gravel, some Organics (TOPSOIL)					
		Moist, tan, Silty SAND with Gravel, trace Organics					
		1.5 Moist, tan, coarse SAND, some Silt					
5		5.0 Moist, ligth tan, coarse SAND, some Silt					
		6.0 Moist, light tan, Sandy SILT					
		9.0 Wet, light tan, Sandy SILT	▽ 9				
10		Bottom of Exploration at 10.0 feet					

TEST PIT TP-10

DATE: 10/13/2025 **LOCATION:** See Exploration Location Plan **SURFACE ELEVATION (FT):** N/A **COMPLETION DEPTH (FT):** 10.0
WATER LEVEL DEPTHS (FT): Saturated Soils not Encountered **REMARKS:**

Depth (feet)	Graphic Log	Stratum Description	H_20 Depth	Sample No.	Type	Sample Depth (ft)	Field / Lab Test Data
		Moist, brown, GRAVEL, some Sand, some Silt, trace Organics (TOPSOIL)					
		1.5 Moist, brown, GRAVEL, some Sand, some Silt,					
		2.5 Moist, brown, Silty SAND, trace Gravel					
		3.0 Moist, tan, Sandy SILT					
5							
		9.0 Moist, loose, tan, SILT with SAND					
10		Bottom of Exploration at 10.0 feet					

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

KEY TO NOTES AND SYMBOLS:
Water Level
▽ At time of Digging
▼ At Completion of Digging
▼ After Digging

q_p = Pocket Penetrometer Strength, kips/sq.ft.

TEST PIT 25-1685 TP.GPJ SWCE TEMPLATE.GDT 12/15/25

KEY TO NOTES & SYMBOLS

Test Boring and Test Pit Explorations

Stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q_u	-	unconfined compressive strength, kips/sq. ft. - laboratory test
S_v	-	field vane shear strength, kips/sq. ft.
L_v	-	lab vane shear strength, kips/sq. ft.
q_p	-	unconfined compressive strength, kips/sq. ft. – pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W_L	-	liquid limit - Atterberg test
W_P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass.
γ_T	-	total soil weight
γ_B	-	buoyant soil weight

Description of Proportions:

Trace:	0 to 5%
Some:	5 to 12%
"Y"	12 to 35%
And	35+%
With	Undifferentiated

Description of Stratified Soils

Parting:	0 to 1/16" thickness
Seam:	1/16" to 1/2" thickness
Layer:	½" to 12" thickness
Varved:	Alternating seams or layers
Occasional:	one or less per foot of thickness
Frequent:	more than one per foot of thickness

REFUSAL: **Test Boring Explorations** - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: **Test Pit Explorations** - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.

APPENDIX D

Laboratory Test Results

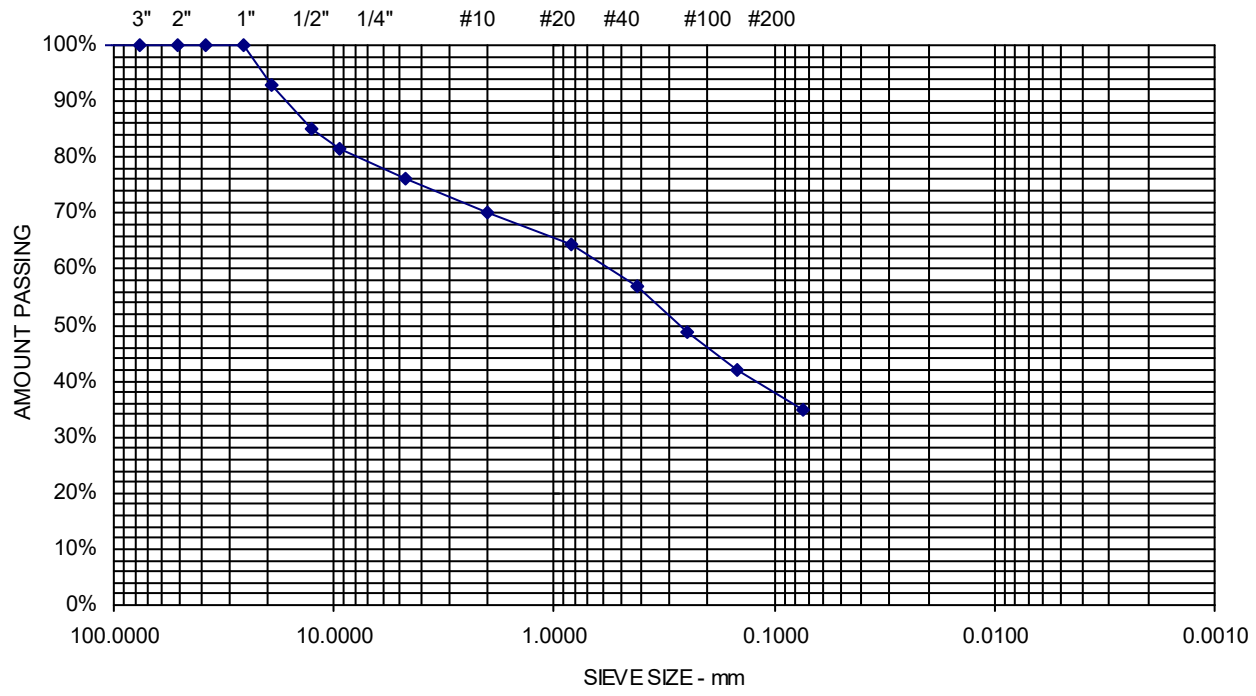
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	AGAWAM MA - BESS AND SUBSTATION - GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	2526R
		Date Received	10/28/2025
		Date Completed	10/29/2025
Material Source	**B-1 2D 2'-4'**	Tested By	SEAN PATOTA

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**93**	
12.5 mm	**1/2"**	**85**	
9.5 mm	**3/8"**	**82**	
4.75 mm	**No. 4**	**76**	23.8% Gravel
2.00 mm	**No. 10**	**70**	
850 um	**No. 20**	**64**	
425 um	**No. 40**	**57**	41.4% Sand
250 um	**No. 60**	**49**	
150 um	**No. 100**	**42**	
75 um	**No. 200**	**34.8**	34.8% Fines



Comments: MC = 9.31%

Sheet

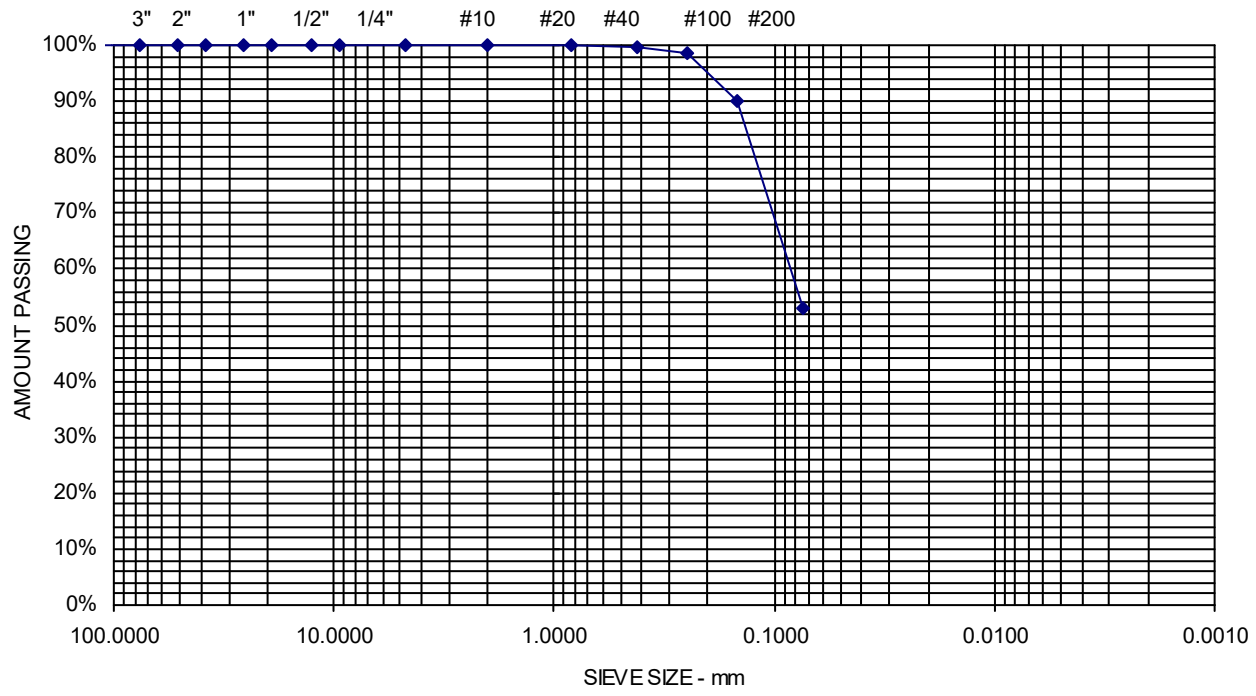
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	AGAWAM MA - BESS AND SUBSTATION - GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	2527R
		Date Received	10/28/2025
		Date Completed	10/29/2025
Material Source	**B-6 4D 10'-12'**	Tested By	SEAN PATOTA

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	47.1% Sand
250 um	**No. 60**	**99**	
150 um	**No. 100**	**90**	
75 um	**No. 200**	**52.9**	52.9% Fines



Comments: MC = 36.13%

Sheet

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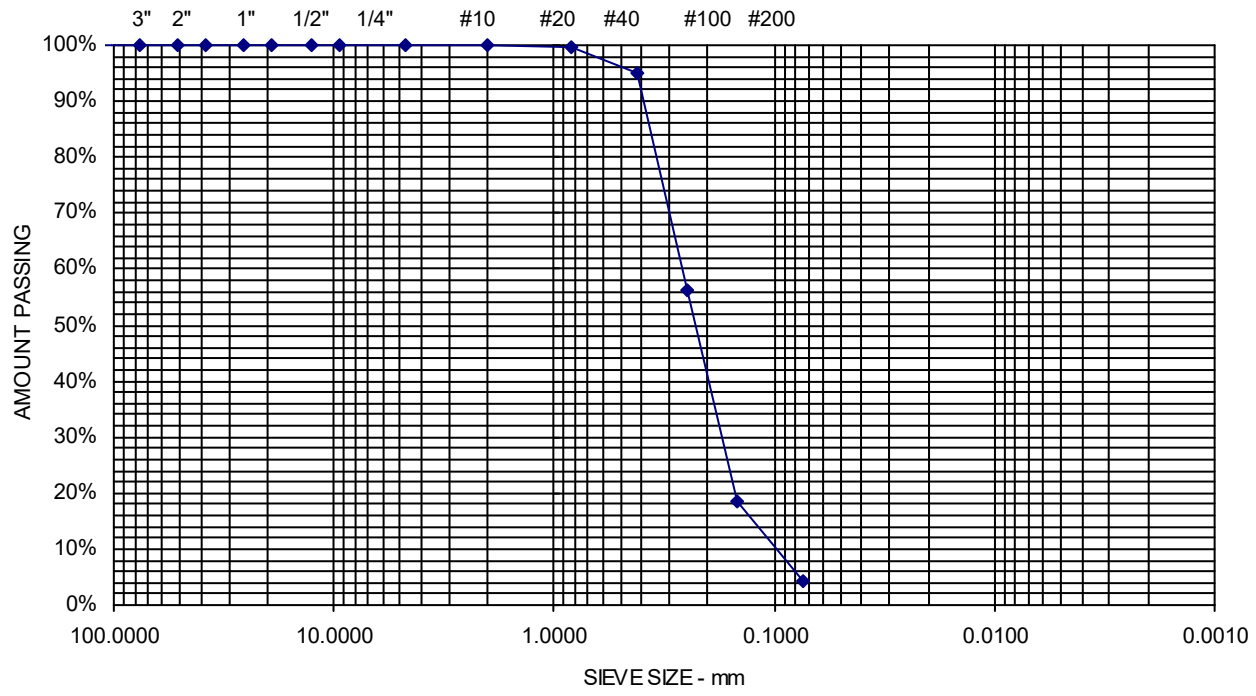
Report of Gradation

ASTM C-117 & C-136

Project Name	AGAWAM MA - BESS AND SUBSTATION - GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	2528R
		Date Received	10/28/2025
		Date Completed	10/29/2025
Material Source	**B-8 3D 5'-7'**	Tested By	SEAN PATOTA

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**95**	95.8% Sand
250 um	**No. 60**	**56**	
150 um	**No. 100**	**18**	
75 um	**No. 200**	**4.2**	4.2% Fines



Comments: MC = 6.24%

Sheet

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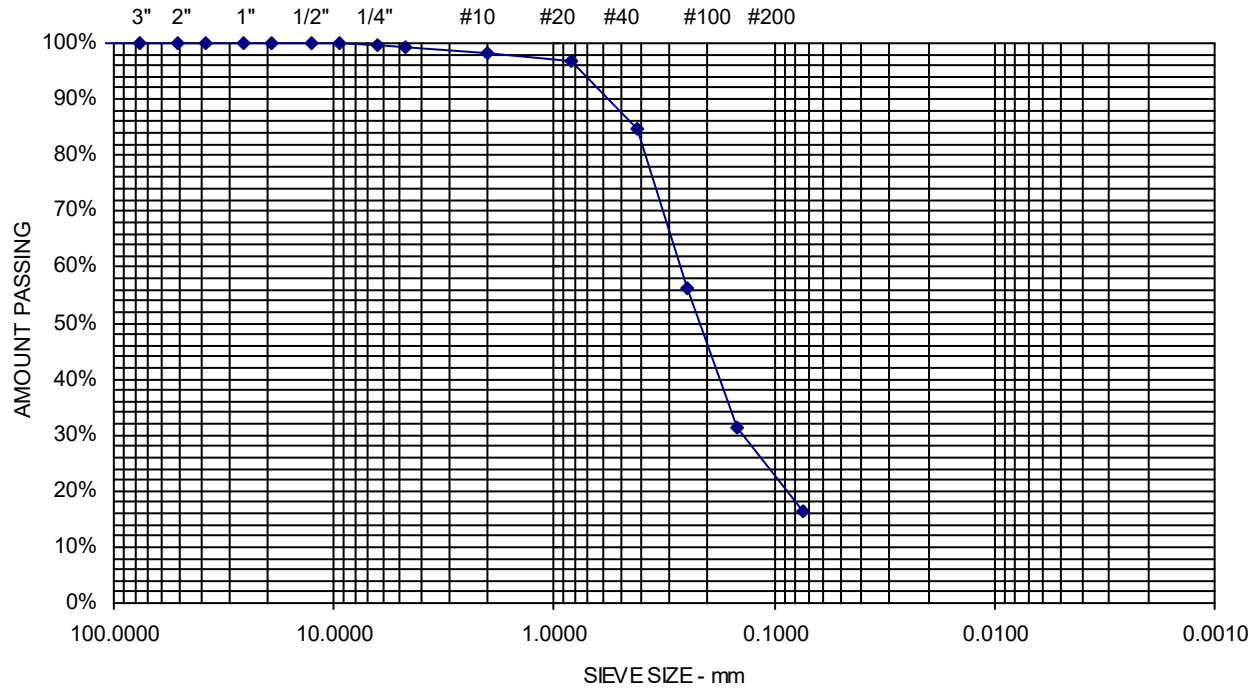
Report of Gradation

ASTM C-117 & C-136

Project Name	AGAWAM MA - BESS AND SUBSTATION - EXPLORATIONS AND GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	9857M
		Date Received	11/5/2025
		Date Completed	11/11/2025
Material Source	**TP4 1.5'**	Tested By	ELIZABETH HALSTEAD

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**99**	0.7% Gravel
2.00 mm	**No. 10**	**98**	
850 um	**No. 20**	**97**	
425 um	**No. 40**	**85**	83.1% Sand
250 um	**No. 60**	**56**	
150 um	**No. 100**	**31**	
75 um	**No. 200**	**16.2**	16.2% Fines



Comments:

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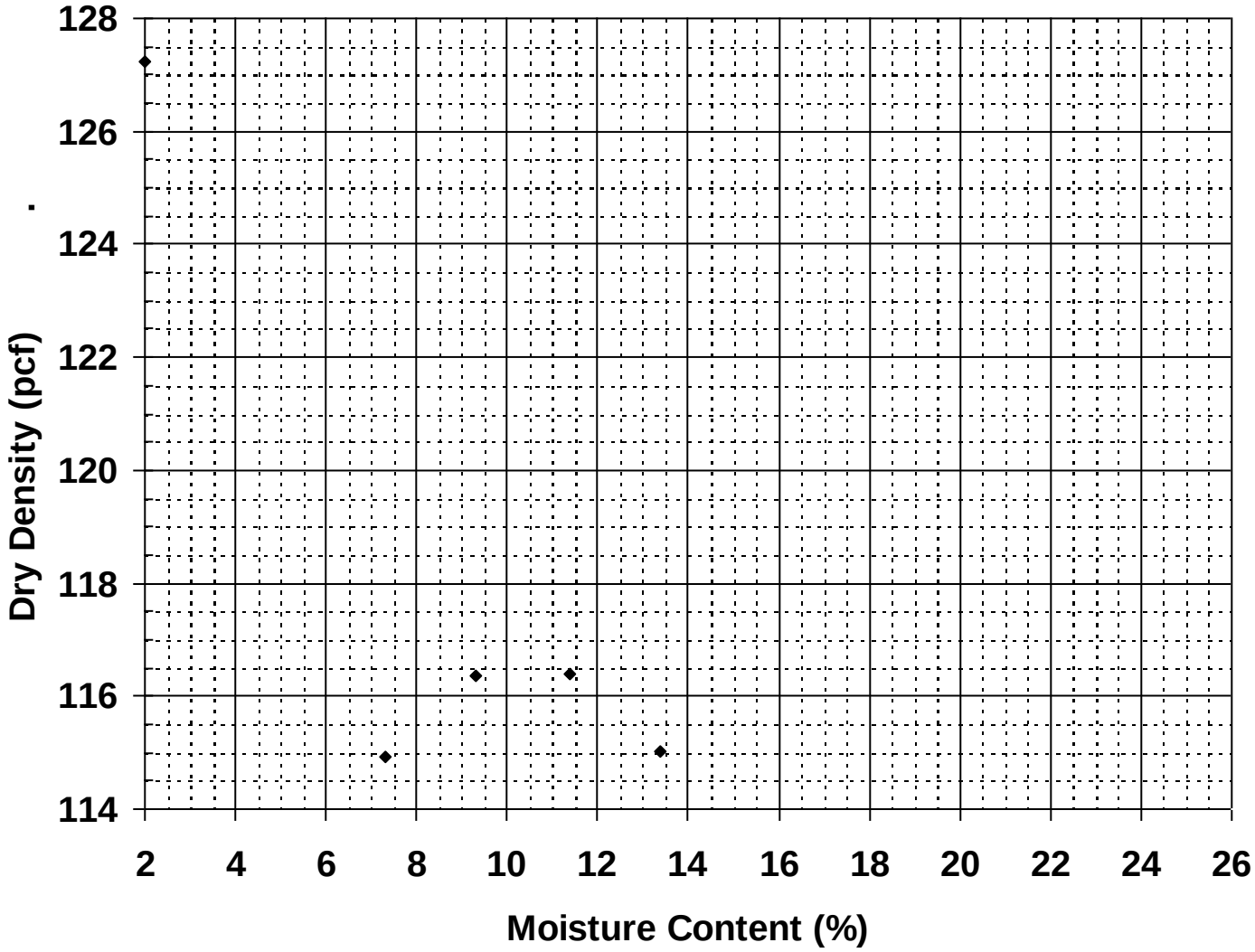
S.W.COLE ENGINEERING, INC.

Report of Moisture-Density

Method ASTM D-1557 MODIFIED Procedure A

Project Name	AGAWAM MA - BESS AND SUBSTATION - EXPLORATIONS AND GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	9857M
Material Type	SOIL	Date Received	11/5/2025
Material Source	TP4 1.5'	Date Completed	11/13/2025
		Tested By	ELIZABETH HALSTEAD

Moisture-Density Relationship Curve



Maximum Dry Density (pcf)	116.8
Optimum Moisture Content (%)	10.4
Percent Oversized	0.7%

Corrected Dry Density (pcf)	**117**
Corrected Moisture Content (%)	**10.3**

Comments

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S.W.COLE ENGINEERING, INC.

Report of Thermal Resistivity
Dryout Curve

Project Name:	BESS and Substation	**Project Number:**	25-1685
Project Location:	Agawam, MA	**Lab ID:**	9857M
Client:	Longroad Energy Management, LLC	**Date Received:**	11/5/2025
Material Description:	Soil	**Date Completed:**	11/18/2025
Material Source:	TP4 1.5'	**Test By:**	D. Jack

Thermal properties were tested, per customers request, at optimum moisture content of 10.4% and at 95% compaction per ASTM Standard D1557. The thermal tests were conducted using the IEEE Standard 442-2017.

Sample Information

Sample ID

TP4 1.5'

Sample Description

Soil

Dry Bulk Density (lb/ft³)

116.8

Moisture Content (%)

10.4

Thermal properties

Thermal resistivity (°C-cm/W)

Wet	48
Dry	212

Dryout Resistivity curve was created utilizing the data on this report.
Please contact us with any questions related to the report or its contents.

Reviewed by: Richard Smith
Richard Smith

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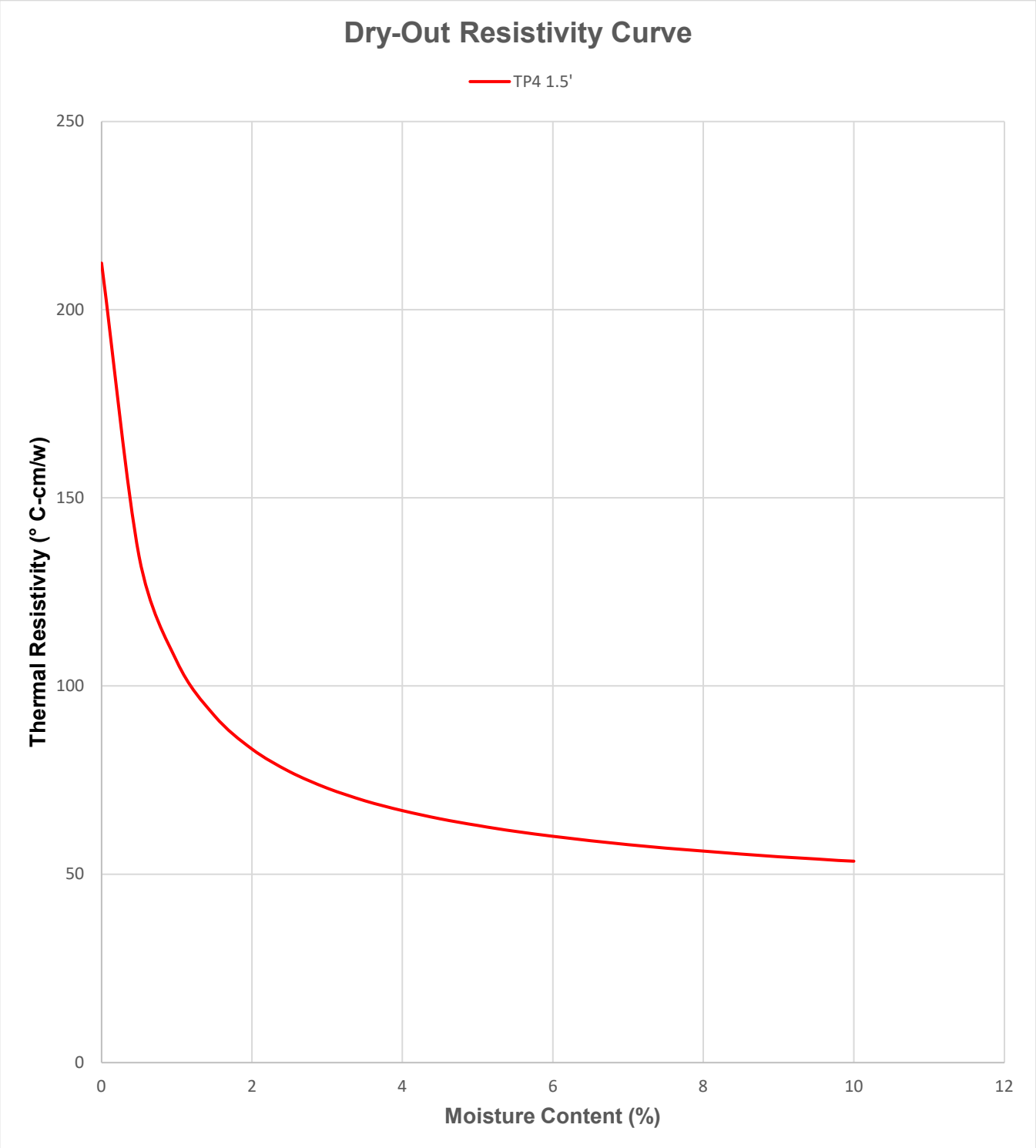
S.W.COLE ENGINEERING, INC.

Project Number: 25-1685
Lab ID: 9857M



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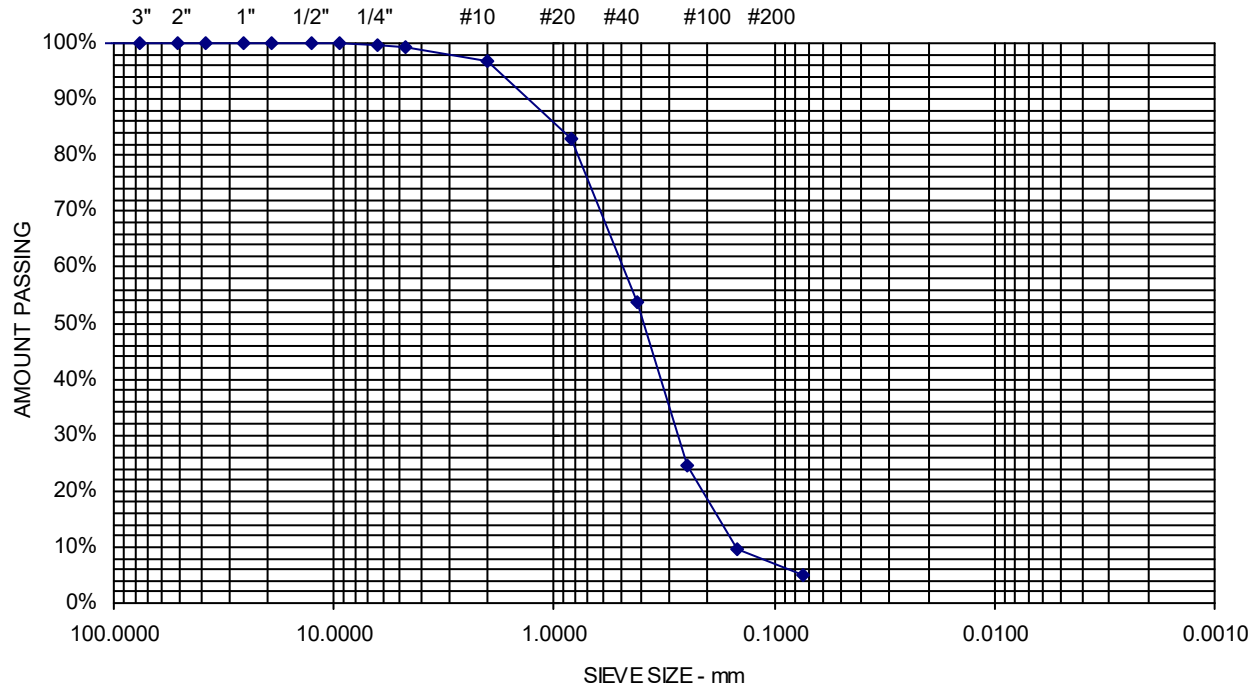
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	AGAWAM MA - BESS AND SUBSTATION - EXPLORATIONS AND GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	9858M
		Date Received	11/5/2025
		Date Completed	11/12/2025
Material Source	**TP9 1.5'**	Tested By	ELIZABETH HALSTEAD

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**99**	
4.75 mm	**No. 4**	**99**	0.9% Gravel
2.00 mm	**No. 10**	**97**	
850 um	**No. 20**	**83**	
425 um	**No. 40**	**54**	94.1% Sand
250 um	**No. 60**	**25**	
150 um	**No. 100**	**10**	
75 um	**No. 200**	**5.0**	5% Fines



Comments:

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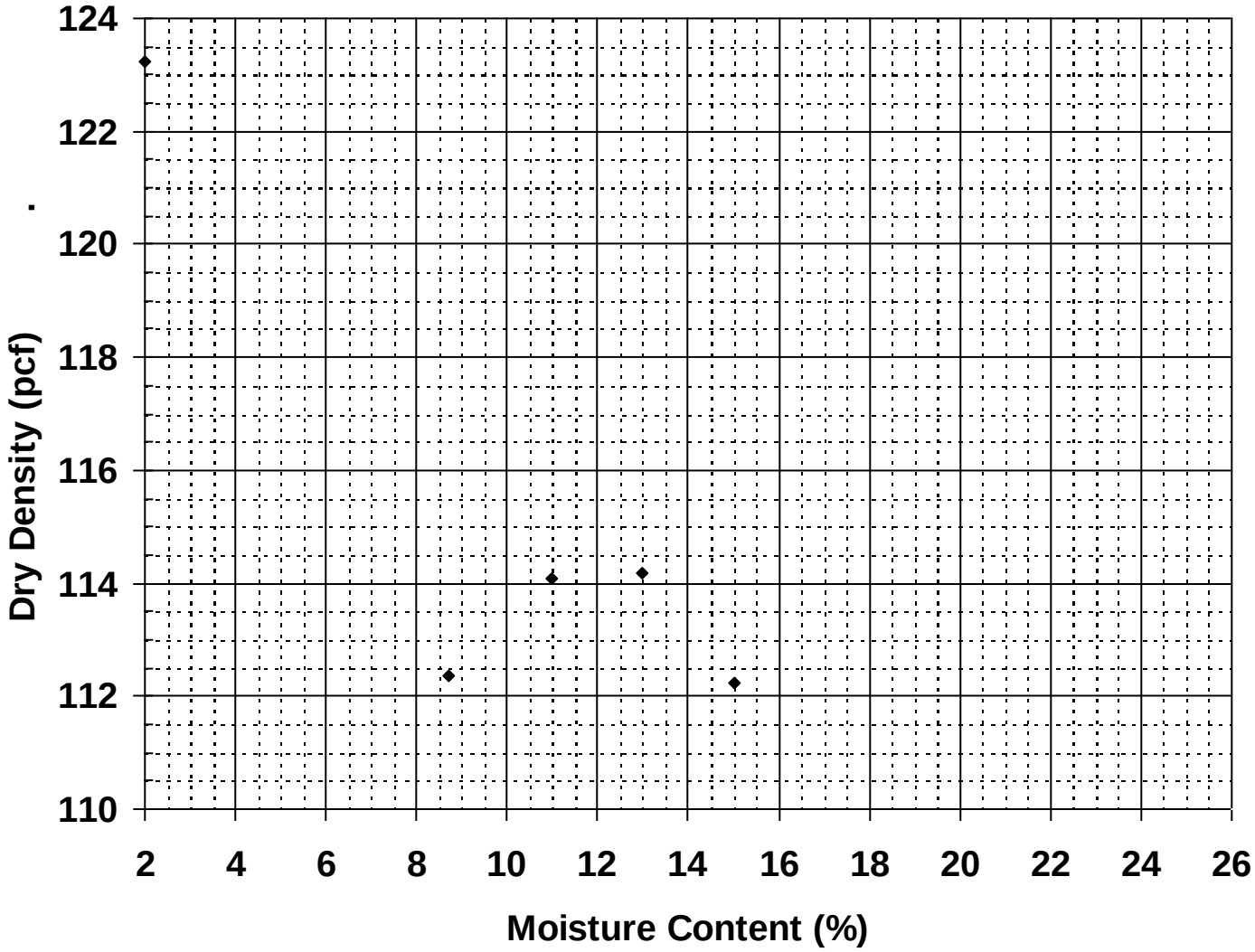
S.W.COLE ENGINEERING, INC.

Report of Moisture-Density

Method ASTM D-1557 MODIFIED Procedure A

Project Name	AGAWAM MA - BESS AND SUBSTATION - EXPLORATIONS AND GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-1685
Client	LONGROAD ENERGY MANAGEMENT, LLC	Lab ID	9858M
Material Type	SOIL	Date Received	11/5/2025
Material Source	TP9 1.5'	Date Completed	11/14/2025
		Tested By	ELIZABETH HALSTEAD

Moisture-Density Relationship Curve



Maximum Dry Density (pcf)	114.6
Optimum Moisture Content (%)	12.1
Percent Oversized	0.9%

Corrected Dry Density (pcf)	**114.9**
Corrected Moisture Content (%)	**12.0**

Comments

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S.W.COLE ENGINEERING, INC.

Report of Thermal Resistivity
Dryout Curve

Project Name:	BESS and Substation	**Project Number:**	25-1685
Project Location:	Agawam, MA	**Lab ID:**	9858M
Client:	Longroad Energy Management, LLC	**Date Received:**	11/5/2025
Material Description:	Soil	**Date Completed:**	11/18/2025
Material Source:	TP9 1.5'	**Test By:**	D. Jack

Thermal properties were tested, per customers request, at optimum moisture content of 12.1% and at 95% compaction per ASTM Standard D1557. The thermal tests were conducted using the IEEE Standard 442-2017.

Sample Information

Sample ID

TP9 1.5'

Sample Description

Soil

Dry Bulk Density (lb/ft³)

114.6

Moisture Content (%)

12.1

Thermal properties

Thermal resistivity (°C-cm/W)

Wet	54
Dry	217

Dryout Resistivity curve was created utilizing the data on this report.
Please contact us with any questions related to the report or its contents.

Reviewed by: Richard Smith
Richard Smith

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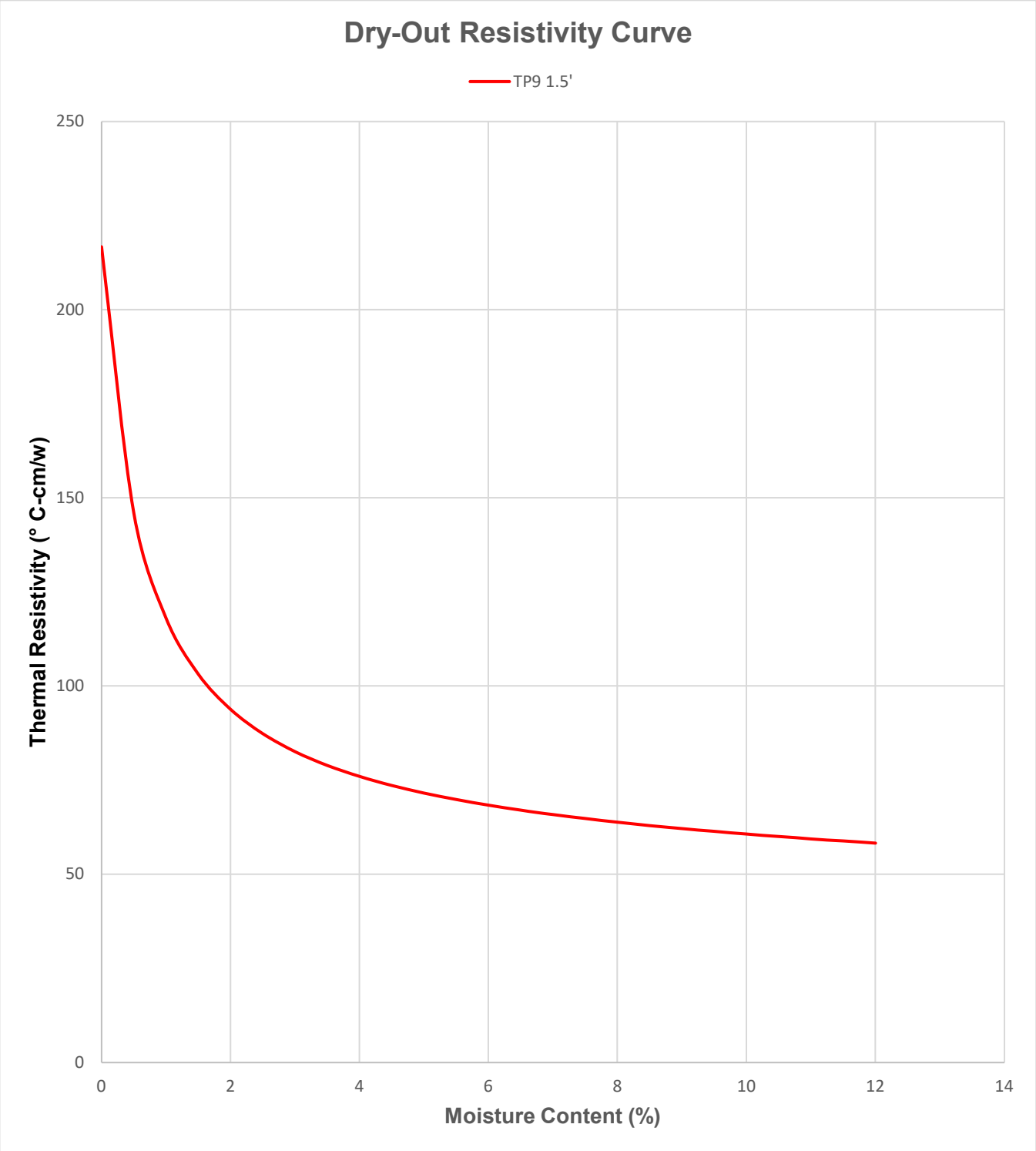
Project Number: 25-1685
Lab ID: 9858M



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SW COLE ENGINEERING INCORPORATED
227 WAMPANOG TRAIL
RIVERSIDE RI 02915-2211
USA

Analysis No.	TS-A2513211
Report Date	30 October 2025
Date Sampled	21 October 2025
Date Received	27 October 2025
Where Sampled	Riverside, RI USA
Sampled By	Client

This is to attest that we have examined: Soils, Project: Long Road Energy – Agawam, MA BESS and Substation; Site Location: 769 Silver Street Agawam, MA; Job Number: 25-1685

When examined to the applicable requirements of:

ASTM D 1411–09*	"Standard Test Methods for Water-Soluble Chlorides Present as Admixtures in Graded Aggregate Road Mixes" Method A
ASTM D 516-22	"Standard Test Method for Sulfate Ion in Water"
ASTM D 4658-15	"Standard Test Method for Sulfide Ion in Water"
ASTM G 51-23	"Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing"
ASTM G 200-20	"Standard Test Method for Measurement of Oxidation-Reduction Potential (ORP) of Soil"
ASTM G 187–18	"Standard Test Method for Measurement of Soil Resistivity Using the Two-Electrode Soil Box Method"
EPA/600/4-90/027F	"Alkalinity Method 310.1"

Results:

ASTM D 1411 – Chloride Method A

Sample		Results		Detection Limit
		ppm (mg/kg)	%[1]	
TP-3		105.	0.0105	10.
– — –	2'			
TP-5		78.	0.0078	
– — –	2'			
TP-7		82.	0.0082	
– — –	2'			
TP-8		77.	0.0077	
– — –	2'			
TP-10		82.	0.0082	
– — –	2'			

NOTE: [1]Percent by weight after drying and prepared as per the Standard. *Withdrawn 2018

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CERTIFICATE OF ANALYSIS

ASTM D 516 – Sulfates (Soluble)

Sample		Results		Detection Limit
		ppm (mg/kg)	%[1]	
TP-3		< 10.	< 0.0010	10.
– — –	2’			
TP-5		< 10.	< 0.0010	
– — –	2’			
TP-7		< 10.	< 0.0010	
– — –	2’			
TP-8		< 10.	< 0.0010	
– — –	2’			
TP-10		< 10.	< 0.0010	
– — –	2’			

NOTE: [1]Percent by weight after drying and prepared as per the Standard.

ASTM D 4658 – Sulfide

Sample		Results		Detection Limit
		ppb (µg/kg)	%[1]	
TP-3		< 10.	< 0.0000010	10.
– — –	2’			
TP-5		10.	0.0000010	
– — –	2’			
TP-7		160.	0.0000160	
– — –	2’			
TP-8		< 10.	< 0.0000010	
– — –	2’			
TP-10		170.	0.0000170	
– — –	2’			

NOTE: [1]Percent by weight after drying and prepared as per the Standard.

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ASTM G 51 – pH

Sample		Results	Detection Limit
TP-3		5.85	0.01
– — –	2’		
TP-5		5.76	
– — –	2’		
TP-7		5.78	
– — –	2’		
TP-8		5.79	
– — –	2’		
TP-10		5.47	
– — –	2’		

NOTE: Prepared as per the Standard.

ASTM G 200 – Reduction Oxidation Potential (REDOX)

Sample		Results	Detection Limit
TP-3		85.9 @ 20.1 ºC	0.1mV
– — –	2’		
TP-5		121.9 @ 20.3 ºC	
– — –	2’		
TP-7		125.0 @ 20.5 ºC	
– — –	2’		
TP-8		126.7 @ 20.5 ºC	
– — –	2’		
TP-10		126.0 @ 20.4 ºC	
– — –	2’		

NOTE: Prepared as per the Standard.

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CERTIFICATE OF ANALYSIS

ASTM G 187 – Resistivity (Saturated using Soil Box)

Sample		Results	
		ohms-cm	mho/cm
TP-3		8 700	0.000114
– — –	2’		
TP-5		79 200	0.0000126
– — –	2’		
TP-7		51 000	0.0000196
– — –	2’		
TP-8		100 600	0.00000993
– — –	2’		
TP-10		41 700	0.0000240
– — –	2’		

NOTE: Prepared as per the Standard.

EPA Method 310.1 – Alkalinity

Sample		Results		Detection Limit
		ppm (mg/kg)	%[1]	
TP-3		233.	0.0233	10.
– — –	2’			
TP-5		636.	0.0636	
– — –	2’			
TP-7		115.	0.0115	
– — –	2’			
TP-8		101.	0.0101	
– — –	2’			
TP-10		118.	0.0118	
– — –	2’			

NOTE: [1]Percent by weight after drying and prepared as per the Standard.

END OF ANALYSIS

USEPA Laboratory ID UT00930



Merrill Gee P.E. – Engineer in Charge

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APPENDIX E

Resistivity Test Data Sheet

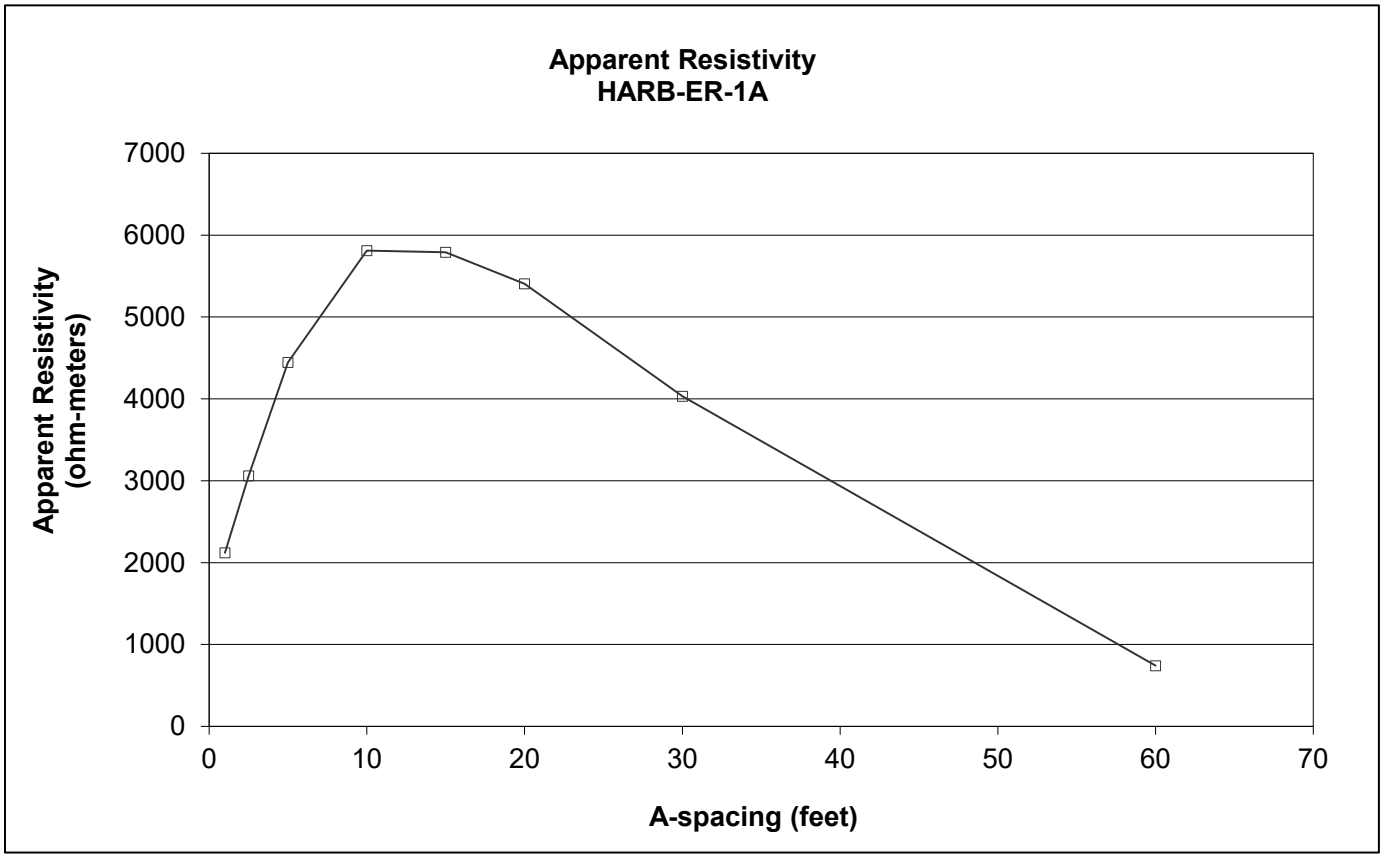
S.W.COLE ENGINEERING & CONSULTING, P.C.

RESISTIVITY COMPUTATION DATA SHEET
Wenner Configuration
Fixed Center

Project #: 25-1685
Site: 769 Silver Street Agawam, MA
Spread No.: LRA-ER-1A
Orientation: 343N

Date: 10/17/2025
Mid point GPS Coordinates: See Exploration Location Plan
Instrument: AGI SuperSting R1

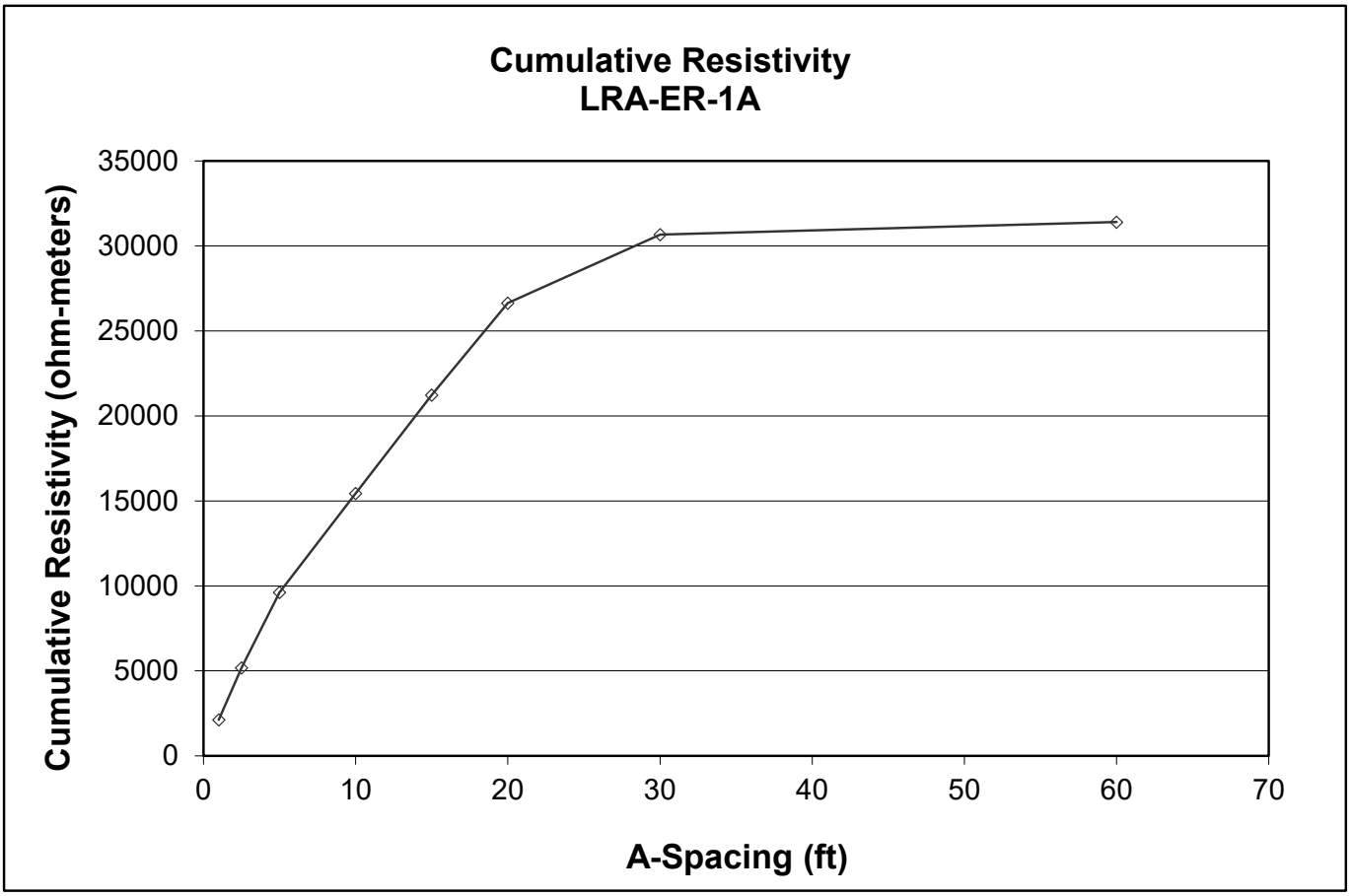
A - Spacing (distance-feet)	A/2 ft	A+A/2 ft	I mA	V mV	Resistance (v/I) Ω	Apparent Resistivity (ohm-meters)	% Error
1	0.5	1.5	3.8	1292	337.4	2120	0.0
2.5	1.3	3.8	2.3	397	194.8	3060	0.1
5	2.5	7.5	2.0	276	141.5	4445	0.0
10	5.0	15.0	8.3	770	92.5	5811	0.0
15	7.5	22.5	6.8	417	61.5	5792	0.0
20	10.0	30.0	7.9	338	43.0	5407	0.0
30	15.0	45.0	4	85	21.4	4032	0.0
60	30.0	90.0	2	4	2.0	742	0.4



Cumulative Resistivity Sheet

LRA-ER-1A

A - Spacing (distance-feet)	A/2 ft	A+A/2 ft	I mA	Apparent Resistivity (ohm-meters)	% Error	Cumulative Resistivity
1	0.5	1.5	3.8	2120	0.0	2120
2.5	1.3	3.8	2.3	3060	0.1	5180
5	2.5	7.5	2.0	4445	0.0	9625
10	5.0	15.0	8.3	5811	0.0	15437
15	7.5	22.5	6.8	5792	0.0	21229
20	10.0	30.0	7.9	5407	0.0	26636
30	15.0	45.0	4.0	4032	0.0	30668
60	30.0	90.0	2.3	742	0.4	31411



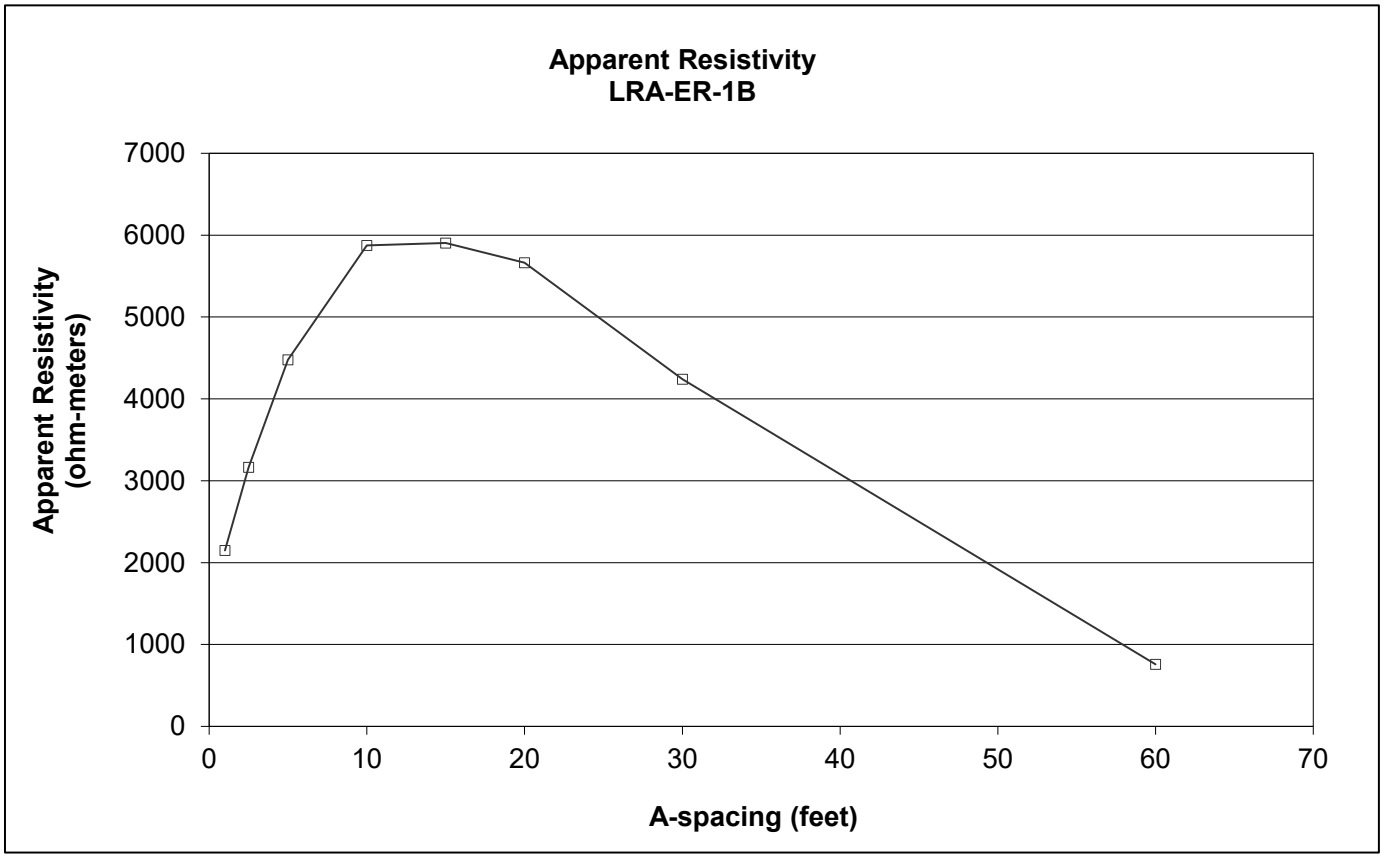
S.W.COLE ENGINEERING & CONSULTING, P.C.

RESISTIVITY COMPUTATION DATA SHEET
Wenner Configuration
Fixed Center

Project #: 25-1685
Site: 769 Silver Street Agawam, MA
Spread No.: LRA-ER-1B
Orientation: 73NE

Date: 10/17/2025
Mid point GPS Coordinates: See Exploration Location Plan
Instrument: AGI SuperSting R1

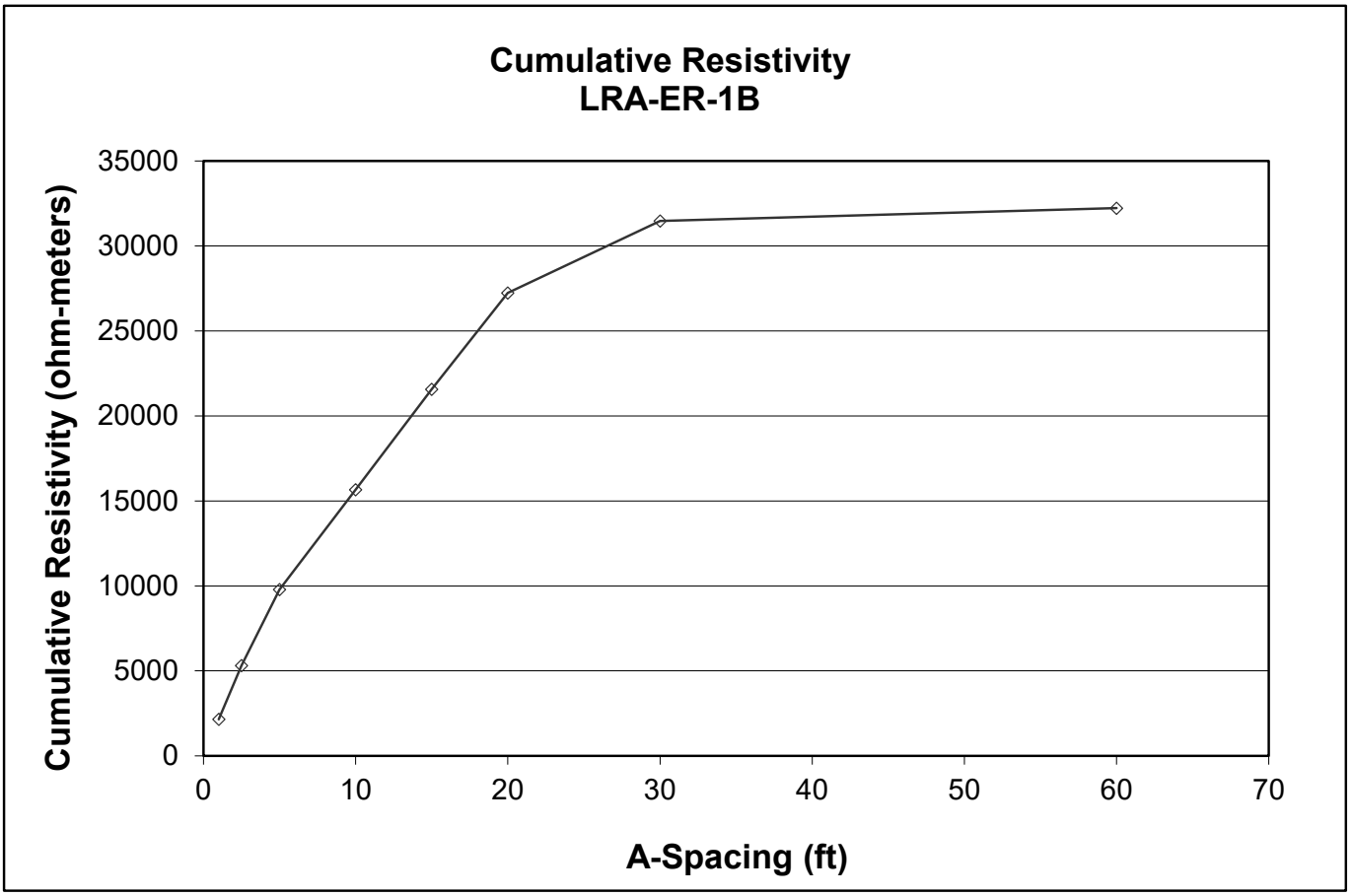
A - Spacing (distance-feet)	A/2 ft	A+A/2 ft	I mA	V mV	Resistance (v/I) Ω	Apparent Resistivity (ohm-meters)	% Error
1	0.5	1.5	3.8	1331	337.4	2150	0.0
2.5	1.3	3.8	2.3	419	194.8	3165	0.1
5	2.5	7.5	2.0	282	141.5	4477	0.0
10	5.0	15.0	8.3	798	92.5	5874	0.0
15	7.5	22.5	6.8	431	61.5	5905	0.0
20	10.0	30.0	7.9	356	43.0	5662	0.0
30	15.0	45.0	4	90	21.4	4239	0.0
60	30.0	90.0	2	5	2.0	758	0.4



Cumulative Resistivity Sheet

LRA-ER-1B

A - Spacing (distance-feet)	A/2 ft	A+A/2 ft	I mA	Apparent Resistivity (ohm-meters)	% Error	Cumulative Resistivity
1	0.5	1.5	3.8	2150	0.0	2150
2.5	1.3	3.8	2.3	3165	0.1	5315
5	2.5	7.5	2.0	4477	0.0	9792
10	5.0	15.0	8.3	5874	0.0	15666
15	7.5	22.5	6.8	5905	0.0	21570
20	10.0	30.0	7.9	5662	0.0	27233
30	15.0	45.0	4.0	4239	0.0	31472
60	30.0	90.0	2.3	758	0.4	32230

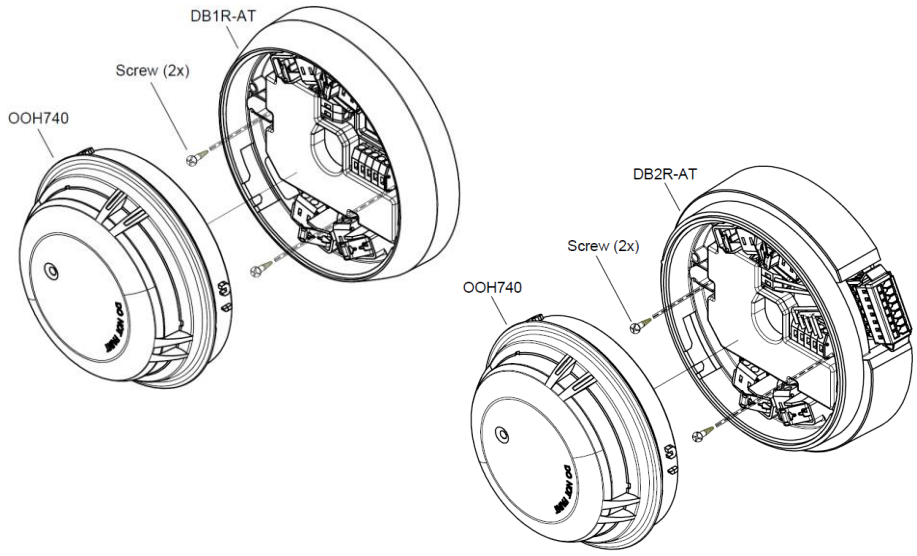


SIEMENS

Fire Safety Application Center

OOH740 for Rail

Automatic fire detector for rail application



- Signal processing with **ASA***technology*
- Event-controlled detection behavior
- Evaluation of the criteria heat
- Quick response
- Highly developed immunity to deceptive phenomena
- Meets material requirements according EN45545-2
- Rail-proved by notified body acc. EN50155
- SIL2 approved acc. EN5012x standards

Properties

Design

- Resistant to environmental and interfering influences such as dust, fibers, insects, moisture, extreme temperatures, electromagnetic interference, corrosive vapors, vibration, artificial aerosols, and atypical fire phenomena

Features

- Shock resistant, protection against sabotage
- Signal processing with **ASA***technology* (Advanced Signal Analysis)
- Time and process-dependent detection behavior
- High degree of immunity to faults in power electronics
- Protected electronics, high-quality components
- Sophisticated sensors and electronic monitoring
- The integrated line separator that locates the defective part on the detector bus of the control panel and isolates between two detectors
- Integrated alarm indicator (AI), 360° visibility
- Rail certified

Eco-friendly

- Environmentally friendly processing
- Reusable materials
- Electronic parts and synthetic materials can be easily separated

Use

OOH740 multi-sensor fire detector, neural ASA



Multi-sensor fire detector consisting of:

- Point detector
- Detector dust cap to protect the point detector during the construction phase

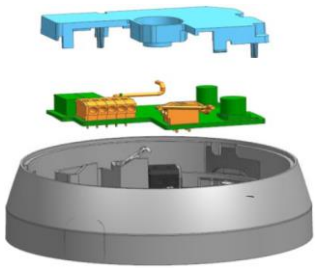
Function:

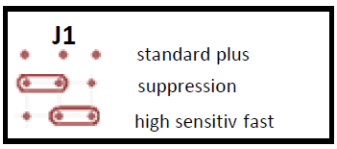
- Functions according to the scattered light principle with two sensors, optical forward and backward scattering
- Opto-electronic measuring chamber that obstructs disruptive extraneous light but provides excellent detection of both light and dark smoke particles
- Two additional heat sensors increase the point detector's immunity to deceptive phenomena
- Selectable detection behavior thanks to application-specific ASA parameter sets

Use:

- For early detection of flaming fires of solid and liquid substances, as well as of smoldering fires
- For early and reliable fire detection in an environment with deceptive phenomena
- Meets UL94-V0 requirements

Detector base DB1R-AT with PCB





Detector base consisting of:

- Protector top cover for PCB
- Base print (24V or 110V)
- Block terminals incl. metal clips
- Detector base

Function:

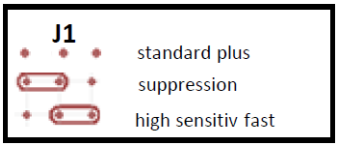
- Base for fire detector OOH740
- Adjustment of detection sensitivity (J1: standard, suppression, hight sensitive fast)
- Signal evaluation through PCB (alarm, interference)
- Potential-free contacts for communication

Use:

- Meets UL94-V0 requirements

Detector base DB2R-AT with PCB





Detector base consisting of:

- Protector top cover for PCB
- Base print (24V or 110V)
- Detector base
- Block terminals incl. metal clips
- Wago plug incl. connector PCB
- Protector cover for Wago connector PCB

Function:

- Base for fire detector OOH740
- External connectivity through Wago plug
- Adjustment of detection sensitivity (J1: standard, suppression, hight sensitive fast)
- Signal evaluation through PCB (alarm, interference)
- Potential-free contacts for communication

Use:

- Meets UL94-V0 requirements

Base attachment wet BA721 with Weidmüller connector







Base attachment wet consisting of:

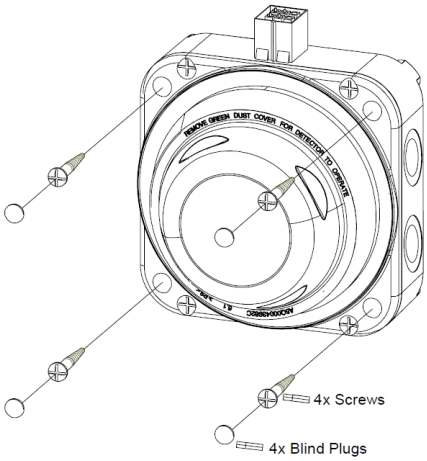
- Base wet
- Plug-in connector incl. crimp contacts
- Blind plugs
- Internal wiring

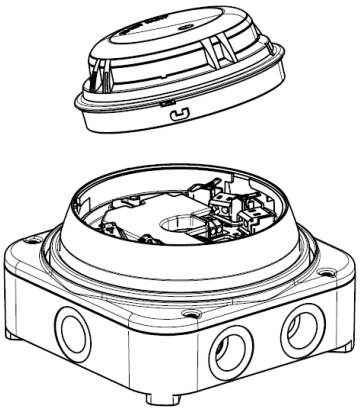
Function:

- Base attachment wet with additional integrated rubber seal for mounting in wet or humid environments
- For achieving a higher protection category
- For mounting in wet or humid environments
- Quick connectivity through plug-in connector

Use:

- Specially for humid and cold environments





(see separate datasheet – DSWxxxR-AT)

Type Overview

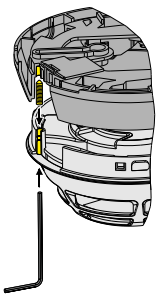
Type	Designation	Order no.	Weight [kg]
OOH740	Multi-sensor fire detector, ASA		0,124
DB1R-AT	Detector base		0,071
DB2R-AT	Detector base		0,076
DP024R-AT	Detector base print (PCB, 24V)		0,020
DP110R-AT	Detector base print (PCB, 110V)		0,023
DBC2R-AT	PCB for Wago connector		0,003
DBT1R-AT	Protector top cover for main PCB		0,008
DBT2R-AT	Protector cover for Wago connector PCB		0,002
WAGO	Plug-in connector Wago		0,002
Torroidal ferrite	Torroidal ferrite		0,010
Ferrite PCB	7x Multilayer Ferrite		0,0001
DB1 024R-AT	Complete Detector base 1, 24VDC Version		0,100
DB1 110R-AT	Complete Detector base 1, 110VDC Version		0,102
DB2 024R-AT	Complete Detector base 2, 24VDC Version		0,112
DB2 110R-AT	Complete Detector base 2, 110VDC Version		0,114
DS1 024R-AT	Complete Detector Set 1, 24VDC Version	6500007594	0,223
DS1 110R-AT	Complete Detector Set 1, 110VDC Version	6500007595	0,226
DS2 024R-AT	Complete Detector Set 2, 24VDC Version	6500007587	0,236
DS2 110R-AT	Complete Detector Set 2, 110VDC Version	6500007588	0,239
DSW024R-AT	Detector Set Wet, 24VDC	6500007569	0,500
DSW110R-AT	Detector Set Wet, 110VDC	6500007593	0,503
Accessories			
LP720	Detector locking device	S54319-F9-A1	0,001

Accessories

Detector locking device LP720



- For protection against theft of the point detector
- Set screw M3 x 12 mm prevents the point detector being unscrewed from the detector base
- Point detector can only be removed with the appropriate Allen key

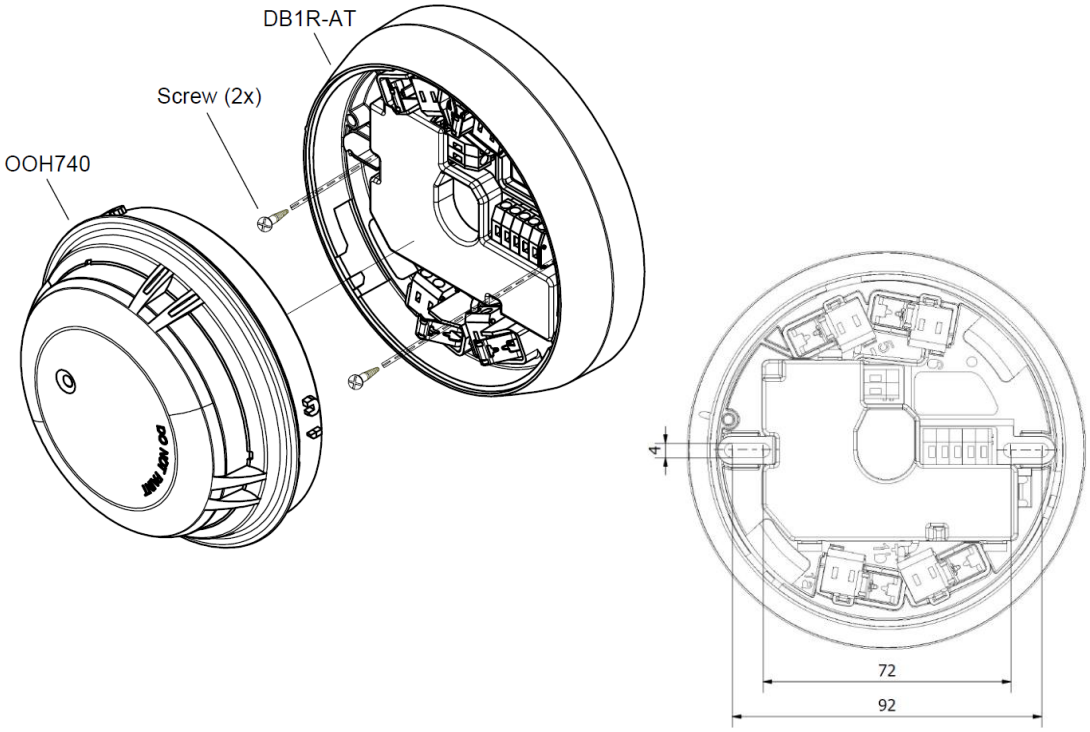


Installation

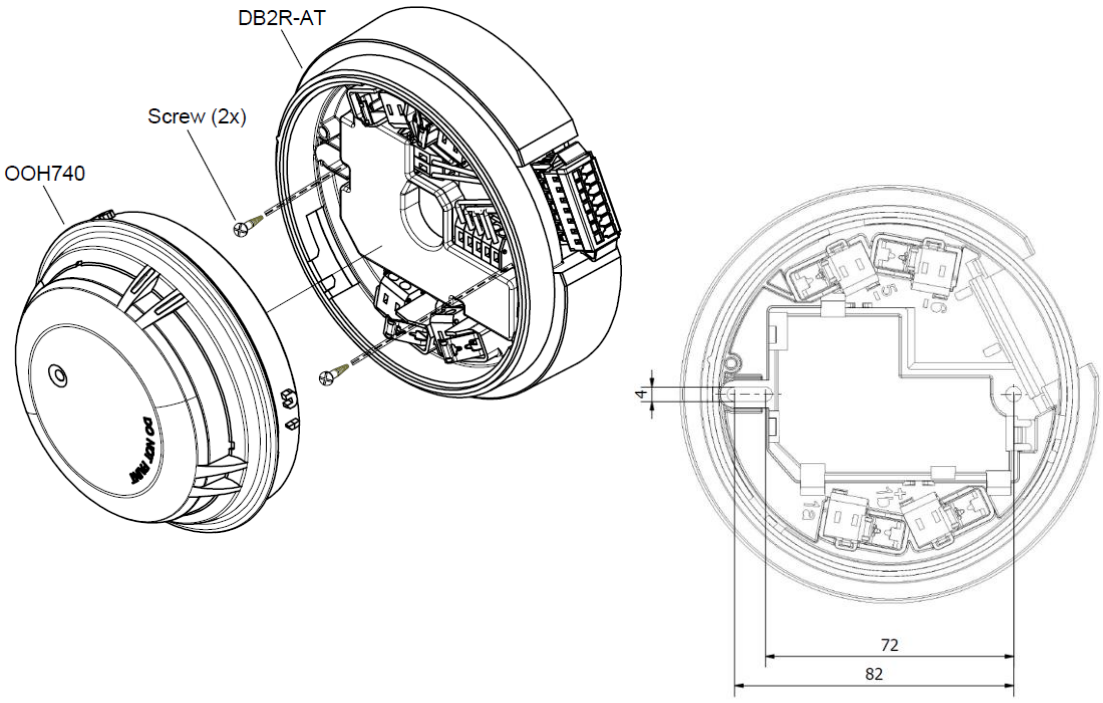
Detector Base DB1R-AT and DB2R-AT

Mounting of the detector base is achieved through 2 appropriate screws in the mounting slits provided for fixation.

- DB1R-AT:



- DB2R-AT:

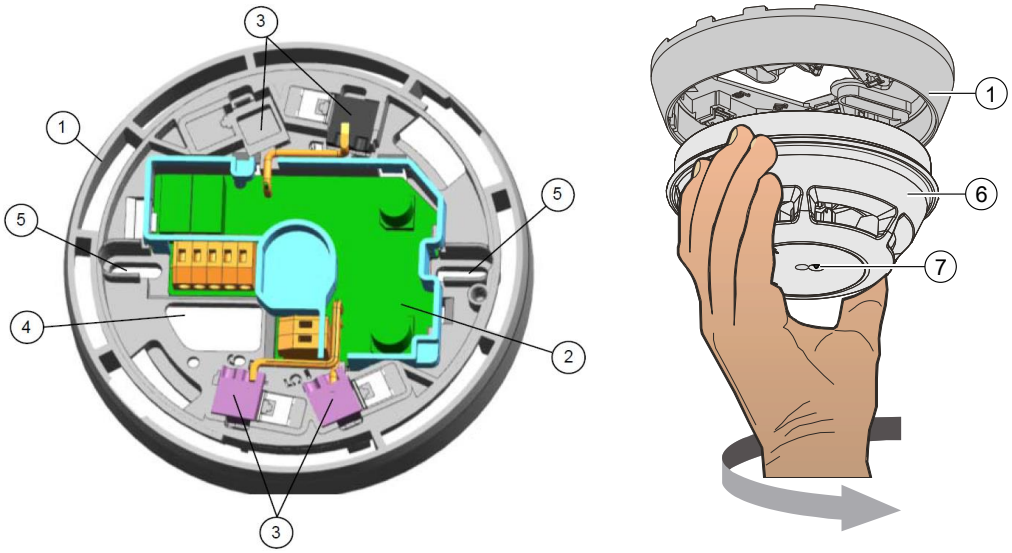


Detector and detector base

- Mounting slits allows fast and variant fixation
- Connection terminals for conductors up to max. 1.6 mm²

The detector can be screwed into the base easily either by hand or using the detector exchanger DX791 and the corresponding adapter FDUD491.

The internal alarm indicator is centered in the detector, which makes alignment of the point detector superfluous.



1 Detector base

2 Print and Cover

3 Connection terminals

4 Opening for cable entry

5 Mounting slits

6 Point detector

7 Internal alarm indicator

Safety

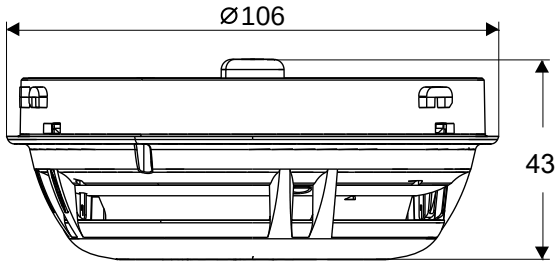
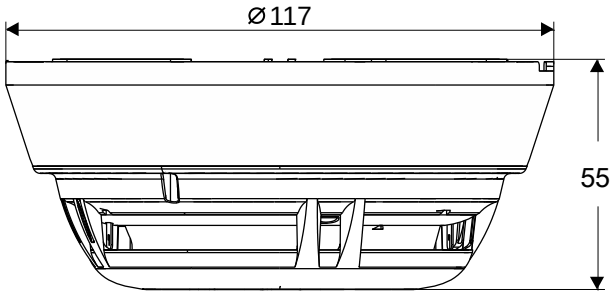
- Do not operate the device above the specified nominal voltage.
- Avoid touching the connection contacts in any case.
- Use of detector locking device (LP720) to prevent improper opening of the device is highly recommended.

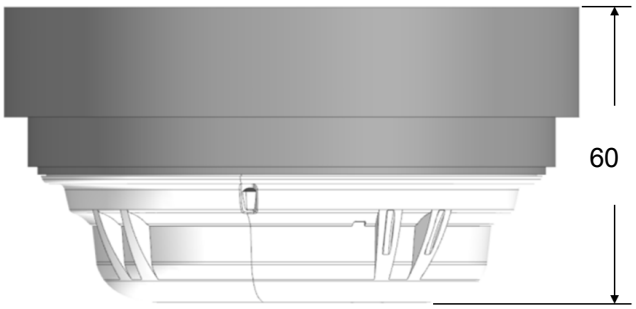
Technical data

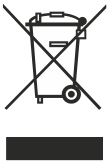
	OOH740 incl. Base
Operating voltage (modulated)	DC 19…30 V (24V Print Version) DC 70…140 V (110V Print Version)
Operating current (quiescent)	10...11 mA (24V Print Version) 3…3,5 mA (110V Print Version)
Max. number of external alarm indicators that can be connected	2
Operating temperature Rail specific approval	-25...+55 °C Temperature class OT4: -40…+70 °C
Storage temperature	-30...+70 °C
Air humidity (short-term moisture condensation permitted)	≤ 95 % rel.
Communication protocol	Potential-free contacts
Color	~RAL 9010 pure white
Weight	~0.230 kg
Protection category (IEC 60529)	IP40
Standards	CEA 4021, EN 54-5, EN 54-7, EN 54-17
Approvals OOH740 only: • VdS • LPCB • FM • DNV GL (Marine) OOH740 incl. Base (DBxR-AT): • Standards • TUEV	 G211070 126bh/05 3051081 MEDB00003UK EN 50155, EN 50121-3-2, EN 61000-4-2/3/4/5/6, EN 60068-2-1/2/27/30, EN 61373, EN 45545-2 Test Report TÜV Austria EN50155 Railway applications Prüfbericht TÜV Austria EN50121-3-2, EN50155 EMV Prüfbericht AIT EN60068-2-27, EN61373 Schocktest Prüfbefund TÜV Austria ÖNORM EN 60068-2-1 SIL Report & Certificate acc. EN50126, EN50128, EN50129
Permissible wind speed	Max. 5 m/s

11 CE 0786	**OOH740**	Siemens Switzerland Ltd; Gubelstrasse 22 CH-6301 Zug Technical data: see doc. **A6V10305793**
OOH740 - Smoke/heat detector incl. short-circuit isolator for use in fire detection and fire alarm systems installed in buildings.		
305/2011/EU (CPR): EN 54-5 / EN 54-7 / EN 54-17 ; 2014/30/EU (EMC): EN 50130-4 / EN 61000-6-3 ; 2011/65/EU (RoHS): EN 50581		
The declared performance and conformity can be seen in the Declaration of Performance (DoP) and the EU Declaration of Conformity (DoC), which is obtainable via the Customer Support Center: Tel. +49 89 9221-8000 or http://siemens.com/bt/download		
DoP No.: 0786-CPR-21094; DoC No.: CED-OOH740		

Dimensional drawings

OOH740	OOH740 with base DB1R-AT
	

	OOH740 with base DB2R-AT
	



The device is considered an electronics device for disposal in terms of European Directive 2012/19/EU and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.
- Dispose of empty batteries in designated collection points.

Issued by
Fire Safety Application Center Austria

Siemens AG Österreich
Smart Infrastructure
RC-AT SI BP FSAC
Siemensstraße 90
AT-1210 Wien
Tel. +43 51707-0
www.siemens.com

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Technical specifications and availability subject to change without notice.

Taryn Egerton

From: Derek Myers
Sent: Thursday, February 19, 2026 4:28 PM
To: Taryn Egerton
Subject: FW: 769 Silver St. -BESS Review-

From: Alan Sirois <ASirois@agawam.ma.us>
Sent: Thursday, February 19, 2026 4:25 PM
To: Derek Myers <afdinsp@agawam.ma.us>
Subject: RE: 769 Silver St. -BESS Review-

Derek, I made a couple of adds below.

Taryn,

The Chief and myself have reviewed the site plan. We have some questions regarding the fire protection plan. This is in regards to the 345 page document titled **APPLICATION FOR SITE PLAN APPROVAL 769 SILVER STREET, AGAWAM, MA AGAWAM ENERGY CENTER.** They are as follows:

1. Page 156 –**"The Smartstack has a standardized, modular design that is not customizable or adjustable and is currently obtaining a UL 9540 factory listing."**
   Questions: What is the timeframe for the Smartstack to obtain UL9540 factory listing? What is the plan if for some reason it does not receive the listing? A full UL9540 certification / UL9540A test report must be provided in order to fully vet the proposal and site plan.

2. Page 123- **"Each Smart Skid is equipped with three multi-detectors and a Fire Alarm Control Unit (FACU)."**
   Question: What is a multi-detector? Please provide specifications.

3. Page 119- **"This document is an emergency response plan (ERP) for the Agawam battery energy storage system (BESS) facility. The ERP provides a facility overview, site design, type of equipment, safety features, suppression and detection information along with response recommendations for potential BESS facility failure scenarios."**
   Questions: Understanding that it is not sound engineering to install fire suppression for BESS batteries, is there a fire suppression system installed in each Smartstack for system support components (i.e. electronics, HVAC, etc.) to prevent the spread of fire to Smartstack batteries? If not, what is the reasoning behind not having a fire suppression system for system support components? An engineering narrative should be provided justifying the omission of fire suppression if applicable.

4. The Agawam Fire Department is ordering an additional yard hydrant at 769 Silver St. The exact location will be determined at a later date and we will work with the developer to identify an appropriate location.



APPLICATION FOR SITE PLAN APPROVAL
769 SILVER STREET, AGAWAM, MA
AGAWAM ENERGY CENTER

January 29, 2026

Prepared For: Agawam Energy Center, LLC

Submitted To: Town of Agawam Planning Department

Prepared By: BSC Group, Inc.

BSC GROUP
BUILD | SUPPORT | CONNECT
180 Glastonbury Boulevard, Suite 305
Glastonbury, CT 06033

BSC GROUP
BUILD | SUPPORT | CONNECT

Engineers
Environmental Scientists
Software Developers
Landscape Architects
Planners
Surveyors

January 29, 2026

Taryn Egerton
Planning Director & Conservation Agent
Planning Department
Town of Agawam
Public Works and Municipal Annex
1000 Suffield Street
Agawam, MA 01001

Re: Application for Site Plan Approval
Agawam Energy Center
769 Silver Street
Agawam, MA 01001

Dear Ms. Egerton:

Agawam Energy Center, LLC (Applicant) proposes to develop an approximately 250 megawatt (MW), 4 megawatt hour (MWh), battery energy storage system (BESS) on the 17.2-acre site located at 769 Silver Street (Map G6, Block 2, Lot 6) (the Project). BSC Group is submitting this package on behalf of the Applicant which includes an Application for Site Plan Approval and related attachments to be filed with the Town of Agawam (the Town) Planning Board.

The Project will consist of battery containers, transformers, inverters, equipment pads, and associated infrastructure. The proposed BESS site will be accessed from Silver Street. The battery containers will be surrounded by an 18-foot-high solid wall and 8-foot-high chain link fence that will act as physical, visual, and sound barriers as detailed in the attached plans. The BESS equipment will connect to Eversource's existing South Agawam Switchyard via the Project's own substation and pole mounted interconnection equipment. This application package includes the following attachments:

- Attachment A – Application for Zoning Determination
- Attachment B – Form D – Application for Site Plan Approval
- Attachment C – Project Narrative
- Attachment D – Existing Conditions Photographs
- Attachment E – Fluence SmartStack Product Datasheet
- Attachment F – Plans and Renderings

- Attachment G – Sound Study
- Attachment H – Emergency Response Plan
- Attachment I – Decommissioning Plan
- Attachment J – Fire Safety Compliance Plan
- Attachment K – Emergency Operations Plan
- Attachment L – Stormwater Management Report
- Attachment M – Stormwater Permit Application
- Attachment N – Eversource Notification

If you have any questions or require additional information, please feel free to contact me at 617-896-4517 or via email at mkaplan@bscgroup.com.

Sincerely,



Melissa Kaplan, PWS
BSC Group
Licensing and Permitting Team Lead
Ecology Project Management Lead
Senior Associate

ATTACHMENT A – APPLICATION FOR ZONING DETERMINATION

The Commonwealth of Massachusetts

Town of Agawam

Inspection Services - Building Department

1000 Suffield Street, Agawam MA 01001 – (413) 821-0632

OFFICE ONLY
Date Filed:
RECEIVED BY BUILDING DEPARTMENT
DEC 05 2025
TOWN OF AGAWAM

Application for Zoning Determination

FILING INSTRUCTIONS: Deliver this form (no fee required) to Inspection Services.
For digital submissions, please confirm receipt. A *complete* application will be processed within 30 days.
The applicant must pick-up, or arrange for the receipt of, this processed form.

1) PROPERTY INFORMATION			
a. Street Address	769 Silver Street	**b. Zoning District**	Industrial B
c. Assessor's Map	G6	**d. Lot(s)**	2-6
e. Registry of Deeds Book	24427	**f. Page**	479
g. Overlay Districts	☑Historic Preservation ☐ Mixed-Use Business C		
h. Previous Special Permits, Site Plan Approvals, Findings or Variances Issued for this Site			
None per November 25, 2025 public records request #25-306.			
2) APPLICANT & OWNER INFORMATION			
a. Applicant Name	Agawam Energy Center, LLC c/o Michael Alvarez	**b. Applicant Phone**	415-792-6071
c. Applicant Email	Michael.Alvarez@longroadenergy.com		
d. Applicant Mailing Address	125 High Street, Suite 1705 Boston, MA 02110		
e. Applicant Relationship to Property	☐Owner ☐ Agent ☑Other:	Exclusive option to purchase the property	
f. Representative Name *(if any)*	Agawam Energy Center, LLC c/o Michael Alvarez	**g. Rep. Phone**	415-792-6071
h. Rep. Email	Michael.Alvarez@longroadenergy.com		
i. Owner Mailing Address	P.O. Box 777, Agawam, MA 01001		
j. Owner Name *(if different)*	Lucia Family Realty LLC	**k. Owner Phone**	413-519-3993
l. Owner Email	TLucia5964@gmail.com		
m.Owner Mailing Address	P.O. Box 777, Agawam, MA 01001		

3) PROJECT & SITE DETAILS
NOTE: Any omission of requested information may result in an INCOMPLETE determination

	Existing	***Proposed*** ☐ *No changes to building, site or lot*	-FOR BUILDING DEPT. REVIEW- REQUIRED / NCU
a. Lot Size	**749,014** SF	No Change SF	LOT SIZE ☐
b. Frontage	**199.5** FT	No Change FT	FRONTAGE ☐
c. Front Lot Line	**147** FT	No Change FT	FRONT SB ☐
d. Side Lot Line (Left/Right)	L: FT **4** R: 27 FT	L: 4 FT R: 132 FT	SIDE SB ☐
e. Rear Lot Line	450 FT	585 FT	REAR SB ☐
f. Building Height	Approx. 30 FT	No Change FT	BLDG HT ☐
g. Total BLDG/Res Area	Approx. 56,684 SF N/A SF	Approx. 19,342 SF No Change SF	AREA LIM ☐
h. BLDG Coverage (Footprint)	50,906 SF 6.8 % of lot	17,570 SF 2.4 % of lot	LOT COVER ☐
i. Impervious Coverage	284,146 SF 37.9 % of lot	378,338 SF 50.5 % of lot	IMPERVIOUS ☐
j. Parking/Loading Spaces	P: **18** L: **0**	P: **12** L: 0	PARKING ☐
k. Bicycle/EV Charge Spaces	B: **0** EV: **0**	B: **0** EV: 0	BIKE/EV ☐
l. Signs (Size & Type)	8 ft x 4 ft T: **Freestanding**	x N/A T: None	SIGNS ☐
m. Fence (Size & Type)	0 LIN FT T: **N/A**	2,350 LIN FT T: Chain Link	
n. Wetland Area	7,284 SF	7,284 SF	
o. Utility Services	☑ Town Water ☑ Town Sewer	☑ Town Water ☑ Town Sewer	NON-CONFORMING USE ☐

p. Current Use of Property	Former Lumber Yard (Lucia Lumber)
q. Proposed Use of Property	Battery Energy Storage System (BESS)

r. Project Description

The Applicant proposes to develop an approximately 250 megawatt (MW), 4 megawatt hour (MWh), battery energy storage system (BESS) on the 17.2 acre site located at 769 Silver Street. The project will consist of battery containers, transformers, inverters, equipment pads, and associated infrastructure. The proposed BESS site will be accessed from Silver Street. The battery containers will be surrounded by a 16 foot high solid wall and 8 foot high chain link fence that will act as physical, visual, and sound barriers as detailed in the attached plans. The BESS equipment will connect to the existing South Agawam Switching Station via the project's own substation and pole mounted interconnection equipment.

s. I have attached additional narrative, plans or supporting materials *(any oversize plans should also be included in an 8.5 x 11" format)*	☑ Yes ☐ No
t. Work is proposed in or within 100' of a wetland or 200' of a stream/river, or construction will occur within the Floodplain district. ***If so, CONSERVATION COMMISSION review is required.***	☐ Yes ☑ No ☐ Unsure
u. The following projects shall be required to comply with the requirements of a STORM DRAIN PERMIT: **[1] Any alteration to sites on parcels of one acre or greater.** **[2] Any alteration to individual lots less than one acre, but which are contiguous or are deemed part of a common project which is one acre or greater.**	☑ Yes ☐ No ☐ Unsure
v. The project will affect at least one of the following; additional gross floor area by 2,000 square feet, any change of use, changes to parking and/ or curb cuts.	☑ Yes ☐ No

4) CERTIFICATION

This determination is based only on the information provided, which I represent as accurate. The issuance of a Zoning Determination does not relieve the Applicant of the responsibility to obtain other zoning or non-zoning permits, as may be required, and this determination is based on the zoning in effect at the issue date and grants no protection from any pending or future zoning changes. Additional information may be requested and required to properly process this form. Any non-zoning related comments provided are cursory in nature; Applicants should follow-up with appropriate Town Departments. ***Sec. 1-7 of the Town of Agawam's General Ordinances authorizes the denial of a license or permit where an outstanding debt or obligation to the Town exists.***

Signature	Michael U. Alvarez Michael U. Alvarez, COO	**Date**	12/4/2025

☑ Applicant ☐ Applicant's Representative

ZONING DETERMINATION - OFFICE USE ONLY

☐ Approved ☐ Denied: ☐ The proposed use is not permitted in the subject zoning district
☐ Only permissible with variance relief from the Zoning Board of Appeals

☒ Approved ***Pending additional approval:***

Per Zoning Ordinance Section(s)	Required Permit(s)	Approval Required	Permitting Authority
§ 180-169-(D&E)	☒ Building Permit(s)	☐ Special Permit(s)	☒ Planning Board
§ 180-13-(S.P.R)	☒ Electrical Permit(s)	☒ Site Plan Review	☐ Board of Appeals
	☐ Plumbing/Gas Permit(s)	☐ Variance	☐ City Council

Town Building Official		**Issue Date**	12/5/2025

This determination may be appealable to the Zoning Board of Appeals under the provisions of MGL Ch. 40A Sec. 8.
Revised 09/08/2022

ATTACHMENT B – FORM D – APPLICATION FOR SITE PLAN APPROVAL

TOWN OF AGAWAM, MASSACHUSETTS

FORM D

Application for Site Plan Approval

Please complete the following form and electronically submit with site plans, completed Zoning Determination and Storm Water Management Report to: siteplan@agawam.ma.us in addition to sending four (4) hard copies of the Site Plan and one (1) hard copy of the Storm Water Management Report and completed Zoning Determination to:

Agawam Planning Department

36 Main Street

Agawam, MA 01001

January 29, 2026

1. Name of Business: Agawam Energy Center, LLC

   Address: 125 High Street, Suite 1705, Boston, MA 02110

   Phone #: 207-210-1175 Email: Chad.Allen@longroadenergy.com

2. Name of Applicant/Owner: Applicant: Agawam Energy Center, LLC / Owner: Lucia Family Realty LLC

   Address: 125 High Street, Suite 1705, Boston, MA 02110 / P.O. Box 777, Agawam, MA 01001 Phone #: 207-210-1175

   Email: Chad.Allen@longroadenergy.com

3. Name of Engineer/Architect: Thomas Henaghen, PE

   Address: 4 Blanchard Road, P.O. Box 85A, Cumberland, ME 04021

   Phone #: 617-921-3703 Email: thomas.henaghen@sme-engineers.com

4. Please give a brief description of the proposed project: Please see the attached sheets which provide supplemental information regarding the project.

ATTACHMENT C – PROJECT NARRATIVE

Introduction

Agawam Energy Center, LLC (Applicant) proposes to develop an approximately 250 megawatt (MW), 4 megawatt hour (MWh), lithium-ion battery energy storage system (BESS) on the 17.2-acre site located at 769 Silver Street (Map G6, Block 2, Lot 6) in Agawam, Massachusetts (the Project). The Project site is located in the Industrial District B zoning district on the east side of Silver Street. The property is a former lumber yard with eight (8) existing buildings and a roadway network that were associated with the business. The subject property also contains two (2) existing easements. One (1) easement runs northwest by southeast across the Project site from Silver Street to the rear property line and provides accommodation for an underground water line. The other easement is located in the rear (southeast) portion of the property running northeast by southwest and provides accommodation for an existing transmission line. A wetland area containing an intermittent stream and a pond are also located along the eastern property boundary, more than 100 feet from the proposed Project footprint.

An Application for Zoning Determination was submitted to the Inspection Services - Building Department on December 5, 2025. According to the direction outlined in the Zoning Determination by the Inspector of Buildings dated December 5, 2025, an Application for Site Plan Approval is required to be submitted to the Planning Board in accordance with Sections 180-13 and 180-169 of the Zoning Ordinance of the Town of Agawam Code (Zoning Ordinance). The following narrative and documentation are hereby submitted to the Planning Board in accordance with Article I General Provisions, Section 180-13 Site Plans, and Article XXIII Battery Energy Storage Systems, Sections 180-167 General Requirements, 180-169 Permitting Requirements for Tier 2 and Tier 3 Battery Energy Storage Systems, and 180-170 Site Plan Application of the Zoning Ordinance, relating to Site Plan Review and BESSs.

This application package includes an Application for Site Plan Approval and related attachments. The application materials were submitted electronically to the following emails: TEgerton@agawam.ma.us, SitePlan@agawam.ma.us, and KDuquette@agawam.ma.us. Two (2) hard copies of the application materials and one (1) hard copy of the Stormwater Management Report have been delivered to the Planning Director & Conservation Agent as instructed.

Proposed Project

The Project's parcel is owned by Lucia Family Realty LLC, with whom the Applicant has an exclusive option to purchase the property. A BESS is an allowed use within the Industrial District B zoning district via Site Plan Review by the Planning Board as outlined in Sections 180-13, 180-169, and 180-170 of the Zoning Ordinance, as well as compliance with applicable provisions of the State Building Code, the State Electrical Code, the State Fire Code, and other applicable codes. Other provisions include those within Article XXIII of the Zoning Ordinance which pertains specifically to BESSs.

As currently designed, the proposed BESS has a capacity of approximately 250 MW and 4 MWh. Of the eight (8) existing buildings on the site, only the two (2) along the southwest property line will be fully retained and a third, the one closest to Silver Street, will have its rear section demolished while the front portion will be retained for office and administrative uses.

The BESS facility will occupy approximately 8 acres of the 17.2-acre Project site. The associated battery containers, transformers, and inverters will sit on concrete pads, driven piles, or grade beams that will be enclosed by a combination of an 18-foot-high, 433-foot-long, solid sound wall along Silver Street and the balance by an 8-foot-high chain link fence that will act as physical, visual, and sound barriers as detailed in the attached plans. The substation at the rear of the property will also be surrounded by an 8-foot-high chain link fence. The stormwater management area for the Project is in the northeast corner of the site, just outside the fence for the BESS area.

The Project is intended to charge during hours where electricity demand is low, such as the middle of the night, and discharge energy to the electrical grid during seasonal peak periods and monthly peak hours. The BESS facility will contain 54 lineups, with each lineup consisting of one medium voltage transformer (54 in total) and four (4) Fluence SmartStack BESSs (216 in total) (see Attachment E for details). Each SmartStack consists of batteries, a power conversion system (PCS), controls, and disconnects. The nominal voltage of the batteries is 1,500 volts direct current (Vdc). The SmartStack PCS converts direct current voltage to alternating current voltage (Vac). Each SmartStack PCS is connected to a medium voltage transformer that steps up voltage to 34.5 Kilovolt (kVac); the medium voltage transformers connect to the Project substation that interconnects to the grid at 115kVaC. Collection trenches with underground utilities ranging from a single circuit to as many as 12 circuits will carry power toward the Project's substation which will contain two (2) transformers, battery collection feeders, and other equipment. A 115-kVac overhead generator tie line will transfer power off-site to Eversource's South Agawam Switchyard located to the southeast, approximately 600 feet from the Project.

The Project is designed to offer world-class safety and environmentally responsible solutions by incorporating the latest technology and conducting close collaboration with Agawam's Fire Department and first responders regarding the design. The Project will use proven and stable lithium-iron-phosphate (LFP) technology, implement a design that incorporates energy storage specific safety certifications and standards, and will be monitored 24 hours a day, 7 days a week, and 365 days a year. By repurposing an idle industrial property and leveraging its proximity to an existing electrical switchyard, it avoids tree clearing and limits the need for new transmission infrastructure. The Project will provide enough energy to power over 285,000 residential homes, generate new long-term tax revenue for the Town, and reduce costs to electric ratepayers, among other items, all while requiring limited Town services.

The primary access to the Project site will be via a new curb cut and driveway off Silver Street close to the northern property boundary. Additional access will be provided through an existing driveway off Silver Street near the southern property boundary. The front of the Project site along Silver Street will consist of heavy landscaping, privacy fencing, and a screening mound between the two driveways, along with up to 12 parking spaces and an 80-foot by 80-foot first responder marshalling area. The landscape plantings at the front of the property will all be native with pollinator species proposed where possible, along with wood board fencing in two locations. Please see the Site Elements sheet in Attachment F for specific examples of vegetation and fencing.

There will also be an emergency access roadway to the south from Moylan Lane over the existing utility easement in that location. The roadways on the Project site itself will circle around the perimeter of the BESS equipment and transformers, as well as divide the equipment into two areas along another utility easement. A single roadway will lead to the rear of the Project site to the substation and connect to Moylan Lane. The roadways on the Project site will all be paved except for the locations within the fenced perimeter of the BESS equipment and substation access, where the roadways will be gravel. Four (4) locations with rolling gates will provide access to/from the BESS perimeter and there will also be two (2) gated access points for the Project's substation. The Natural Heritage & Endangered Species Program (NHESP) requirements for the Project include the fencing being installed to and into the ground to prevent wildlife or potential rare species from entering the site, and the gates will be constructed to prevent wildlife passage as well.

The Project Applicant is:

Agawam Energy Center, LLC
125 High Street, Suite 1705
Boston, MA 02110
Contact: Chad Allen
Phone: 207-210-1175
Email: chad.allen@longroadenergy.com

The Project Engineer authorized to represent the Applicant is:

Sevee & Maher Engineers, Inc.
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Contact: Thomas Henaghen, PE
Phone: 617-921-3703
Email: thomas.henaghen@sme-engineers.com

Surrounding Area

The neighborhood around the Project site consists primarily of industrial, warehouse, and distribution type buildings and businesses, with a few single-family dwellings mixed in as well. To the north are two (2) single-family dwellings, a self-storage facility, and a slate roofing company. West, across Silver Street, is an Industrial District A zoning district with a variety of industrial businesses for engine control products, warehouses, noise control products, and horticultural growing mixes. To the south are four (4) single-family dwellings along Silver Street and a variety of other industrial businesses, such as a corrugated box company, a tool company, N.E.X.T. Fitness, and Berkshire Power, which includes a substation. To the east of the Project site are wooded parcels owned by Western Massachusetts Electric Company (Eversource Energy).

The area immediately surrounding the BESS site contains maintained lawn and filled/disturbed areas dominated by invasive species. Sensitive areas present on the parcel that are being avoided

and/or are having impacts minimized include trees, wetlands, streams, a pond, and NHESP Priority and Estimated Mapped Habitats of Rare Species. The outer edge of mapped NHESP Priority and Estimated Habitats of Rare Species is present along the northeastern section of the Project parcel. The proposed disturbed area (limit of work) for the Project avoids most of the NHESP area as the majority of the designated habitat is located off-site. The mapped NHESP areas on the Project site are mostly disturbed, and not high quality or suitable rare species habitat. Additionally, the Project does not infringe upon any of the wetlands or their 100-foot Buffer Zone on the subject property. BSC is currently working with NHESP and will comply with any Best Management Practices and protection plans as requested by NHESP.

There are no vernal pools, water supply watersheds, or aquifers on the Project site. One (1) field delineated open water pond on the subject property was confirmed by two (2) environmental consultants not to be a vernal pool. There were no indicators of vernal pool obligate of facultative species observed during the investigations. The pond also appears to hold water year-round based on multiple visits to the site, and contains the presence of duckweed and green frog tadpoles. As a result, the Project team was able to conclude the pond was not a vernal pool. The Applicant is currently in the process of obtaining a Request for Determination of Applicability (RDA) from the Conservation Commission to verify the wetland limits and confirm the Project does not require an Order of Conditions (OOC) under the Wetlands Protection Act.

There are no FEMA flood zones or floodplain areas present on or near the Project site, nor in the greater surrounding area.

Compliance with Zoning Ordinance

On behalf of the Applicant, the Project team has developed a set of plans (Attachment F) that are intended to meet requirements set forth in the Zoning Ordinance for the Industrial District B zoning district where the Project is located. Provisions of the Zoning Ordinance relative to the Project, followed by an analysis of the Project's compliance with the applicable provisions (in underlined font), are listed below. The outlined regulations represent an analysis applicable to Article I General Provisions, Section 180-13 Site Plans, and Article XXIII Battery Energy Storage Systems, Sections 180-167 General Requirements, 180-169 Permitting Requirements for Tier 2 and Tier 3 Battery Energy Storage Systems, and 180-170 Site Plan Application of the Zoning Ordinance.

Article I General Provisions

Section 180-13. Site Plans

A. Site plans prepared and approved in accordance with this section shall be required to assist the Inspector of Buildings in the review of certain applications for building permits and to assure compliance with all applicable requirements of this chapter.

   Acknowledged. An Application for Site Plan Approval and associated plans have been prepared in accordance with this section.

B. A site plan shall be required and shall be submitted in each of the following situations:

(1) Any proposed residential, business, industrial, institutional or other use of a new or renovated structure or of a parcel of land, or any change in any such use, structure or parcel, except for one-family detached dwellings and duplexes on separate lots; provided, however, that, upon application, the Inspector of Buildings may waive the site plan review and approval requirement for proposals involving a) a change in use only, b) construction or alteration of nonresidential structures not to exceed 2,000 square feet of additional gross floor area, or c) construction or alteration of structures that are accessory to a nonresidential structure. For the purposes of computing gross floor area, the Inspector of Buildings must aggregate all alterations or construction completed within the immediately preceding five years.
[Amended 9-5-2018 by TOR 2018-11]

Acknowledged. An Application for Site Plan Approval has been submitted for the proposed BESS.

(2) Any nonresidential use of a one-family dwelling.

Acknowledged. Not applicable.

(3) Any use requiring a special permit from the Board of Appeals. For this section, residences which are to be used solely for residential purposes are exempt.
[Amended 1-21-2003 by TOR-2002-8]

Acknowledged. Not applicable.

(4) Any major change in any condition or feature which is not in conformance with any feature of a previously approved site plan. Changes to parking and/or curb cuts will always necessitate site plan review.

Acknowledged. An Application for Site Plan Approval has been submitted for the proposed BESS.

C. Procedure.

(1) An applicant for site plan review under this section shall file an electronic copy of an application and a site plan, plus four hard copies of the site plan, and an electronic copy of the stormwater management plan, plus one hard copy of the stormwater plan and an electronic copy of the pre- and post-development stormwater calculations when applicable with the Building Department. The site plan shall be prepared by an engineer, architect or landscape architect unless otherwise specified by the Planning Board.
[Amended 10-7-2019 by Ord. No. TOR-2019-9]

Acknowledged. An electronic copy of the Site Plan Approval application, Site Plans, Stormwater Management Report, pre- and post-development stormwater calculations, and other associated materials have been submitted. Additionally, two (2) hard copies of the application materials and one (1) hard copy of the Stormwater Management Report have been submitted to Town staff as instructed by the Planning Director & Conservation Agent.

(2) The Inspector of Buildings shall, within five days of receipt, transmit to the Planning Board four copies of the application and site plan and an electronic copy of the stormwater management plan.
[Amended 12-6-2021 by Ord. No. TOR-2021-4]

Acknowledged.

(3) All site plans shall be prepared to scale on standard sheets of 24 inches by 36 inches to show with reasonable accuracy the following information, in addition to that required in § 180-4:

(a) A title block, containing the street address, applicant's name and address, date, scale and the name of the preparer of the plan.

The Site Plans (Attachment F, Site Layout Plan – Sheet 1 and Site Layout Plan – Sheet 2) include a title block detailing the street address, applicant's name and address, date, scale, and name of the plan preparer on each sheet.

(b) A site layout at a scale of no smaller than one inch equals 50 feet.

The Site Plans (Attachment F, Site Layout Plan – Sheet 1 and Site Layout Plan – Sheet 2) contain the proposed site layout at a scale of 1" = 40'.

(c) Topography of the site and adjacent lands.

Various plans in Attachment F (Existing Conditions and Demo Plan, Grading Plan – Sheet 1, and Grading Plan – Sheet 2) illustrate the topography of the Project site and adjacent lands.

(d) Provision for the handling of vehicular traffic flow. All curb cuts must be clearly defined with widths and radii noted on the plan. Radii shall meet Town standards. Parking lot and site traffic flow must be clearly noted with signs or other methods if it is to be maintained as one-way.

No new public roads are proposed for the Project. Within Attachment F, Site Layout Plan – Sheet 1 illustrates the 30-foot radius of the new proposed curb cut and paved access off Silver Street. Site Layout Plan – Sheet 2 displays the secondary emergency access via Moylan Lane. The existing curb cut and driveway off of Silver Street will remain. All roadways outside of the fenced-in BESS area will be paved and all

roadways within the BESS area will be gravel. All roadways on the site will accommodate two-way traffic.

(e) Parking areas and loading areas.

The 12 new parking spaces and first responder marshalling area for the Project are noted at the front of the Project site on Site Layout Plan – Sheet 1 in Attachment F.

(f) Drainage. The plan must be submitted to the Department of Public Works for input prior to Planning Board review.

The stormwater management area for the Project is shown on Site Layout Plan – Sheet 1 and Grading Plan – Sheet 1 in Attachment F. A Stormwater Management Report and associated watershed drainage figures is included in Attachment L which summarizes the stormwater runoff patterns of the pre- and post-development conditions for the Project.

(g) All public utilities (sewer, water, gas, electric).

The Project site has existing connections to public utilities that will be maintained to service the buildings that will be retained. The Utility Plan in Attachment F illustrates existing public utilities at the site. Additional electrical infrastructure will be installed at the site to service the BESS and substation.

(h) Landscaping. All landscaped areas are to be designated on the plan. These areas are to specify species type and size.

Site Layout Plan – Sheet 1 and Site Layout Plan – Sheet 2 in Attachment F provide a general sense of the proposed landscaping around the entire site. Dense landscaping will be provided at the front of the subject property along Silver Street. Additionally, a vegetated buffer strip will be provided around the north and east sides of the BESS between the BESS's perimeter gravel roadway and its perimeter fencing. Landscape Plan Enlargement – Sheet 3 in Attachment F portrays extensive details regarding the proposed landscaping at the front of the Project site which includes trees, shrubs, privacy fencing (wood board), and a screening mound. The landscape plantings at the front of the property will all be native with pollinator species proposed that are supportive of butterflies and other species. Please see the Site Elements sheet in Attachment F for specific examples of plantings, pollinator species, and fencing. The existing vegetation outside the proposed limit of work will remain.

(i) Sign location only.

Signage will comply with local, state, and federal regulations, as well as American National Standards Institute (ANSI) requirements as outlined in the Town of Agawam's BESS Ordinance. Signage will be placed in the required locations for safety and operational purposes. Please see the Lighting and Security Plan and Sign

Details sheets in Attachment F for signage details. High voltage warning signage will be placed on the chain link fence surrounding the BESS and the Project's substation. Site information and emergency contact signage will be placed at each gated entry to the BESS and Project's substation.

(j) Exterior lighting.

Lighting systems will comply with local, state, and federal regulations; will be limited to those locations required for safety and operational purposes; and will be reasonably shielded from abutting properties as necessary. Please see the Lighting and Security Plan in Attachment F for additional lighting details.

(k) Rendering or elevations, including all mechanical facility support items originating from or terminating on the building exterior, or both.

Attachment F contains renderings of the Project including BESS infrastructure and landscaping elements.

(l) The location and characteristics of any proposed screening, fencing or other buffers.

The submitted Site Plans (Site Layout Plan – Sheet 1 and Site Layout Plan – Sheet 2 in Attachment F) indicate the location of proposed screening, fencing, and buffers. A Site Elements sheet, also included in Attachment F, illustrates the type of solid and chain link fencing that will be used in the Project.

(m) The location of any wetlands, streams, drainage swales and areas subject to flooding.

The Existing Conditions and Demo Plan, Site Layout Plan – Sheet 1, and Site Layout Plan – Sheet 2 included in Attachment F illustrate the location of existing wetlands.

(n) Storm drain permit requirements pursuant to Chapter 175, §§ 175-22 to 175-30, inclusive, of the Code of the Town of Agawam, when applicable.
[Added 10-7-2019 by Ord. No. TOR-2019-9]

Acknowledged. The proposed Project application has been prepared to meet the requirements of Article IV Sanity Sewers, Storm Drains, and Connections, of the Town of Agawam Code (Sections 175-22 through 175-30).

Sanitary Sewer: No new buildings are proposed as part of the Project. There is an existing sewer service to one of the existing buildings to remain. That service will continue to be used. No new sewer connections are proposed and no significant increase in volume is proposed.

Storm Drains: A Stormwater Permit application (Attachment M), Stormwater Management Report (Attachment L), and a set of design drawings have been submitted with this application. No new discharges to the Town's closed drainage

system are proposed. Temporary and permanent BMPs are included in the submitted documents.

The Applicant will coordinate with the Department of Public Works throughout the process to provide necessary reporting and allow for inspections prior to and during construction in accordance with the Town requirements.

(o) Stormwater management plan requirements pursuant to Chapter 175, § 175-35 of the Code of the Town of Agawam, when applicable.
[Added 10-7-2019 by Ord. No. TOR-2019-9]

A Stormwater Management Report is included as Attachment L and is in accordance with Section 175-35 of the Code of the Town of Agawam.

(4) Within 21 days of receipt, the Planning Board shall hold a public meeting. The Planning Board shall within 35 days of receipt approve the site plan, approve it with modifications or return it for changes or additional information. When changes have been made or additional information provided, the above-specified time limits will apply. The Planning Board can in certain cases extend the review period if done so in writing and for good reason; however, the review period shall not exceed 90 days. A report containing the findings of the Board shall be submitted to the Inspector of Buildings for consideration in issuing a building permit.

Acknowledged.

(5) Any application for a building permit requiring site plan approval shall not be deemed complete until such site plan is submitted.

Acknowledged.

(6) Any decision pursuant to a site plan review shall be subject to the right of appeal to the Board of Appeals.

Acknowledged.

Article XXIII Battery Energy Storage Systems

Section 180-167. General Requirements

1. All permits required by state codes, including but not limited to building permit, an electrical permit, and a fire department permit shall be required for installation of all battery energy storage systems.

Acknowledged. All required permits will be obtained before the work associated with those permits commences.

2. All battery energy storage systems, all Dedicated Use Buildings, and all other buildings or structures that (a) contain or are otherwise associated with a battery energy storage system; and (b) are subject to the requirements of the State Building Code, shall be designed, erected, and installed in accordance with all applicable provisions of the State Building Code, the State Fire Code, and the State Electrical Code. All battery energy storage systems shall comply with the NFPA Standard for the Installation of Stationary Energy Storage Systems, as amended from time to time.

   Acknowledged. All buildings and structures associated with the BESS will be designed, erected, and installed in accordance with all applicable provisions of the State Building Code, the State Fire Code, and the State Electrical Code. The BESS will comply with the National Fire Protection Association (NFPA) Standard for the Installation of Stationary Energy Storage Systems.

3. Energy storage system capacities, including array capacity and separation, are limited to the thresholds contained in the NFPA Standard for the Installation of Stationary Energy Storage Systems, as amended from time to time.

   Acknowledged. The energy storage system capacities for the BESS will not exceed the thresholds contained in the NFPA Standard for the Installation of Stationary Energy Storage Systems.

4. Any battery energy storage system constructed in the Floodplain District as set forth in §180-68 shall require a special permit granted pursuant to §180-71.

   Acknowledged. The Project is not located within a Floodplain District.

5. Any application to construct a Tier 2 or Tier 3 battery energy storage system where the energy storage units are located within two hundred fifty (250) feet of a sensitive noise receptor may be required to include an acoustic study in order to ensure that any increase in sound complies with Massachusetts DEP requirements.

   Acknowledged. A Sound Study has been included in this application as Attachment G.

Section 180-169. Permitting Requirements for Tier 2 and Tier 3 Battery Energy Storage Systems

Tier 2 and Tier 3 Battery Energy Storage Systems are allowed by right in any Industrial zone subject to applicable provisions of the State Building Code, the State Electrical Code, the State Fire Code, and other applicable codes, and subject to site plan review as outlined in §180-13 of the Code of the Town of Agawam and such provisions of this Article as are applicable. Tier 2 Battery Energy Storage Systems are allowed by right in the Agricultural zone subject to applicable provisions of the State Building Code, the State Electrical Code, the State Fire Code, and other applicable codes, and subject to site plan review as outlined in §180-13 of the Code of the Town of Agawam and such provisions of this Article as are applicable. Tier 3 Battery Energy Storage Systems are allowed in the Agricultural zone subject to the issuance of a special permit as outlined in §180-11 of the Code of the Town of Agawam and subject to applicable provisions

of the State Building Code, the State Electrical Code, the State Fire Code, and other applicable codes, and subject to site plan review as outlined in §180-13 of the Code of the Town of Agawam and such provisions of this Article as are applicable. No Tier 2 or Tier 3 Battery Energy Storage System shall be constructed or installed in any Residential or Business zone, except for access or utility interconnection. Tier 1, Tier 2 and Tier 3 BESS shall comply with the applicable requirements set forth in this Article, as well as the Code of the Town of Agawam. The following requirements apply to all BESS subject to this Article, except where it is specifically noted to apply only to Tier 2 or Tier 3 BESS:

1. Utility Lines and Electrical Circuitry. All on-site utility lines shall be placed underground to the extent feasible and as permitted by the serving utility, with the exception of the main service connection at the utility company right-of-way and any new interconnection equipment, including without limitation any poles.

   Acknowledged. All utility lines for the Project will be placed underground except for the 115kV generator tie line which will be located overhead and connect to the existing Eversource South Agawam Switchyard. Site Layout Plan – Sheet 2 displays the location of this generator tie line as well as the proposed locations for the support poles. Please note, the final configuration of the tie line and support poles may vary based upon final coordination with Eversource.

2. Signage. Signage shall comply with the requirements of Article XIII of Chapter 180 of the Code of the Town of Agawam and the following additional requirements; in the event of a conflict between the provisions of Article XIII and this Section, the requirements of this Section shall prevail.

   Acknowledged. Signage will comply with the requirements of Article XIII of Chapter 180.

   a. The signage shall be in compliance with ANSI requirements and shall include the type of technology associated with the battery energy storage systems, any special hazards associated, the type of suppression system installed in the area of battery energy storage systems, and twenty-four (24) hour emergency contact information, including reach-back phone number.

      Acknowledged. Signage will comply with ANSI requirements and provide the information stated above. Please see the Lighting and Security Plan and Sign Details sheets in Attachment F for signage details. High voltage warning signage will be placed on the chain link fence surrounding the BESS and the Project's substation. Site information and emergency contact signage will be placed at each gated entry to the BESS and Project's substation. Please find below two examples of typical signage that will be used in the Project.





b. As required by the state electrical code, disconnect and other emergency shutoff information shall be clearly displayed on a light reflective surface. A clearly visible warning sign concerning voltage shall be placed at the base of all pad-mounted transformers and substations.

   Acknowledged. Signage will comply with these requirements and provide the information stated above. Please see the Lighting and Security Plan and Sign Details sheets in Attachment F for additional signage details. High voltage warning signage will be placed on the chain link fence surrounding the BESS and the Project's substation.

c. Signage compliant with ANSI requirements shall be provided on doors to rooms, entrances to BESS facilities, and on BESS outdoor containers.

   Acknowledged. Signage will comply with ANSI requirements and be provided in the locations stated above. Please see the Lighting and Security Plan and Sign Details sheets in Attachment F for additional signage details.

3. Lighting. Lighting systems shall be consistent with local, state and federal law. Lighting of other parts of the installation, such as appurtenant structures, shall be limited to that required for safety and operational purposes, and shall be reasonably shielded from abutting properties.

   Acknowledged. Lighting systems will comply with local, state, and federal regulations; will be limited to those locations required for safety and operational purposes; and will be reasonably shielded from abutting properties as necessary. Please see the Lighting and Security Plan in Attachment F for lighting details. Light fixtures will be installed at the gated entries of each service road, on the Project side of retained buildings, and within the Project's substation.

4. Vegetation and tree-cutting. Areas within ten (10) feet on each side of Battery Energy Storage Systems shall be cleared of combustible vegetation and other combustible growth. Single specimens of trees, shrubbery, or cultivated ground cover such as green grass, ivy, succulents, or similar plants used as ground covers shall be permitted provided

that they do not form a means of readily transmitting fire. Removal of trees should be minimized to the extent possible.

Acknowledged. Although there is minimal existing vegetation in the proposed location of the BESS, where necessary, areas within ten (10) feet on each side of BESSs will be cleared of any combustible vegetation and other combustible growth. Additionally, near the Project's on-site substation at the rear of the property, there may be a need to remove a few trees that might cause hazards for the facility, as well as some smaller trees/saplings, based upon earlier site visits to the property. There are also some aspen and cottonwoods in a few pockets along the eastern property line near the pond that will need to be removed as well. Combustible growth and tree removal is always an important issue for BESS facilities as vegetation can cause immediate potential hazards for these facilities, and potentially in the future as well as the vegetation grows upward and outward.

6. Setbacks. Tier 2 Battery Energy Storage Systems shall be set back a minimum of fifty (50) feet from all side, rear, and front lot lines; Tier 3 BESS shall be set back a minimum of one hundred (100) feet from side, rear, and front lot lines that abut or are across a street from residential zoning districts or existing single, two-family, or multi-family structures. The minimum setback areas shall include a buffer area at least fifteen (15) feet wide along all property lines. Access drives and parking are allowed in the setback areas, but shall not intrude into the required buffer areas except where necessary to provide access or egress to the property. In addition, a minimum of ten (10) feet must be maintained between BESS components and all buildings, stored combustible materials, hazardous materials, high-piled storage, personnel means of egress, and other exposure hazards not associated with electrical grid infrastructure.

   Acknowledged. As displayed on Site Layout Plan – Sheet 1 and Site Layout Plan – Sheet 2 in Attachment F, all components of the BESS are setback at least 100 feet from all lot lines. All other components to the Project, such as the substation, comply with the setback requirements of the Industrial District B zoning district. A buffer area has been provided around the perimeter of the BESS where feasible to work around access drives. All BESS components are at least 10 feet away from all buildings and the other items listed above.

7. Dimensional. Tier 2 and Tier 3 Battery Energy Storage Systems shall comply with the dimensional limitations for principal structures of the underlying zoning district as provided in Table of Dimension Regulations (See 180 Attachment 4, Appendix B to Chapter 180 of the Code of the Town of Agawam, unless otherwise provided in this Article).

   Acknowledged. As displayed on Site Layout Plan – Sheet 1 and Site Layout Plan – Sheet 2 in Attachment F, all components of the BESS are setback at least 100 feet from all lot lines. No new principal structures are being erected for the Project. As displayed on the Existing Conditions and Demo Plan in Attachment F, of the eight (8) existing buildings on the site, only the two (2) along the southwest property line will be fully retained and a

third, the one closest to Silver Street, will have its rear section demolished while the front portion will be retained for office and administrative uses.

8. Fencing Requirements. Battery Energy Storage Systems, including all mechanical equipment, shall be enclosed by a minimum eight (8) foot high fence with a self-locking gate to prevent unauthorized access unless housed in a dedicated-use building. Said fence may be placed within any minimum setback area. Security barriers, fences, landscaping and other enclosures must not inhibit required air flow to or exhaust from the BESS and components. The NFPA Standard for the Installation of Stationary Energy Storage Systems, as amended from time to time, requires specialty safety systems to be provided based on the BESS chemistry and installed location.

   Acknowledged. The associated equipment for the BESS will be enclosed by an 18-foot-high, 433-foot-long, solid wall on its northwest side and an 8-foot-high chain link fence in all other locations. This wall and fencing will act as physical, visual, and sound barriers as detailed in Site Layout Plan – Sheet 1 and Site Layout Plan – Sheet 2 in Attachment F. Gates will be provided where access roads intersect the fencing or sound wall, for the both the BESS and Project's substation. There will also be a gate on the north side of the BESS near the stormwater management area. The NHESP requirements for the Project include the fencing being installed to and into the ground to prevent wildlife or potential rare species from entering the site, and the gates will be constructed to prevent wildlife passage as well.

9. Screening and Visibility. Battery Energy Storage Systems shall have views minimized from adjacent properties to the extent reasonably practicable using architectural features, earth berms, landscaping or other screening methods that will harmonize with the character of the property and surrounding area. Such features may not inhibit required air flow to or exhaust from the BESS and components and must comply with the setbacks established in paragraph 6 above.

   Acknowledged. As displayed in Site Layout Plan – Sheet 1 and Site Layout Plan – Sheet 2 in Attachment F, the BESS will be enclosed by an 18-foot-high, 433-foot-long, solid sound wall on its northwest side and an 8-foot-high chain link fence on all other sides. The front of the property between Silver Street and the BESS will consist of heavy landscaping, privacy wood board fencing, and a screening mound between the two (2) access driveways. These items are displayed on Landscape Plan Enlargement – Sheet 3 in Attachment F. To the east of the BESS is an existing, sizeable, vegetated wetland area, that is not being disturbed as part of this Project, which will also act as a buffer. Additionally, as displayed in the Existing Conditions and Demo Plan in Attachment F, the two (2) large buildings along the southwest property line, both of which are approximately two (2) stories in height, will be fully retained. Each of these items will act as physical, visual, and sound barriers to properties adjacent to the BESS.

10. Batteries. Failed battery cells and modules shall not be stored on the site and shall be removed no later than thirty (30) days after deemed failed by the BESS operator or cell/module manufacturer. The operator shall notify the Agawam Fire Chief in advance if the type of battery or batteries used onsite is to be changed.

    Acknowledged.

11. Decommissioning Plan. The applicant for Tier 2 and Tier 3 BESS shall submit with its application a decommissioning plan for the BESS to be implemented upon abandonment and/or in conjunction with removal of the facility. The owner or operator of the BESS shall notify the Building Commissioner in writing at least twenty (20) days prior to when a BESS will be decommissioned. Decommissioning of an abandoned or discontinued BESS shall be completed within six (6) months after the facility ceases operation. The decommissioning plan shall include:

    a. A narrative description of the activities to be accomplished, including who will perform that activity and at what point in time, for complete physical removal of all battery energy storage system components, structures, equipment, security barriers, and transmission lines from the site;

       Acknowledged. Section 3.5 Equipment Removal Sequence on page 6 of the Decommissioning Plan (Attachment I) provides guidance on the typical removal process of all BESS components.

    b. Disposal of all solid and hazardous waste in accordance with local, state, and federal waste disposal regulations;

       Acknowledged. Section 3.7 Health, Safety & Environmental on page 7 of the Decommissioning Plan (Attachment I) speaks to the health and safety requirements in place regarding the appropriate handling of solid and hazardous waste.

    c. The anticipated life of the battery energy storage system;

       Acknowledged. Sections 3.1 on page 4 and 4.2.2 on page 13 of the Decommissioning Plan (Attachment I) discuss the anticipated life of the battery energy storage system.

    d. The estimated decommissioning costs and how said estimate was determined;

       Acknowledged. Section 4.0 Estimate of Probable Costs starting on page 8 of the Decommissioning Plan (Attachment I) discusses estimated decommissioning costs and how the estimates were determined.

    e. The method of ensuring that funds will be available for decommissioning and restoration;

Acknowledged. Sections 4.0 Estimate of Probable Costs starting on page 8 and 4.2 Scrap/Salvage Value on page 12 of the Decommissioning Plan (Attachment I) speak to the method of ensuring funds will be available for decommissioning and restoration.

f. The method by which the decommissioning cost will be kept current;

Acknowledged. Section 4.0 Estimate of Probable Costs starting on page 8 of the Decommissioning Plan (Attachment I) discusses the method by which the decommissioning cost will be kept current.

g. The manner in which the site will be restored, including a description of how any changes to the surrounding areas and other systems adjacent to the battery energy storage system, such as, but not limited to, structural elements, building penetrations, means of egress, and required fire detection suppression systems, will be protected during decommissioning and confirmed as being acceptable after the system is removed; and

Acknowledged. The manner in which the BESS site will be restored is discussed in Sections 3.6 Site Stabilization on page 7, 4.1.2 Site Work/Civil (Site Reclamation) on page 9, and 5.3 Schedule & Phasing on page 15 of the Decommissioning Plan (Attachment I).

h. A listing of any contingencies for removing an intact operational energy storage system from service, and for removing an energy storage system from service that has been damaged by a fire or other event.

Acknowledged. The procedures for removing intact BESSs with no major defects is discussed in Sections 3.5 Equipment Removal Sequence on page 6 and 4.1 Disassembly & Removal on page 9 of the Decommissioning Plan (Attachment I).

12. Decommissioning Bond. The owner and/or operator of a Tier 2 or Tier 3 BESS shall continuously maintain a bond or other surety acceptable to the Town, in a form approved by the Mayor, for the removal of the battery energy storage system, in an amount to be determined by the Town, for the period of the life of the facility. All costs of the financial security shall be borne by the applicant.

Acknowledged. A Decommissioning Bond will be posted per the requirements above prior to the issuance of a Building Permit.

13. Proof of Liability Insurance. The applicant for a Tier 2 or Tier 3 BESS or the property owner shall provide evidence of commercially liability insurance in an amount and type generally acceptable in the industry and approved by the Mayor prior to the issuance of a building permit, and shall continue such insurance in effect until such facility has been decommissioned, removed and the site restored in accordance with this Article.

Acknowledged. Liability insurance will be implemented per the requirements above prior to the issuance of a Building Permit for the Project.

Section 180-170 Site Plan Application

For Tier 2 and Tier 3 Battery Energy Storage Systems, the site plan application shall include the following information, in addition to that required by §180-13 of the Code of the Town of Agawam:

1. A one-line or three-line electrical diagram detailing the battery energy storage system layout, associated components, and electrical interconnection methods, with all state electrical code compliant disconnects and over current devices.

   Acknowledged. Please see the Power One-Line, 115kV Relay One-Line, 34.5KV Bus 1 Relay One-Line, 34.5KV Bus 2 Relay One-Line, Substation General Arrangement, Collection Power One-Line, and Collection General Arrangement sheets in Attachment F.

2. A preliminary equipment specification sheet that documents the proposed battery energy storage system components, inverters and associated electrical equipment that are to be installed. A final equipment specification sheet shall be submitted prior to the issuance of building permit.

   Acknowledged. A preliminary equipment specification sheet for the Fluence SmartStacks is provided as Attachment E.

3. Name, address, and contact information of proposed or potential system installer and the owner and/or operator of the battery energy storage system. Such information of the final system installer shall be submitted prior to the issuance of building permit.

   Acknowledged. This information will be submitted to the Town of Agawam prior to the issuance of a Building Permit.

4. Large-scale fire test data, evaluation information, and calculations and modeling data. For any of the following, UL fire test data must be made available to the Town for review: BESS systems with a capacity of greater than 50kWh - BESS systems with spacing between arrays of less than three (3) feet.

   Acknowledged. This information is still being generated and will not be fully completed until the first or second quarter of 2026. Once fully prepared, this information will be submitted to the Town of Agawam prior to the issuance of a Building Permit for the Project.

5. Commissioning Plan. The system installer or commissioning agent shall prepare a commissioning plan prior to the start of commissioning. Such plan shall be compliant with the NFPA Standard for the Installation of Stationary Energy Storage Systems, as amended from time to time, and document and verify that the system and its associated

controls and safety systems are in proper working condition per requirements set forth in applicable state codes. Where commissioning is required by the building code, battery energy storage system commissioning shall be conducted by a Massachusetts Licensed Professional Engineer after the installation is complete but prior to final inspection and approval. A corrective action plan shall be developed for any open or continuing issues that are allowed to be continued after commissioning. A report describing the results of the system commissioning and including the results of the initial acceptance testing required by applicable state codes shall be provided to Zoning Enforcement Officer prior to final inspection and approval and maintained at an approved on-site location.

Acknowledged. A Commissioning Plan and Operations and Maintenance Manual will be prepared prior to the start of commissioning, according to the latest version of the NFPA Standard of Station of Stationary Energy Storage (NFPA 855).

6. Fire Safety Compliance Plan. Such plan shall document and verify that the system and its associated controls and safety systems are in compliance with state codes, including documentation that BESS components comply with the safety standards set forth in §180-172.

   Acknowledged. The Agawam BESS Siting Assessment (Attachment J) speaks to the Project's compliance with fire safety measures. Fire and Risk Alliance, LLC performed the siting assessment for the proposed lithium-ion BESS proposed for the Project site. The document presents a summary of the proposed BESS, its inherent safety features, the applicable codes/standards/test methods that would be applied to the Project site, a discussion of BESS hazards, and typical emergency response considerations. The siting assessment provides general guidance based on typical BESS design characteristics and common siting practices for BESS installations. Modern lithium-ion BESSs, when designed, certified, and installed in accordance with UL 9540, UL 9540A, NFPA 855, and other applicable fire codes/standards, provide sufficient safety at the site level during deployment. Overall, the proposed SmartStack BESS installation at the Project site will have the necessary safety measures in place as confirmed by specialized testing and as documented in the prospective hazard mitigation analysis (HMA) and emergency response planning (ERP).

7. Operation and Maintenance Manual. Such plan shall describe continuing battery energy storage system maintenance and property upkeep, as well as design, construction, installation, testing and commissioning information and shall meet all requirements set forth state codes and the NFPA Standard for the Installation of Stationary Energy Storage Systems, as amended from time to time. Maintenance provisions will be driven by manufacturer requirements for the specific listed system.

   Acknowledged. A Commissioning Plan and Operations and Maintenance Manual will be prepared prior to the start of commissioning, according to the latest version of the NFPA Standard of Station of Stationary Energy Storage (NFPA 855).

8. Depending on the location of the BESS in relation to and its interaction with the electrical grid, interconnection will be completed per the State Electrical Code. System interconnections into utility grids shall be in accordance with the NFPA Standard for the Installation of Stationary Energy Storage Systems, as amended from time to time. An accessible disconnect is required per the State Electrical Code.

   Acknowledged. The Project's interconnection and disconnect will be compliant with the State Electrical Code, and its system interconnections will be in accordance with the NFPA Standard for the Installation of Stationary Energy Storage Systems. Please note the following NFPA Compliance Statement regarding the BESS Interconnection Design:

   The interconnection design for the BESS Project, including the associated interconnection substation and related electrical, protection, and control systems, will be designed in accordance with applicable NFPA codes and standards as adopted and enforced by the Authority Having Jurisdiction (AHJ). The design will address fire prevention, life safety, electrical safety, and emergency response considerations consistent with applicable NFPA requirements.

   The Project's design will be developed to align with NFPA 855, Standard for the Installation of Stationary Energy Storage Systems, including provisions related to system separation distances, fire detection and suppression interfaces, emergency shutdown functions, signage, and coordination with emergency responders. Electrical equipment, grounding, bonding, working clearances, and overcurrent protection within the interconnection substation and associated facilities will be designed in accordance with NFPA 70, National Electrical Code (NEC), including applicable articles governing energy storage systems, power production sources, and medium- and high-voltage installations.

   Where applicable, fire detection, alarm, and signaling features associated with the BESS and interconnection facilities will be designed to align with NFPA 72. Fire protection considerations for substation equipment will be informed by NFPA 850 recommended practices for fire protection of electric generating plants and substations. The interconnection substation layout will provide appropriate access, egress, and working clearances to support safe operation and maintenance activities.

   NFPA compliance will be confirmed through detailed engineering, equipment listings and certifications where required, and construction-phase inspections. Final installation and energization will be subject to review and approval by the AHJ and local fire officials.

9. Prior to the issuance of the building permit, engineering documents must be signed and sealed by a Massachusetts Licensed Professional Engineer.

   Acknowledged.

10. Emergency Operations Plan. An Emergency Operations Plan compliant with the NFPA Standard for the Installation of Stationary Energy Storage Systems, as amended from time to time, is required. A copy of the approved Emergency Operations Plan shall be given to the system owner, the local fire department, and local fire code official. For so long as the BESS is operational, the operator shall provide the Fire Department, Police Department, Building Commissioner, and Mayor's office with contact information for personnel that can be reached twenty four (24) hours per day every day, and this contact information shall be updated by the operator whenever there is a change in the information. The operator shall also be required to have an official representative be present onsite not later than two hours after notification by the Fire Chief, Police Chief, or their designee. A permanent copy shall also be placed in an approved location to be accessible to facility personnel, fire code officials, and emergency responders. The emergency operations plan shall include the following information:

    a. Procedures for safe shutdown, de-energizing, or isolation of equipment and systems under emergency conditions to reduce the risk of fire, electric shock, and personal injuries, and for safe start-up following cessation of emergency conditions.

       Acknowledged. Section 8.9.3 on page 9 of the Emergency Preparedness and Response Plan (Attachment K) speaks to the isolation of equipment and systems under emergency conditions.

    b. Procedures for inspection and testing of associated alarms, interlocks, and controls, including time intervals for inspection and testing.

       Acknowledged. Section 8.6.3.9 on page 6 of the Emergency Preparedness and Response Plan (Attachment K) speaks to the various inspections and tests of the fire protection equipment that must be completed.

    c. Procedures to be followed in response to notifications from the Battery Energy Storage Management System, when provided, that could signify potentially dangerous conditions, including shutting down equipment, summoning service and repair personnel, and providing agreed upon notification to fire department personnel for potentially hazardous conditions in the event of a system failure.

       Acknowledged. Section 8 Plan starting on page 4 of the Emergency Preparedness and Response Plan (Attachment K) discusses the procedures to be followed in response to notifications from the BESS Management System that could signify potentially dangerous conditions.

    d. Emergency procedures to be followed in case of fire, explosion, release of liquids or vapors, damage to critical moving parts, or other potentially dangerous conditions. Procedures can include sounding the alarm, notifying the fire department, evacuating personnel, de-energizing equipment, and controlling and extinguishing the fire.

Acknowledged. Sections 8.3, 8.4, 8.5, and 8.6 on pages 5 to 7 of the Emergency Preparedness and Response Plan (Attachment K) speak to the emergency procedures to be followed in case of fire, explosion, release of liquids or vapors, damage to critical moving parts, or other potentially dangerous conditions.

e. Response considerations similar to a safety data sheet (SDS) that will address response safety concerns and extinguishment when an SDS is not required.

   Acknowledged. Section 8.3 on page 5 of the Emergency Preparedness and Response Plan (Attachment K) speaks to the SDS binder.

f. Procedures for safe disposal of battery energy storage system equipment damaged in a fire or other emergency event, including maintaining contact information for personnel qualified to safely remove damaged battery energy storage system equipment from the facility.

   Acknowledged. Sections 8.6 Fire on page 5, 8.9 Chemical Spill or Leak on page 9, 8.9.8 Tornado on page 10, 8.10 Earthquake on page 11, and 8.11 Wind Turbine Incident on page 11 of the Emergency Preparedness and Response Plan (Attachment K) speak to this item.

g. Other procedures as determined necessary by the Town to provide for the safety of occupants, neighboring properties, and emergency responders.

   Acknowledged. The Applicant is open to input from the Town regarding other elements that should be included in the Emergency Preparedness and Response Plan (Attachment K).

h. Procedures and schedules for conducting drills of these procedures and for training local first responders on the contents of the plan and appropriate response procedures.

   Acknowledged. Section 8.6.5 on page 7 of the Emergency Preparedness and Response Plan (Attachment K) speaks to the emergency drill procedures.

ATTACHMENT D – EXISTING CONDITIONS PHOTOGRAPHS



Front of 769 Silver Street - Looking Southeast



North Side of 769 Silver Street - Looking Southeast



Field in Northeast Section of 769 Silver Street - Looking Northeast



Between Buildings at 769 Silver Street – Looking Southeast



Rear of 769 Silver Street – Looking Northwest

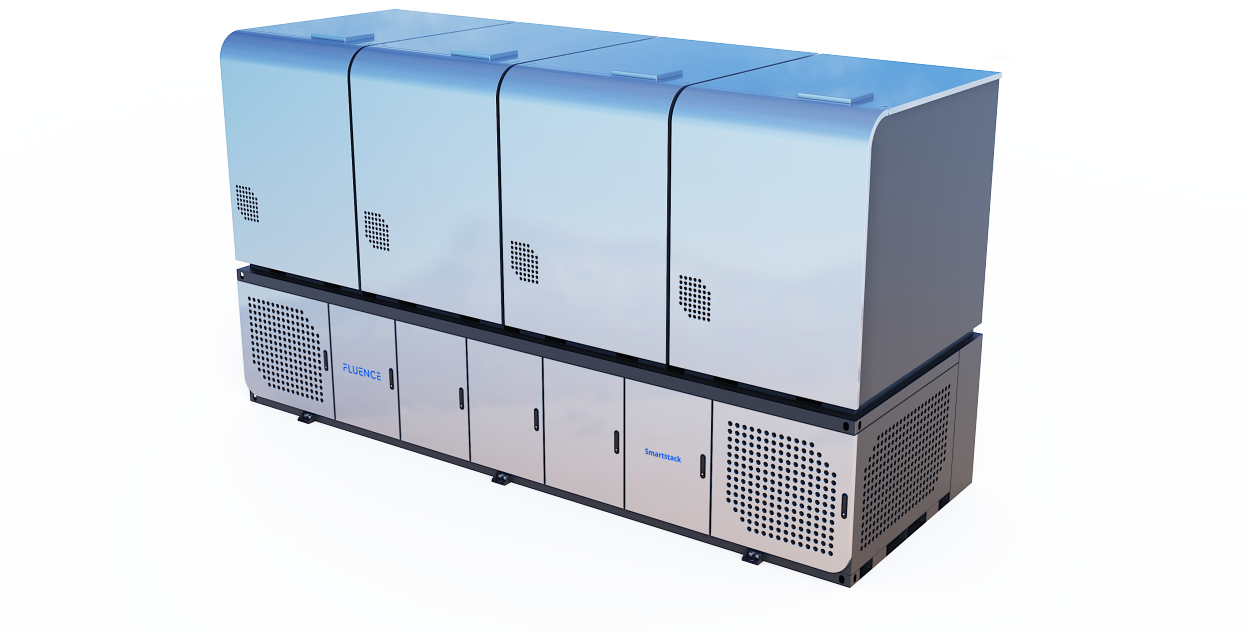


Rear of 769 Silver Street – Looking Southeast

ATTACHMENT E – FLUENCE SMARTSTACK PRODUCT DATASHEET

Smartstack™

- **Liquid-cooled 7.5 MWh BESS system - 2hr+ duration**



The Fluence Smartstack™ revolutionizes utility-scale energy storage by delivering embedded intelligence and unprecedented power density and in a revolutionary split architecture design. Our innovative approach makes intelligence, not hardware, the heart of innovation, creating the industry's first future-proof storage solution.

Maximum Power, Minimum Footprint

- Industry-leading energy density
- Optimized weight distribution
- Reduced land requirements
- Simplified site preparation

Embedded Intelligence

- Real-time performance optimization
- Predictive maintenance
- Complex event processing
- Continuous learning system

Maximize Investment

- Faster installation
- Streamlined permitting
- Up to 99% availability
- Turn system health from question into a certainty

Future-proof Design

- Upgrade without overhaul
- Easy capacity expansion
- Regular software updates
- Recyclability/End of life

Integrated Technology

- Fast Installation and Commissioning
- Standardized solution
- Standard power distribution block
- High energy density system
- Fast Stop circuit (F-Stop)
- Uninterruptible power supply (UPS)
- Battery thermal management system
- Interior climate-control HVAC unit
- NFPA 72 and EN 54 compliant fire alarm system
- Fire detection: certified SIL 2 fire detector
- Incipient gas detection: H_2 sensor
- Battery Pod vent exhaust system
- NFPA 68 and NFPA 69 compliant system
- NFPA 855 compliant system

System Configuration

Specification	Description
Cell	
Cell Chemistry	LFP
Cell Capacity (Ah)	314
Cell Rating C-rate	≤0.5
Pod	
Battery Strings per Pod	4.5
Modules per Pod	18
Pod Weight (including coolant)	~15,400 kg (33,952 lbs)
Pod Dimensions (L x D x H)	1,762 x 2,528 x 2,550 mm (5.78 x 8.3 x 8.4 ft.)
Smart Skid	
Nameplate Energy (kWh)	7,500
Number of Pods per Skid	4
Number of PCS per Skid (4hr/2hr)	5/9
Nominal AC Voltage	690 V AC, 3 phase
Maximum AC Output Current (A) (4hr/2hr)	2,092/3,765
Smart Skid Dimensions (L x D x H)	7,320 x 2,200 x 1,524 mm (24 x 7.22 x 5 ft.)
Smart Skid Weight	~11,000 kg (24,250 lbs) ±5%
Coolant Volume	~500 liters (132 gallons)
Battery coolant type	50/50 water/glycol
Auxiliary Power	
Peak Load Power Demand (kW)	~110
Supply mode	Internal (self-supply) and external provisions

Specification	Description
External supply mode	400 V AC, 3 phase
UPS Backup time	20 minutes to 2 hours
Mechanical Specification	
Seismicity	• Meets International Building Code (IBC) • Meets California Building Code (CBC) requirements per Seismic Design Category (SDC) D • Conforms to ASCE 7-16 standard • Compliant with IEEE693 High
Installation	• Compatible with bottom and top lifting
Enclosure sound pressure level at 1 m (Free Field)	• <70 dB(A) at 25 °C (77 °F)
Communication	
System BMS to Rack BMS	• Ethernet RJ45
OS Compatibility	• F.OS7 or later
Environment Specifications	
Operating Temperature Range (Ambient)	• -20 °C to +55 °C (-4 °F to +131 °F) • -30 °C to +55 °C (-22 °F to +131 °F) with cold weather kit • Derating after 50 °C (122 °F)
Wind Speed	• 240 km/h (149 mph)
Altitude	• Power de-rated over 2000 m (6562 ft) up to maximum of 4000 m (13123.3 ft) (1.5% for every 100 m)
Foundations	• Concrete Foundation • Static reference load 45 kN/m^2
Snow Load	• 130 kg/m2 (26.62 lbs/sq. ft)
IP Rating	• IP55
Chemical and Corrosion Resistance (ISO 12944-6)	• C3 Standard • C5 Optional

PCS

Specification	Description
AC Continuous Apparent Power	2 x 250 kVA
Nominal AC Voltage	690 V
Minimum DC Voltage	1164 V
Maximum DC Voltage	1500 V
Continuous AC Voltage Range	Nominal ±10%
Maximum Continuous AC Current	2 x 209 A
PF Range	0.9 (Lag)/0.9 (Lead)
Nominal AC Frequency	50/60 Hz
Cooling Method	Liquid cooled
Certification	• Safety: IEC 62477-1, UL1741, CSA C22.2No. 107.1 • EMC: FCC Part 15, IEC 61000-6-2, IEC 61000-6-4 • Grid codes as applicable

Approvals/Certifications/Tests

The Fluence Smartstack shall be certified to UL 9540 and tested as per IEC61439.2, and UL9540A at cell, module, and unit level.

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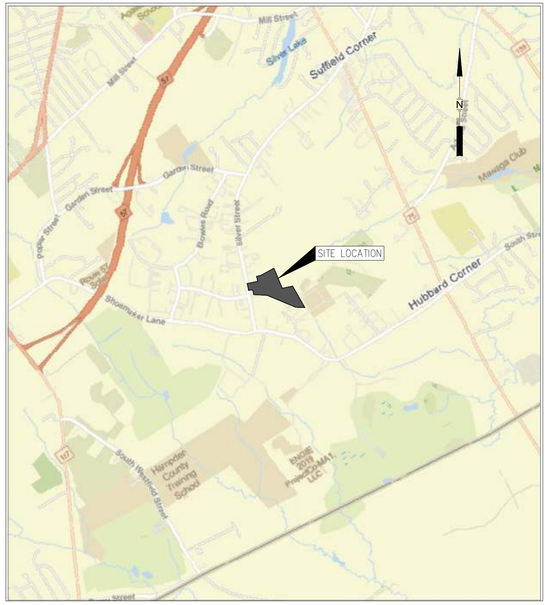
ATTACHMENT F – PLANS AND RENDERINGS

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

TITLE	DWG NO
COVER SHEET	AW1-C-000
EXISTING CONDITIONS PLAN	AW1-C-200
LAYOUT PLAN (SHEET 1 OF 2)	AW1-C-201-1
LAYOUT PLAN (SHEET 2 OF 2)	AW1-C-201-2
GRADING PLAN (SHEET 1 OF 2)	AW1-C-202-1
GRADING PLAN (SHEET 2 OF 2)	AW1-C-202-2
UTILITY PLAN	AW1-C-203
LIGHTING AND SECURITY PLAN	AW1-C-204
EROSION AND SEDIMENT CONTROL DETAILS	AW1-C-300
SITE DETAILS	AW1-C-301
SIGN DETAILS	AW1-C-302
CHAIN LINK FENCE DETAILS	AW1-C-303
POWER ONE-LINE	AW1-E-100
115 KV RELAY ONE-LINE	AW1-E-200
34.5 KV BUS 1 RELAY ONE-LINE	AW1-E-201
34.5 KV BUS 2 RELAY ONE-LINE	AW1-E-202
SUBSTATION GENERAL ARRANGEMENT	AW1-P-100
COLLECTION POWER ONE-LINE	AW1-U-100
COLLECTION GENERAL ARRANGEMENT	AW1-U-200
TRENCH DETAILS	AW1-U-600
TRENCHLESS INSTALLATION DETAILS	AW1-U-601



0 1000 2000 4000

1 INCH = 2000 FEET

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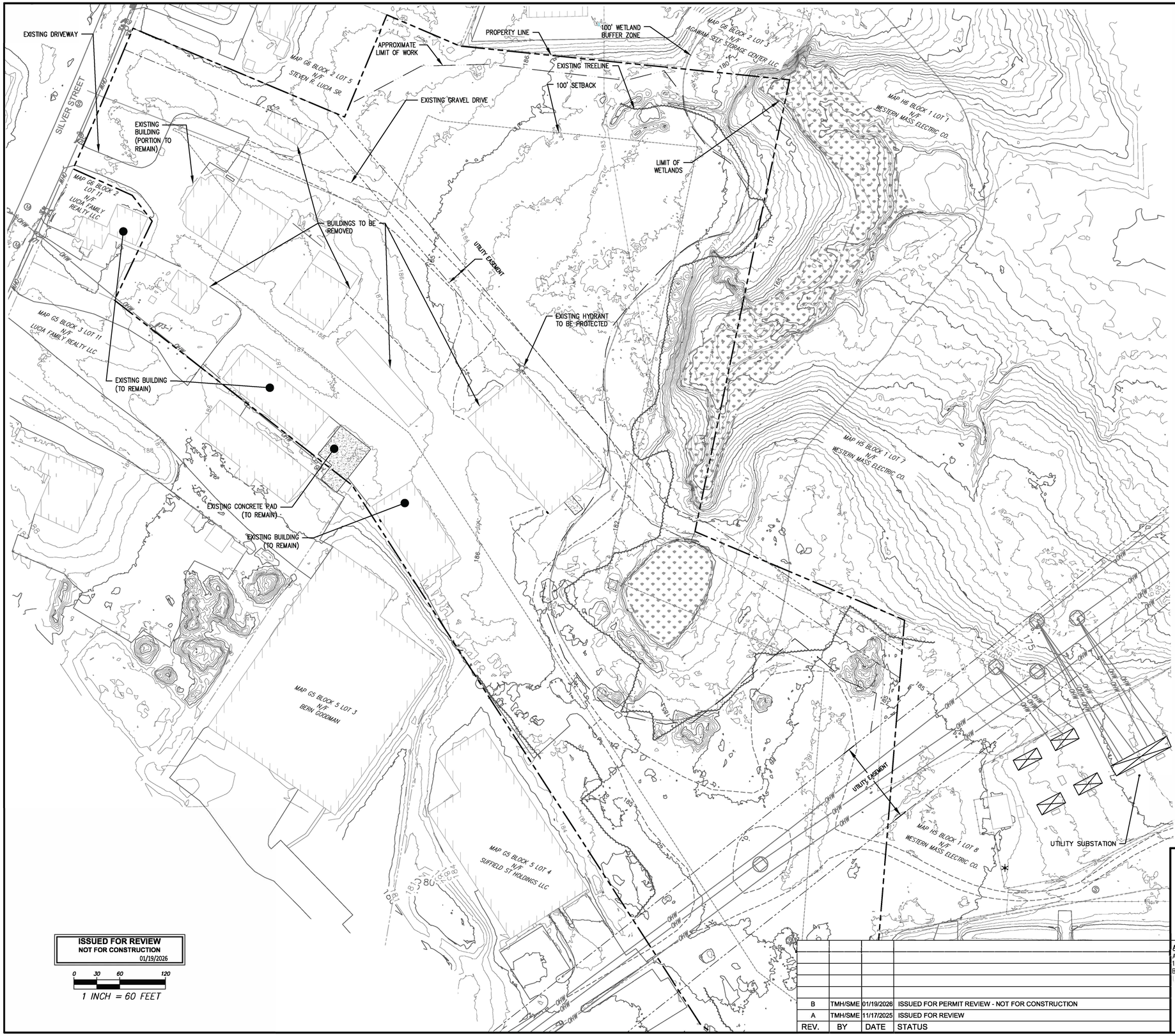
COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
Civil
No. 45045
REGISTERED PROFESSIONAL ENGINEER
1-19-2026

APPLICANT:
AGAWAM ENERGY CENTER, LLC
C/O MICHAEL ALVAREZ
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

PROJECT: 250741
DATE: 01-19-2026
REVISION: B
DRAWING: AW1-C-000



LEGEND

- PROPERTY LINE
- 100' PROPERTY SETBACK
- LIMIT OF WETLANDS
- 100' WETLAND BUFFER
- UTILITY EASEMENT
- EXISTING 1-FOOT CONTOUR — 181
- EXISTING 5-FT CONTOUR — 180
- EXISTING TREE LINE
- LIMIT OF WORK

NOTES

1. EXISTING CONDITIONS SURVEY CONDUCTED BY MILLSTONE LLC.

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0 30 60 120
1 INCH = 60 FEET

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A	TMH/SME	11/17/2025	ISSUED FOR REVIEW

COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
Civil
No. 45045
REGISTERED PROFESSIONAL ENGINEER
1-12-26

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

EXISTING CONDITIONS AND DEMO PLAN

APPLICANT:
AGAWAM ENERGY CENTER, LLC
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

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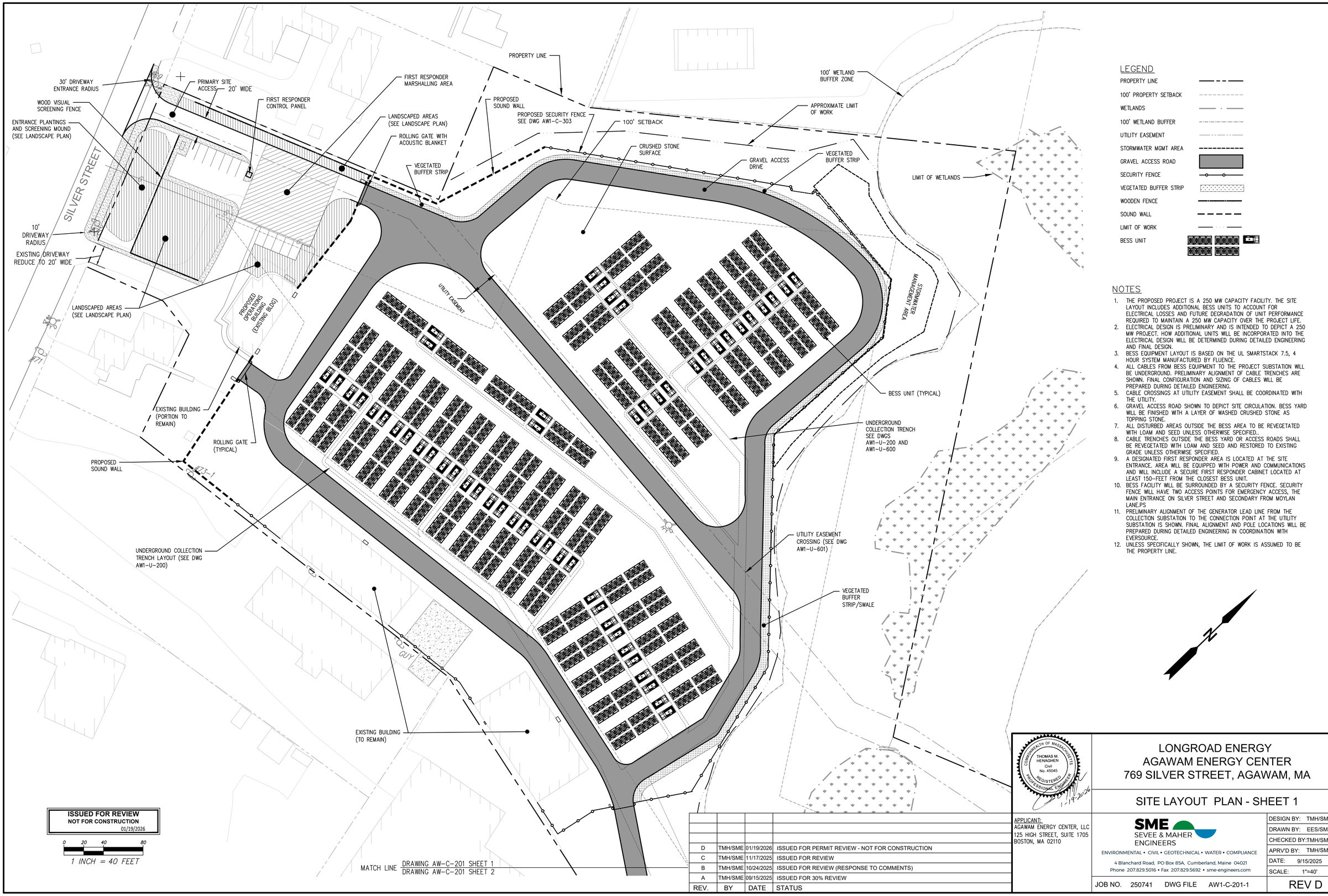
SCALE:	1"=60'

JOB NO. 250741 DWG FILE AW1-C-200 REV B



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D	TMH/SME	01/19/2026	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION
C	TMH/SME	11/17/2025	ISSUED FOR REVIEW
B	TMH/SME	10/24/2025	ISSUED FOR REVIEW (RESPONSE TO COMMENTS)
A	TMH/SME	09/15/2025	ISSUED FOR 30% REVIEW

COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
Civil
No. 45045
REGISTERED PROFESSIONAL ENGINEER
1-19-26

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

SITE LAYOUT PLAN - SHEET 1

APPLICANT:
AGAWAM ENERGY CENTER, LLC
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

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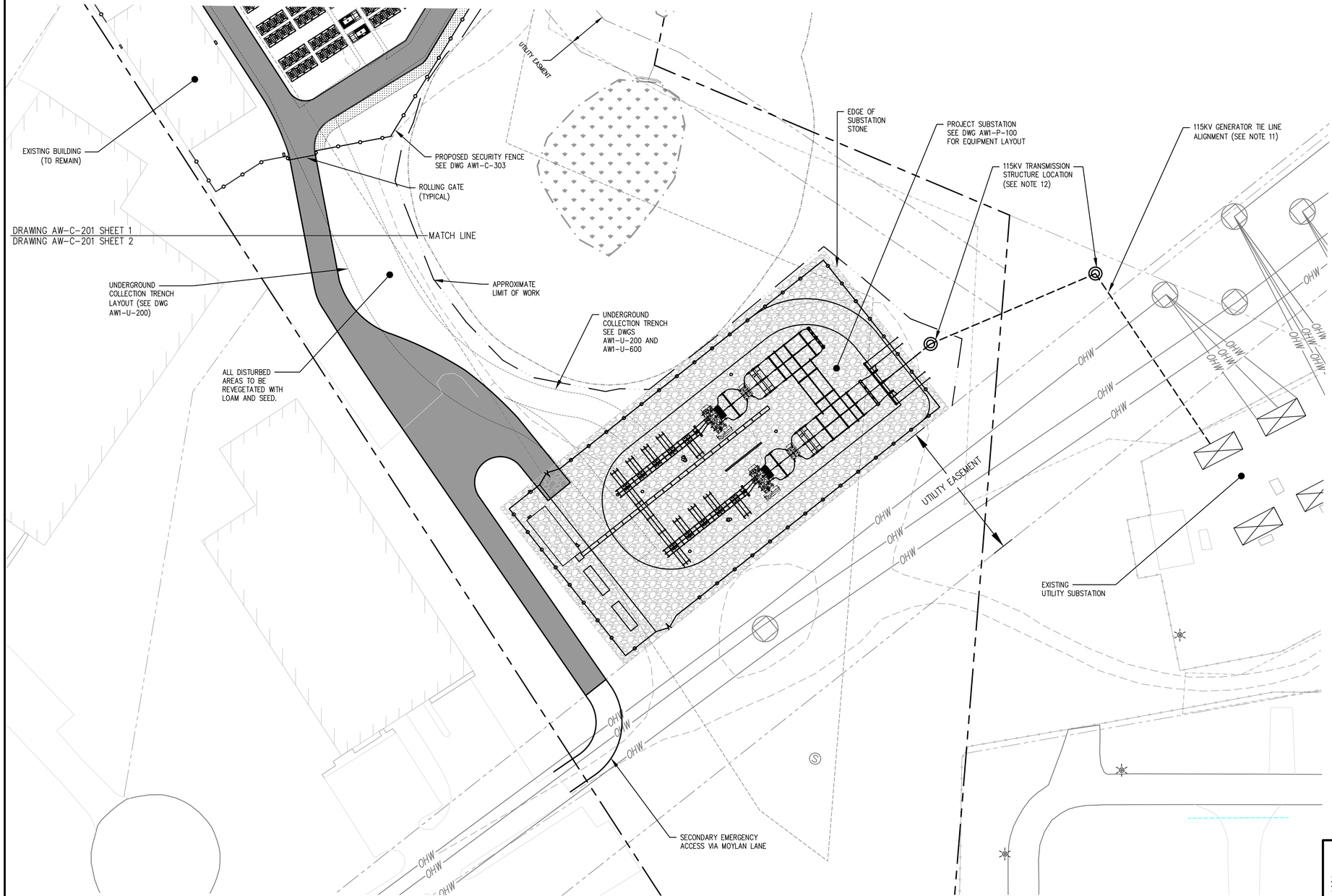
DATE:	9/15/2025
SCALE:	1"=40'

JOB NO. 250741 DWG FILE AW1-C-201-1 REV D



LEGEND

- PROPERTY LINE
- 100' PROPERTY SETBACK
- WETLANDS
- 100' WETLAND BUFFER
- UTILITY EASEMENT
- GRAVEL ACCESS ROAD
- VEGETATED BUFFER STRIP
- SECURITY FENCE
- SOUND WALL
- LIMIT OF WORK
- BESS UNIT

NOTES

1. THE PROPOSED PROJECT IS A 250 MW CAPACITY FACILITY. THE SITE LAYOUT INCLUDES ADDITIONAL BESS UNITS TO ACCOUNT FOR ELECTRICAL LOSSES AND FUTURE DEGRADATION OF UNIT PERFORMANCE REQUIRED TO MAINTAIN A 250 MW CAPACITY OVER THE PROJECT LIFE.
2. ELECTRICAL DESIGN IS PRELIMINARY AND IS INTENDED TO DEPICT A 250 MW PROJECT. HOW ADDITIONAL UNITS WILL BE INCORPORATED INTO THE ELECTRICAL DESIGN WILL BE DETERMINED DURING DETAILED ENGINEERING AND FINAL DESIGN.
3. BESS EQUIPMENT LAYOUT IS BASED ON THE UL SMARTSTACK 7.5, 4 HOUR SYSTEM MANUFACTURED BY FLUENCE.
4. ALL CABLES FROM BESS EQUIPMENT TO THE PROJECT SUBSTATION WILL BE UNDERGROUND. PRELIMINARY ALIGNMENT OF CABLE TRENCHES ARE SHOWN. FINAL CONFIGURATION AND SIZING OF CABLES WILL BE PREPARED DURING DETAILED ENGINEERING.
5. CABLE CROSSINGS AT UTILITY EASEMENT SHALL BE COORDINATED WITH THE UTILITY.
6. GRAVEL ACCESS ROAD SHOWN TO DEPICT SITE CIRCULATION. BESS YARD WILL BE FINISHED WITH A LAYER OF WASHED CRUSHED STONE AS TOPPING STONE.
7. ALL DISTURBED AREAS OUTSIDE THE BESS AREA TO BE REVEGETATED WITH LOAM AND SEED UNLESS OTHERWISE SPECIFIED..
8. CABLE TRENCHES OUTSIDE THE BESS YARD OR ACCESS ROADS SHALL BE REVEGETATED WITH LOAM AND SEED AND RESTORED TO EXISTING GRADE UNLESS OTHERWISE SPECIFIED.
9. A DESIGNATED FIRST RESPONDER AREA IS LOCATED AT THE SITE ENTRANCE. AREA WILL BE EQUIPPED WITH POWER AND COMMUNICATIONS AND WILL INCLUDE A SECURE FIRST RESPONDER CABINET LOCATED AT LEAST 150-FEET FROM THE CLOSEST BESS UNIT.
10. BESS FACILITY WILL BE SURROUNDED BY A SECURITY FENCE. SECURITY FENCE WILL HAVE TWO ACCESS POINTS FOR EMERGENCY ACCESS, THE MAIN ENTRANCE ON SILVER STREET AND SECONDARY FROM MOYLAN LANE.PS
11. PRELIMINARY ALIGNMENT OF THE GENERATOR LEAD LINE FROM THE COLLECTION SUBSTATION TO THE CONNECTION POINT AT THE UTILITY SUBSTATION IS SHOWN. FINAL ALIGNMENT MAY BE ADJUSTED BASED ON DETAILED ENGINEERING AND COORDINATION WITH EVERSOURCE.
12. THE ANTICIPATED CENTER POINT OF TRANSMISSION STRUCTURE ARE SHOWN. THE FINAL STRUCTURE LOCATION AND CONFIGURATION (HEIGHT, SIZE, TYPE) WILL BE DETERMINED BASED ON DETAILED ENGINEERING AND COORDINATION WITH EVERSOURCE.
13. UNLESS SPECIFICALLY SHOWN, THE LIMIT OF WORK IS ASSUMED TO BE THE PROPERTY LINE

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0 20 40 80
1 INCH = 40 FEET

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B	TMH/SME	10/24/2025	ISSUED FOR REVIEW (RESPONSE TO COMMENTS)
A	TMH/SME	09/15/2025	ISSUED FOR 30% REVIEW

COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
Civil
No. 45045
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1/19/2026

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

SITE LAYOUT PLAN - SHEET 2

APPLICANT:
AGAWAM ENERGY CENTER, LLC
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

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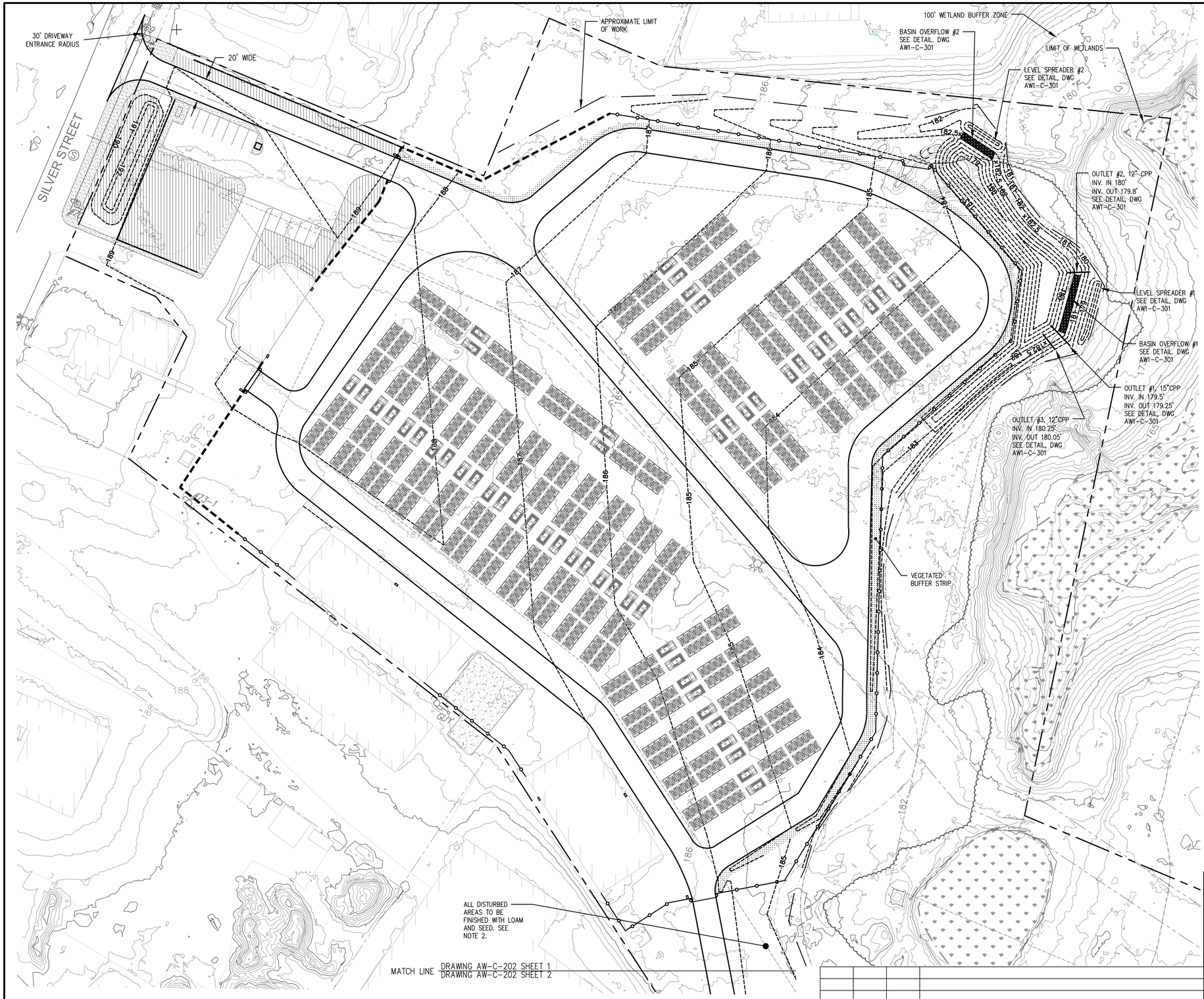
DATE:	9/15/2025
SCALE:	1"=40'

JOB NO. 250741 DWG FILE AW1-C-201-2

REV D



LEGEND

- PROPERTY LINE
- 100' PROPERTY SETBACK
- WETLANDS
- 100' WETLAND BUFFER
- UTILITY EASEMENT
- EXISTING 1-FT CONTOUR — 181
- EXISTING 5-FT CONTOUR — 180
- PROPOSED CONTOURS — 185
- PROPOSED SPOT ELEV. x 186.5
- GRAVEL ACCESS ROAD
- VEGETATED BUFFER STRIP
- SECURITY FENCE
- SOUND WALL
- LIMIT OF WORK

NOTES:

1. ALL DISTURBED AREAS TO BE RESTORED AND REVEGETATED WITH LOAM AND SEED UNLESS SPECIFIED OTHERWISE.
2. ANY CABLE TRENCHES OUTSIDE OF BESS YARD AND ACCESS ROAD SHALL BE REVEGETATED WITH LOAM AND SEED AND RESTORED TO EXISTING GRADE.
3. EROSION CONTROLS SHALL BE INSTALLED AND MAINTAINED ALONG THE PERIMETER OF THE WORK AREA IN ACCORDANCE WITH THE EROSION CONTROL NOTES AND DETAILS.

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1 INCH = 40 FEET

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A	TMH/SME	09/24/2025	ISSUED FOR REVIEW (RESPONSE TO COMMENTS)

COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
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No. 45045
REGISTERED PROFESSIONAL ENGINEER
1/19/2026

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

GRADING PLAN - SHEET 1

APPLICANT:
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125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

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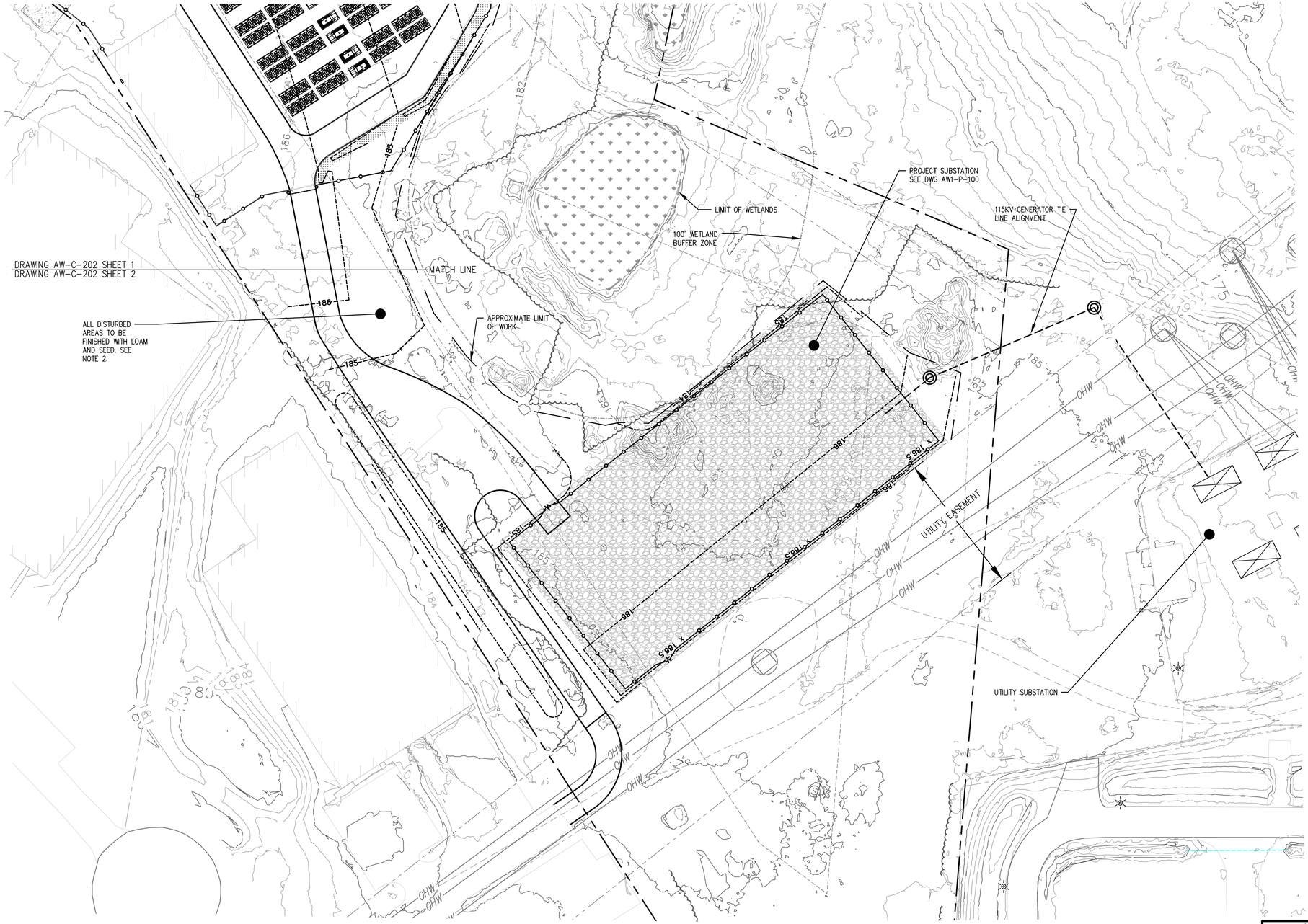

LEGEND

- PROPERTY LINE
- 100' PROPERTY SETBACK
- WETLANDS
- 100' WETLAND BUFFER
- UTILITY EASEMENT
- EXISTING 1-FT CONTOUR — 181
- EXISTING 5-FT CONTOUR — 180
- PROPOSED CONTOURS — 185
- PROPOSED SPOT ELEV. — x 186.5
- GRAVEL ACCESS ROAD
- VEGETATED BUFFER STRIP
- SECURITY FENCE
- LIMIT OF WORK

NOTES:

1. ALL DISTURBED AREAS TO BE RESTORED AND REVEGETATED WITH LOAM AND SEED UNLESS SPECIFIED OTHERWISE.
2. ANY CABLE TRENCHES OUTSIDE OF BESS YARD AND ACCESS ROAD SHALL BE REVEGETATED WITH LOAM AND SEED AND RESTORED TO EXISTING GRADE.
3. EROSION CONTROLS SHALL BE INSTALLED AND MAINTAINED ALONG THE PERIMETER OF THE WORK AREA IN ACCORDANCE WITH THE EROSION CONTROL NOTES AND DETAILS.

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COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
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No. 45045
REGISTERED PROFESSIONAL ENGINEER
1/19/2026

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

GRADING PLAN - SHEET 2

APPLICANT:
AGAWAM ENERGY CENTER, LLC
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

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DATE:	9/15/2025
SCALE:	1"=40'

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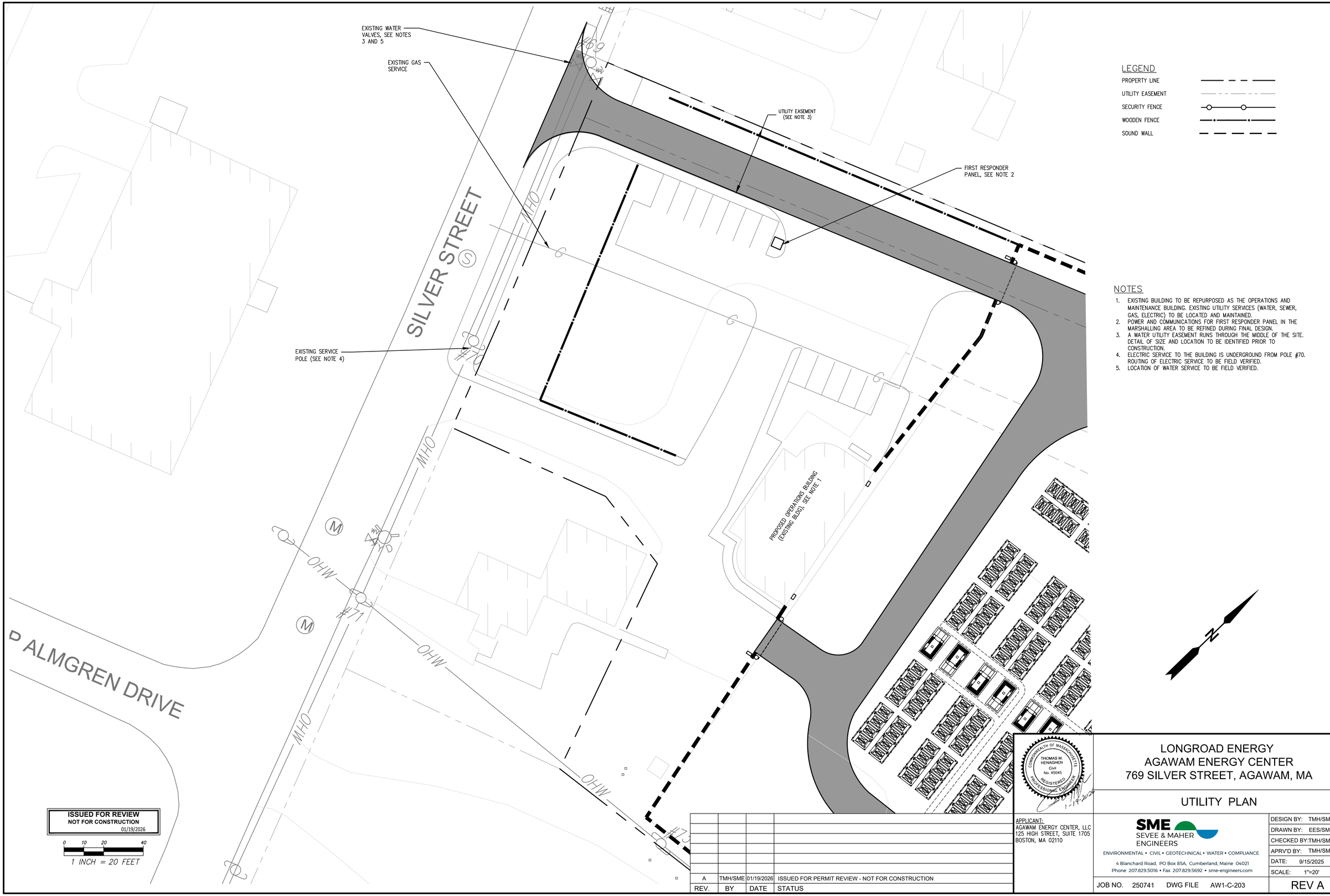

NOTES

1. EXISTING BUILDING TO BE REPURPOSED AS THE OPERATIONS AND MAINTENANCE BUILDING. EXISTING UTILITY SERVICES (WATER, SEWER, GAS, ELECTRIC) TO BE LOCATED AND MAINTAINED.
2. POWER AND COMMUNICATIONS FOR FIRST RESPONDER PANEL IN THE MARSHALLING AREA TO BE REFINED DURING FINAL DESIGN.
3. A WATER UTILITY EASEMENT RUNS THROUGH THE MIDDLE OF THE SITE. DETAIL OF SIZE AND LOCATION TO BE IDENTIFIED PRIOR TO CONSTRUCTION.
4. ELECTRIC SERVICE TO THE BUILDING IS UNDERGROUND FROM POLE #70. ROUTING OF ELECTRIC SERVICE TO BE FIELD VERIFIED.
5. LOCATION OF WATER SERVICE TO BE FIELD VERIFIED.

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COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
Civil
No. 45045
REGISTERED PROFESSIONAL ENGINEER
1-19-2026

APPLICANT:
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LONGROAD ENERGY
AGAWAM ENERGY CENTER
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UTILITY PLAN

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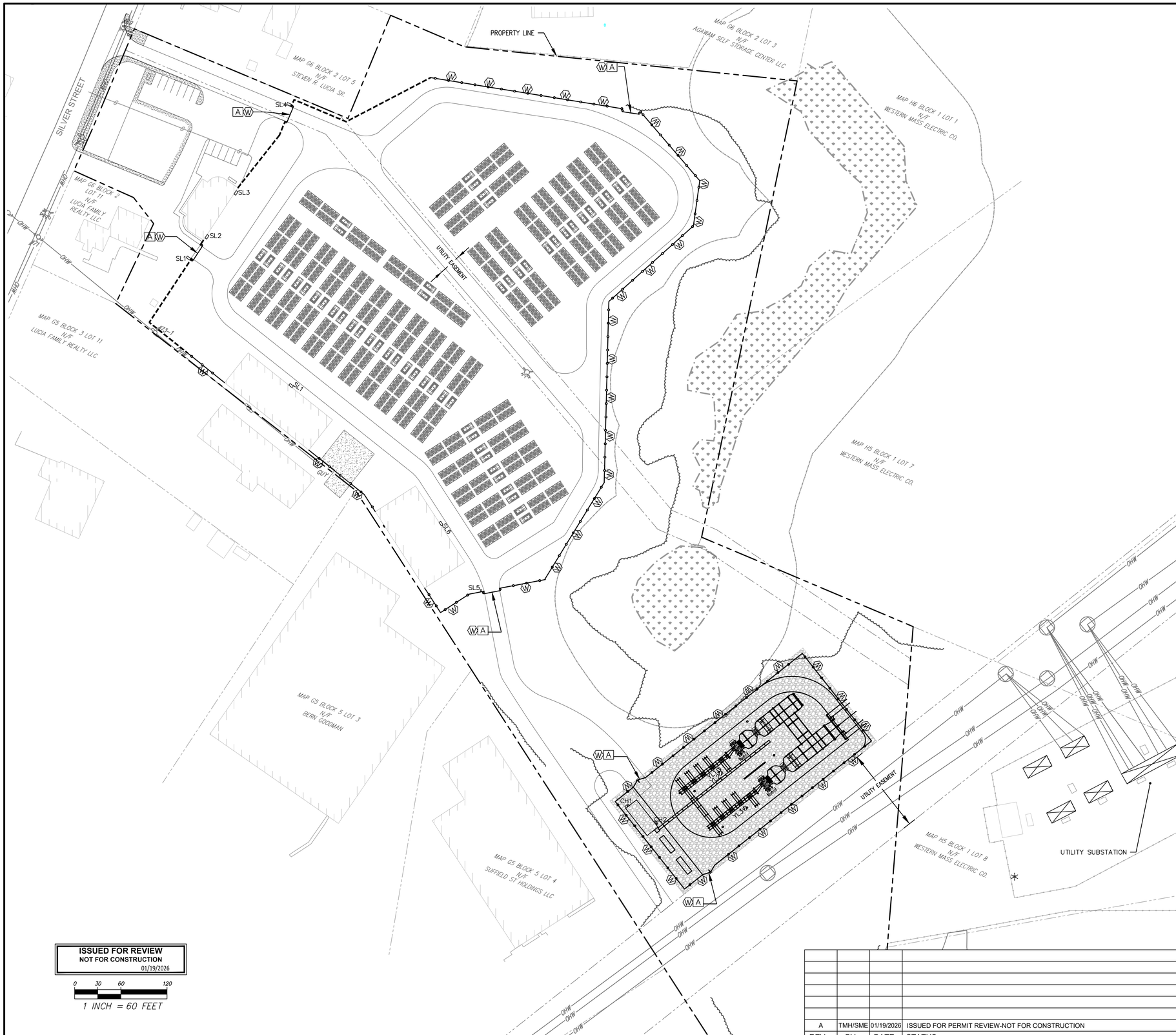

LIGHTING NOTES:

1. ALL FLOOD LIGHTS IN THE SUBSTATION (YL-1, YL-2 AND YL-3) ARE TASK LIGHTS AND SHALL BE NORMALLY IN THE "OFF" POSITION.
2. LIGHTS CH1 AND CH2 ARE PROVIDED BY THE CONTROL ENCLOSURE VENDORS.
3. SECURITY LIGHTS (SL) SHALL BE POLE MOUNTED NEAR GATES OR BUILDING MOUNTED. ALL LIGHTS WILL BE FULLY SHIELDED/FULL CUTOFF LIGHTING.

CH1 = CONTROL HOUSE LIGHTING
YL1 = YARD LIGHTING (NORMALLY OFF)
SL1 = SECURITY LIGHTING

SIGNAGE NOTES:

1. REFER TO C-303 SIGN DETAILS.
2. HIGH VOLTAGE WARNING SIGNS SHALL BE PLACED ON EVERY GATE, AT LEAST 25' FROM ANY FENCE CORNER OR TERMINATION, AND EVERY 50' ELSEWHERE. SIGNS SHOULD BE MOUNTED AT APPROXIMATELY 5' ABOVE FINISH GRADE. SIGNS SHALL BE MOUNTED ON THE OUTSIDE WITH ANTI-THEFT FENCE BRACKETS.
3. SITE INFO/911 SIGNS SHALL BE LOCATED ON NEXT TO GATES TO THE SUBSTATION AND BESS YARDS.

(W) HIGH VOLTAGE WARNING SIGN: 20"x14" "WARNING HIGH VOLTAGE"

[A] SITE INFO/911 SIGN: 36"x24" WITH SITE ADDRESS AND EMERGENCY PHONE NUMBER

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0 30 60 120
1 INCH = 60 FEET

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COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
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REGISTERED PROFESSIONAL ENGINEER
1-19-2026

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

LIGHTING AND SECURITY PLAN

APPLICANT:
AGAWAM ENERGY CENTER, LLC
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

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APRV'D BY:	TMH/SME
DATE:	01/16/2026
SCALE:	1"=60'

JOB NO. 250741 DWG FILE AW1-C-204

REV A

EROSION CONTROL NOTES:

A. GENERAL

1. All soil erosion and sediment control will be done in accordance with the Massachusetts Erosion and Sediment Control Guidelines for Urban Suburban Areas, latest edition.

2. The site Contractor (to be determined) will be responsible for the inspection and repair/replacement/maintenance of all erosion control measures, disturbed areas, material storage areas, and vehicle access points until all disturbed areas are stabilized.

3. Disturbed areas will be permanently stabilized within 7 days of final grading. Disturbed areas not to be worked upon within 14 days of disturbance will be temporarily stabilized within 7 days of the disturbance.

4. In all areas, removal of trees, bushes and other vegetation, as well as disturbance of topsoil will be kept to a minimum while allowing proper site operations.

5. Any suitable topsoil will be stripped and stockpiled for reuse as directed by the Owner. Topsoil will be stockpiled in a manner such that natural drainage is not obstructed and no off-site sediment damage will result. In any event, stockpiles will not be located within 100 feet of wetlands and will be at least 50 feet upgradient of the stockpile's perimeter silt fence. The sideslopes of the topsoil stockpile will not exceed 2:1. Silt fence will be installed around the perimeter of all topsoil stockpiles. Topsoil stockpiles will be surrounded with siltation fencing and will be temporarily seeded with Aroostook rye, annual or perennial ryegrass within 7 days of formation, or temporarily mulched.

6. Winter excavation and earthwork will be completed so as to minimize exposed areas while satisfactorily completing the project. Limit exposed areas to those areas in which work is to occur during the following 15 days and that can be mulched in one day. All areas will be considered denuded until the subbase gravel is installed in roadway areas or the areas of future loam and seed have been loamed, seeded, and mulched.

   Install any added measures necessary to control erosion/sedimentation. The particular measure used will be dependent upon site conditions, the size of the area to be protected, and weather conditions.

   To minimize areas without erosion control protection, continuation of earthwork operations on additional areas will not begin until the exposed soil surface on the area being worked has been stabilized.

B. TEMPORARY MEASURES

1. STABILIZED CONSTRUCTION ENTRANCE/EXIT

   A crushed stone stabilized construction entrance/exit will be placed at any point of vehicular access to the site, in accordance with the detail shown on this sheet.

2. SILT FENCE

   a. Silt fence will be installed prior to all construction activity, where soil disturbance may result in erosion. Silt fence will be erected at locations shown on the plans and/or downgradient of all construction activity.

   b. Silt fences will be removed when they have served their useful purpose, but not before the upgradient areas have been permanently stabilized.

   c. Silt fences will be inspected immediately after each rainfall and at least daily during prolonged rainfall. They will be inspected if there are any signs of erosion or sedimentation below them. Any required repairs will be made immediately. If there are signs of undercutting at the center or the edges, or impounding of large volumes of water behind them, they will be replaced with a temporary crushed stone check dam.

   d. Sediment deposits will be removed after each storm event if significant build-up has occurred or if deposits exceed half the height of the barrier.

3. STONE CHECK DAMS

   Stone check dams will be installed in grass-lined swales and ditches during construction. Remove stone check dams when they have served their useful purpose, but not before upgradient areas have been permanently stabilized.

4. EROSION CONTROL MIX SEDIMENT BARRIER

   a. Where approved, erosion control mix sediment barriers may be used as a substitute for silt fence. See the details in this drawing set for specifications.

   b. Rock Filter Berms: To provide more filtering capacity or to act as a velocity check dam, a berm's center can be composed of clean crushed rock ranging in size from the french drain stone to riprap.

5. TEMPORARY SEEDING

   Stabilize disturbed areas that will not be brought to final grade and reduce problems associated with mud and dust production from exposed soil surface during construction with temporary vegetation.

6. TEMPORARY MULCHING

   Use temporary mulch in the following locations and/or circumstances:

   - In sensitive areas (within 100 feet of streams, wetlands and in lake watersheds) temporary mulch will be applied within 7 days of exposing spill or prior to any storm event.
   - Apply temporary mulch within 14 days of disturbance or prior to any storm event in all other areas.
   - Areas which have been temporarily or permanently seeded will be mulched immediately following seeding.
   - Areas which cannot be seeded within the growing season will be mulched for over-winter protection and the area will be seeded at the beginning of the growing season.
   - Mulch can be used in conjunction with tree, shrub, vine, and ground cover plantings.
   - Mulch anchoring will be used on slopes greater than 5 percent in late fall (past October 15), and over-winter (October 15 - April 15).

   The following materials may be used for temporary mulch:

   a. Hay or Straw material shall be air-dried, free of seeds and coarse material. Apply 2 bales/1,000 sf or 1.5 to 2 tons/acre to cover 90% of ground surface.

   b. Erosion Control Mix: It can be used as a stand-alone reinforcement:
      - on slopes 2 horizontal to 1 vertical or less;
      - on frozen ground or forested areas; and
      - at the edge of gravel parking areas and areas under construction.

   c. Erosion control mix alone is not suitable:
      - on slopes with groundwater seepage;
      - at low points with concentrated flows and in gullies;
      - at the bottom of steep perimeter slopes exceeding 100 feet in length;
      - below culvert outlet aprons; and around catch basins and closed storm systems.

   d. Chemical Mulches and Soil Binders: Wide ranges of synthetic spray-on materials are marketed to protect the soil surface. These are emulsions that are mixed with water and applied to the soil. They may be used alone, but most often are used to hold wood fiber, hydro-mulches or straw to the soil surface.

   e. Erosion Control Blankets and Mats: Mats are manufactured combinations of mulch and netting designed to retain soil moisture and modify soil temperature. During the growing season (April 15 to October 15) use mats indicated on drawings or North American Green (NAG) S75 (or mulch and netting) on:
      - the base of grassed waterways;
      - steep slopes (15 percent or greater); and
      - any disturbed soil within 100 feet of lakes, streams, or wetlands.

   During the late fall and winter (October 15 to April 15) use heavy grade mats indicated on drawings for all areas.

C. TEMPORARY DUST CONTROL

To prevent the blowing and movement of dust from exposed soil surfaces, and reduce the presence of dust, use water or calcium chloride to control dusting by preserving the moisture level in the road surface materials.

D. CONSTRUCTION DE-WATERING

1. Water from construction de-watering operations shall be cleaned of sediment before reaching wetlands, water bodies, streams or site boundaries. Utilize temporary sediment basins, erosion control soil filter berms backed by staked hay bales, A Dirt Bag 55" sediment filter bag by ACF Environmental, or other approved Best Management Practices (BMP's).

2. In sensitive areas near streams or ponds, discharge the water from the de-watering operation into a temporary sediment basin created by a surrounding filter berm of uncompacted erosion control mix immediately backed by staked hay bales (see the site details). Locate the temporary sediment basin at lease 100 feet from the nearest water body, such that the filtered water will flow through undisturbed vegetated soil areas prior to reaching the water body or property line.

E. PERMANENT MEASURES

1. Riprapped Aprons: All storm drain pipe outlets and the inlet and outlet of culverts will have riprap aprons to protect against scour and deterioration.

2. Topsoil, Seed, and Mulch: All areas disturbed during construction, but not subject to other restoration (paving, riprap, etc.) will be loamed, limed, fertilized, seeded, and mulched.

   Seeded Preparation: Use stockpiled materials spread to the depths shown on the plans, if available. Approved topsoil substitutes may be used. Grade the site as needed.

   a. Seeding will be completed by August 15 of each year. Late season seeding may be done between August 15 and October 15. Areas not seeded or which do not obtain satisfactory growth by October 15, will be seeded with Aroostook Rye or mulched. After November 1, or the first killing frost, disturbed areas will be seeded at double the specified application rates, mulched, and anchored.

   PERMANENT SEEDING SPECIFICATIONS OUTSIDE OF BESS YARD FOOTPRINT

Mixture:	Roadside (lbs/acre)	Lawn (lbs/acre)
Kentucky Bluegrass	20	55
White Clover	5	0
Creeping Red Fescue	20	55
Perennial Ryegrass	5	15

   b. Mulch in accordance with specifications for temporary mulching.

   c. If permanent vegetated stabilization cannot be established due to the season of the year, all exposed and disturbed areas not to undergo further disturbance are to have dormant seeding applied and be temporarily mulched to protect the site.

   d. Any fertilizer used on the site to be free of phosphorous.

3. Ditches and Channels: All ditches on-site will be lined with North American Green S75 erosion control mesh (or an approved equal) upon installation of loam and seed.

F. WINTER CONSTRUCTION AND STABILIZATION

1. Natural Resource Protection: During winter construction, a double-row of sediment barriers (i.e., silt fence backed with hay bales or erosion control mix) will be placed between any natural resource and the disturbed area. Projects crossing the natural resource will be protected a minimum distance of 100 feet on either side from the resource.

2. Sediment Barriers: During frozen conditions, sediment barriers may consist of erosion control mix berms or any other recognized sediment barriers as frozen soil prevents the proper installation of hay bales or silt fences.

3. Mulching:

   - All areas will be considered to be denuded until seeded and mulched. Hay and straw mulch will be applied at a rate of twice the normal accepted rate.
   - Mulch will not be spread on top of snow.
   - After each day of final grading, the area will be properly stabilized with anchored hay or straw or erosion control matting.
   - Between the dates of November 1 and April 15, all mulch will be anchored by either mulch netting, emulsion chemical, tracking or wood cellulose fiber.

5. Soil Stockpiling: Stockpiles of soil or subsoil will be mulched for over-winter protection with hay or straw at twice the normal rate or with a 4-inch layer of erosion control mix. This will be done within 24 hours of stocking and re-established prior to any rainfall or snowfall. Any soil stockpiles shall not be placed (even covered with mulch) within 100 feet from any natural resources. Sediment barriers should be installed downgradient of stockpiles. Stormwater shall be directed away from stockpiles.

6. Seeding: Dormant seeding may be placed prior to the placement of mulch or erosion control blankets. If dormant seeding is used for the site, all disturbed areas will receive 4 inches of loam and seed at an application rate of three times the rate for permanent seeding. All areas seeded during the winter will be inspected in the spring for adequate catch. All areas insufficiently vegetated (less than 75 percent catch) will be revegetated by replacing loam, seed, and mulch.

   If dormant seeding is not used for the site, all disturbed areas will be revegetated in the spring.

7. Maintenance: Maintenance measures will be applied as needed during the entire construction season. After each rainfall, snow storm, or period of thawing and runoff, and at least once a week, the site Contractor will perform a visual inspection of all installed erosion control measures and perform repairs as needed to ensure their continuous function.

8. Identified repairs will be started no later than the end of the net work day and be completed within seven (7) calendar days.

   Following the temporary and/or final seeding and mulching, the Contractor will, in the spring, inspect and repair any damages and/or bare spots. An established vegetative cover means a minimum of 85 to 90 percent of areas vegetated with vigorous growth.

G. OVER-WINTER CONSTRUCTION EROSION CONTROL MEASURES

1. Stabilization of Disturbed Soil: By October 15, all disturbed soils on areas having a slope less than 15 percent will be seeded and mulched. If the Contractor fails to stabilize these soils by this date, then the Contractor shall stabilize the soil for late fall and winter, by using either temporary seeding or mulching.

2. Stabilization of Disturbed Slopes: All slopes to be vegetated will be completed by October 15. The Owner will consider any area having a grade greater than 15 percent (6.5H:1V) to be a slope. Slopes not vegetated by October 15 will receive one of the following actions to stabilize the slope for late fall and winter:

   a. Stabilize the soil with temporary vegetation and erosion control mesh.
   b. Stabilize the slope with erosion control mix.
   c. Stabilize the slope with stone riprap.
   d. Slopes steeper than 1.5:1 are prohibited.

3. Stabilization of Ditches and Channels: All stone-lined ditches and channels to be used to convey runoff through the winter will be constructed and stabilized by November 15. Grass-lined ditches and channels will be complete by September 15. Grass-lined ditches not stabilized by September 15 shall be lined with either sod or riprap.

H. MAINTENANCE PLAN

1. Routine Maintenance: Inspection will be performed as outlined in the project's Erosion Control Plan. Inspection will be by a qualified person during wet weather to ensure that the facility performs as intended. Inspection priorities will include checking erosion controls for accumulation of sediments.

I. Housekeeping

1. Spill prevention. Controls must be used to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

2. Groundwater protection. During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

3. Fugitive sediment and dust. Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control. If off-site tracking occurs roadways should be swept immediately and no loss once a week and prior to significant storm events.

4. Debris and other materials. Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

5. Trench or foundation de-watering. Trench de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the department.

6. Authorized Non-stormwater discharges. Identify and prevent contamination by non-stormwater discharges. Where allowed non-stormwater discharges exist, they must be identified and steps should be taken to ensure the implementation of appropriate pollution prevention measures for the non-stormwater component(s) of the discharge. Authorized non-stormwater discharges are:

   (a) Discharges from firefighting activity;

   (b) Fire hydrant flushings;

   (c) Vehicle washwater if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage and transmission washing is prohibited);

   (d) Dust control runoff in accordance with permit conditions and section I3;

   (e) Routine external building washdown, not including surface paint removal, that does not involve detergents;

   (f) Pavement washwater (where spills/leaks of toxic or hazardous materials have not occurred, unless all spilled material had been removed) if detergents are not used;

   (g) Uncontaminated air conditioning or compressor condensate;

   (h) Uncontaminated groundwater or spring water;

   (i) Foundation or footer drain-water where flows are not contaminated;

   (j) Uncontaminated excavation dewatering (see requirements in section I5);

   (k) Potable water sources including waterline flushings; and

   (l) Landscape irrigation.

7. Unauthorized non-stormwater discharges. The Department's approval under this Chapter does not authorize a discharge that is mixed with a source of non stormwater, other than those discharges in compliance with section I6. Specifically, the Department's approval does not authorize discharges of the following:

   (a) Wastewater from the washout or cleanout of concrete, stucco, paint, form release oils, curing compounds or other construction materials;

   (b) Fuels, oils or other pollutants used in vehicle and equipment operation and maintenance;

   (c) Soaps, solvents, or detergents used in vehicle and equipment washing; and

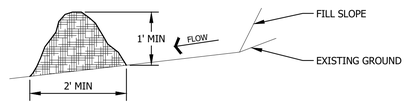
   (d) Toxic or hazardous substances from a spill or other release.

8. Additional requirements. Additional requirements may be applied on a site-specific basis.

J. CONSTRUCTION SEQUENCE

In general, the expected sequence of construction for each phase is provided below.

- Mobilization
- Install temporary erosion control measures
- Clearing and grubbing
- Site Grading
- Install gravel access road
- Install site utilities and BESS units
- Install fence
- Site stabilization, loam and seed, and landscaping
- Remove temporary erosion control measures



EROSION CONTROL MIX SEDIMENT BARRIER

NOTES:

1. EROSION CONTROL MIX CAN BE MANUFACTURED ON OR OFF THE SITE. IT MUST CONSIST PRIMARILY OF ORGANIC MATERIAL SEPARATED AT THE POINT OF GENERATION, AND MAY INCLUDE: SHREDDED BARK, STUMP GRINDINGS, COMPOSTED BARK, OR FLUME GRIT AND FRAGMENTED WOOD GENERATED FROM WATER-FLUME LOG HANDLING SYSTEMS. WOOD CHIPS, GROUND CONSTRUCTION DEBRIS, REPROCESSED WOOD PRODUCTS OR BARK CHIPS WILL NOT BE ACCEPTABLE AS THE ORGANIC COMPONENT OF THE MIX. EROSION CONTROL MIX SHALL CONTAIN A WELL-GRADED MIXTURE OF PARTICLE SIZES AND MAY CONTAIN ROCKS LESS THAN 4" IN DIAMETER. EROSION CONTROL MIX MUST BE FREE OF REFUSE, PHYSICAL CONTAMINANTS, AND MATERIAL TOXIC TO PLANT GROWTH.

   THE MIX COMPOSITION SHALL MEET THE FOLLOWING STANDARDS:
   A. ORGANIC MATERIAL: BETWEEN 20% - 100% (DRY WEIGHT BASIS)
   B. PARTICLE SIZE: BY WEIGHT, 100% PASSING 6" SCREEN, 70-85% PASSING 0.75" SCREEN
   C. THE ORGANIC PORTION NEEDS TO BE FIBROUS AND ELONGATED.
   D. LARGE PORTIONS OF SILTS, CLAYS OR FINE SANDS ARE NOT ACCEPTABLE IN THE MIX.
   E. SOLUBLE SALTS CONTENT SHALL BE LESS THAN 4.0 MMHOS/CM.
   F. PH: 5.0 - 8.0

2. ON SLOPES LESS THAN 5% OR AT THE BOTTOM OF SLOPES 2:1 OR LESS UP TO 20 FEET LONG, THE BARRIER MUST CONFORM TO THE ABOVE DIMENSIONS. ON THE LONGER OR STEEPER SLOPES, THE BARRIER SHOULD BE WIDER TO ACCOMMODATE THE ADDITIONAL FLOW.

3. THE BARRIER MUST BE PLACED ALONG A RELATIVELY LEVEL ELEVATION. IT MAY BE NECESSARY TO CUT TALL GRASSES OR WOODY VEGETATION TO AVOID CREATING VOIDS AND BRIDGES THAT WOULD ENABLE FINES TO WASH UNDER THE BARRIER THROUGH THE GRASS BLADES OR PLANT STEMS.

4. LOCATIONS WHERE OTHER BMP'S SHOULD BE USED:
   A. AT LOW POINTS OF CONCENTRATED FLOW
   B. BELOW CULVERT OUTLET APRONS
   C. WHERE A PREVIOUS STAND-ALONE EROSION CONTROL MIX APPLICATION HAS FAILED
   D. AT THE BOTTOM OF STEEP PERIMETER SLOPES THAT ARE MORE THAN 50 FEET FROM TOP TO BOTTOM (LARGE UPGRADIENT WATERSHED)
   E. AROUND CATCH BASINS AND CLOSED STORM DRAIN SYSTEMS

5. THE EROSION CONTROL MIX BARRIERS SHOULD BE INSPECTED REGULARLY AND AFTER EACH LARGE RAINFALL. REPAIR ALL DAMAGED SECTIONS OF BERM IMMEDIATELY BY REPLACING OR ADDING ADDITIONAL MATERIAL PLACED ON THE BERM TO THE DESIRED HEIGHT AND WIDTH.

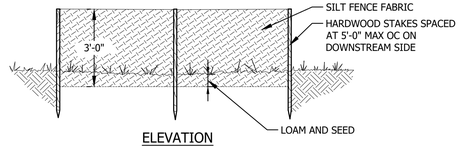
6. IT MAY BE NECESSARY TO REINFORCE THE BARRIER WITH SILT FENCE OR STONE CHECK DAMS IF THERE ARE SIGNS OF UNDERCUTTING OR THE IMPOUNDMENT OF LARGE VOLUMES OF WATER.

7. SEDIMENT DEPOSITS SHOULD BE REMOVED WHEN THEY REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.

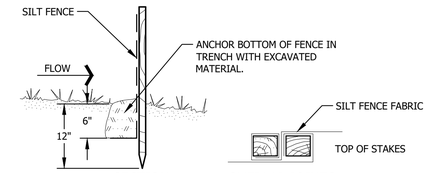
8. REPLACE SECTIONS OF BERM THAT DECOMPOSE, BECOME CLOGGED WITH SEDIMENT OR OTHERWISE BECOME INEFFECTIVE. THE BARRIER SHOULD BE RESHAPED AS NEEDED.

9. EROSION CONTROL MIX BARRIERS CAN BE LEFT IN PLACE AFTER CONSTRUCTION. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER BARRIER IS NO LONGER REQUIRED SHOULD BE SPREAD TO CONFORM TO THE EXISTING GRADE AND BE SEEDED AND MULCHED. WOODY VEGETATION CAN BE PLANTED INTO THE BARRIERS, OR THEY CAN BE OVER-SEEDED WITH LEGUMES. IF THE BARRIER NEEDS TO BE REMOVED, IT CAN BE SPREAD OUT INTO THE LANDSCAPE.

10. IF TEMPORARY BERMS ARE USED AS SILT BARRIERS, THEY ARE PROHIBITED AT THE BASE OF SLOPES STEEPER THAN 8% OR WHERE THERE IS FLOWING WATER WITHOUT THE SUPPORT OF ADDITIONAL MEASURES SUCH AS SILT FENCE.



ELEVATION



SECTION OVERLAP JOINTS

SILT FENCE

NOTE:
CONTRACTORS OPTION TO USE SEDIMENT BARRIER OR SILT FENCE FOR SLOPE PROTECTION.

SURFACE DRAINAGE SEDIMENT CONTROL

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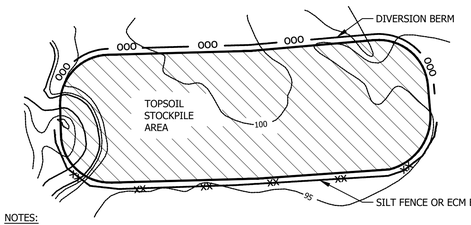
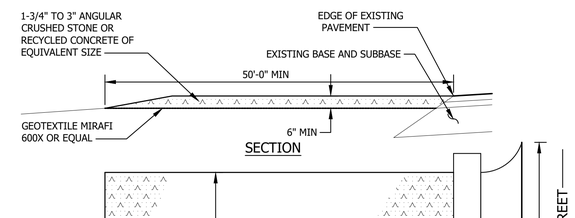


NOTES:

1. LOCATE SOIL STOCKPILES AS FAR FROM PROTECTED RESOURCES AS POSSIBLE (PONDS, RIVERS, STREAMS, BROOKS, & WETLANDS). LOCATE SOIL STOCKPILES AWAY FROM AREAS OF CONCENTRATED FLOW OR POTENTIAL FLOODING.
2. ERECT SEDIMENT BARRIER (SILT FENCE OR ECM BERM) DOWN SLOPE OF STOCKPILES.
3. STABILIZE STOCKPILES THAT WILL NOT BE WORKED FOR 14 OR MORE DAYS IN THE GROWING SEASON OR WILL REMAIN UNWORKED OR PARTIALLY UNWORKED OVER THE WINTER (NOVEMBER 1 TO APRIL 15) WITH TEMPORARY SEED, MULCH AND MULCH ANCHORING OR EROSION CONTROL BLANKET OR MESH AS SPECIFIED IN THE EROSION CONTROL PLAN. IN WINTER APPLY HAY MULCH AT THE RATE OF AT LEAST 150 LBS/1000 SF AND THICK ENOUGH THAT THE GROUND SURFACE IS NOT VISIBLE AND ANCHOR IF STOCKPILE HAS NOT BEEN PERMANENTLY STABILIZED USING ANOTHER METHOD (TARPS, PERMANENT SEED (< 90% VEGETATED), EROSION CONTROL BLANKET OR EROSION CONTROL MIX. EROSION CONTROL MIX CAN BE MANUFACTURED ON OR OFF THE SITE. IT MUST CONSIST PRIMARILY OF ORGANIC MATERIAL SEPARATED AT THE POINT OF GENERATION, AND MAY INCLUDE: SHREDDED BARK, STUMP GRINDINGS, COMPOSTED BARK, OR FLUME GRIT AND FRAGMENTED WOOD GENERATED FROM WATER-FLUME LOG HANDLING SYSTEMS. WOOD CHIPS, GROUND CONSTRUCTION DEBRIS, REPROCESSED WOOD PRODUCTS OR BARK CHIPS WILL NOT BE ACCEPTABLE AS THE ORGANIC COMPONENT OF THE MIX. EROSION CONTROL MIX SHALL CONTAIN A WELL-GRADED MIXTURE OF PARTICLE SIZES AND MAY CONTAIN ROCKS LESS THAN 4" IN DIAMETER. EROSION CONTROL MIX MUST BE FREE OF REFUSE, PHYSICAL CONTAMINANTS, AND MATERIAL TOXIC TO PLANT GROWTH. THE MIX COMPOSITION SHALL MEET THE FOLLOWING STANDARDS:
   A. ORGANIC MATERIAL: BETWEEN 20% - 100% (DRY WEIGHT BASIS)
   B. PARTICLE SIZE: BY WEIGHT, 100% PASSING 6" SCREEN, 70-85% PASSING 0.75" SCREEN.
   C. THE ORGANIC PORTION NEEDS TO BE FIBROUS AND ELONGATED.
   D. LARGE PORTIONS OF SILTS, CLAYS OR FINE SANDS ARE NOT ACCEPTABLE IN THE MIX.
   E. SOLUBLE SALTS CONTENT SHALL BE LESS THAN 4.0 MMHOS/CM.
   F. PH: 5.0 - 8.0.
4. IF SLOPE OF LAND IS GREATER THAN 5%, CONSTRUCT A DIVERSION BERM UPHILL OF THE STOCKPILE TO DIVERT FLOW.

SOIL STOCKPILE

NTS



NOTES:

1. MAINTAIN ENTRANCE IN A CONDITION THAT WILL PREVENT TRACKING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAY. IF WASHING IS REQUIRED PREVENT SEDIMENT FROM ENTERING WATERWAYS, DITCHES OR STORM DRAINS.

2. REMOVE STABILIZED CONSTRUCTION ENTRANCE TO FINISH ROAD CONSTRUCTION AND PAVEMENT.

STABILIZED CONSTRUCTION ENTRANCE

NTS

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION
01/19/2026

REV.	BY	DATE	STATUS
C	TMH/SME	01/19/2026	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION
B	TMH/SME	11/17/25	ISSUED FOR REVIEW
A	TMH/SME	10/24/25	ISSUED FOR REVIEW - INCORPORATING CLIENT COMMENTS (NOT FOR CONSTRUCTION)

COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
Civil
No. 45045
REGISTERED PROFESSIONAL ENGINEER
1-19-2026

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

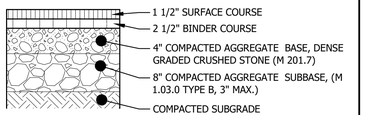
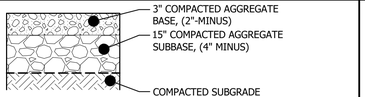
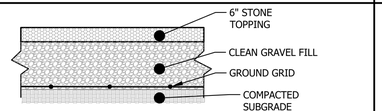
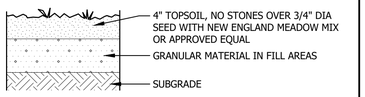
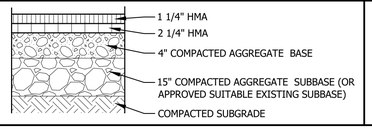
EROSION AND SEDIMENT CONTROL DETAILS

APPLICANT:
AGAWAM ENERGY CENTER, LLC
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	JJS/SME
DRAWN BY:	JJS/SME
DATE:	CLR/SME
CHECKED BY:	TMH/SME
LMN:	10/24/2025
CTB:	NONE

JOB NO. 250741.02 DWG FILE AW1-C-300 REV C

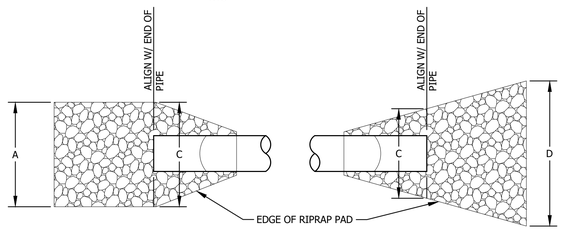
CONSTRUCTION	USE
	BITUMINOUS DRIVEWAY AND PARKING
	COMPACTED GRAVEL GRAVEL ACCESS ROADS
 1. TOPPING STONE SHALL BE CONSIST OF ANGULAR FRAGMENTS OF BROKEN SOUND ROCK, BLENDED TO PROVIDE A UNIFORM MIX MEETING TEH FOLLOWING GRADATION: 34% - 3/8" CRUSHED STONE 33% - 3/4" CRUSHED STONE 33% - 1-1/2" CRUSHED STONE 2. STONE SHALL BE WASHED AFTER BLENDING TO REMOVE FINES. 3. TOPPING SHALL BE 2,500 OHM-M OR HIGHER RESISTIVITY	TOPPING STONE BESS YARD AND SUBSTATION
	GRASS ALL DISTURBED AREAS
	BITUMINOUS SITE ENTRANCE, MARSHALLING AREA, PARKING AREA

NOTES:

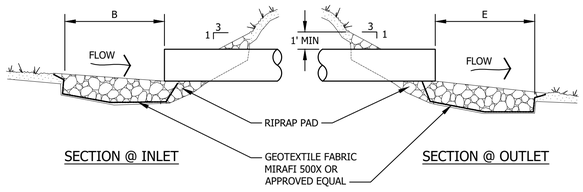
1. COMPACT SUBGRADE AND EACH LAYER OF BORROW , SUBBASE MATERIAL, AND BASE MATERIAL TO MINIMUM 95% OF MATERIAL MAXIMUM DRY DENSITY PER ASTM D1557.

SCHEDULE OF SURFACE FINISHES

NTS



PLAN @ INLET PLAN @ OUTLET



BASIN INLET/OUTLET DETAILS

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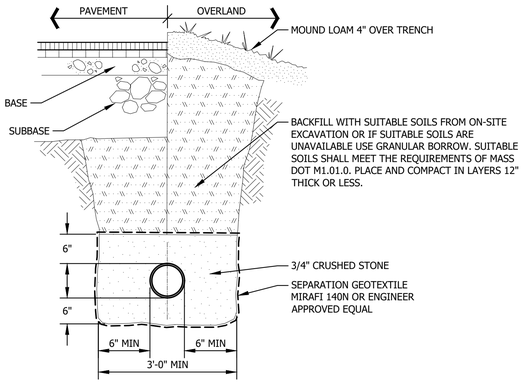

TYPICAL CULVERT TRENCH SECTION

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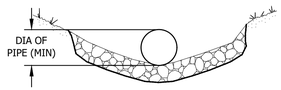
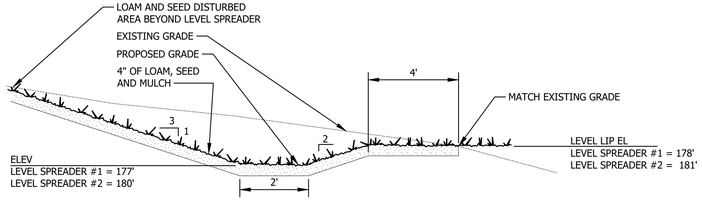


CROSS SECTION

RIPRAP PAD MUST BE INSTALLED WITHIN 48 HOURS OF INSTALLING NEW PIPE OR CULVERT.

PIPE	A	B	C	D	E	PAD DEPTH	D_{50}
≤12"	3 FT	2 FT	3 FT	4 FT	6 FT	10"	5"
15"	3.75 FT	2.5 FT	3.75 FT	5 FT	8 FT	16"	8"

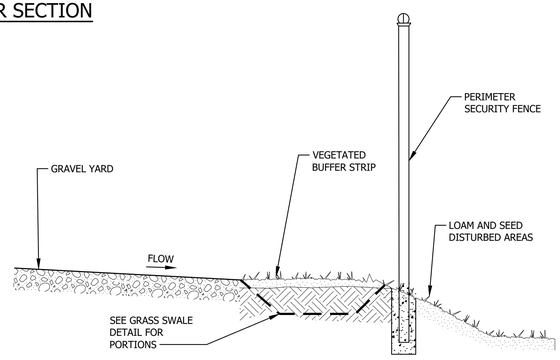


NOTES:

1. CONSTRUCT LEVEL LIP AND SPREADER ON ZERO PERCENT GRADE.
2. DO NOT CONSTRUCT LEVEL SPREADER ON FILL.
3. STORM RUNOFF CONVERTED TO SHEET FLOW SHALL OUTLET ONTO STABILIZED AREA. WATER SHALL NOT BE CHANNELIZED IMMEDIATELY BELOW POINT OF DISCHARGE.

LEVEL SPREADER SECTION

NTS

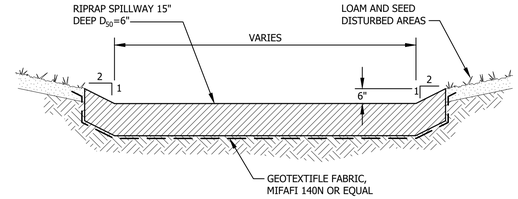


NOTES:

1. DETAIL REPRESENTS A TYPICAL LAYOUT FOR THE VEGETATED BUFFER STRIP. THE LOCATION OF THE FENCE WILL VARY. SEE LAYOUT PLAN. THE LOCATION OF DRAINAGE POINTS TO ALLOW STORMWATER TO FLOW ARE SHOWN ON THE GRADING PLAN.

VEGETATED BUFFER STRIP

NTS

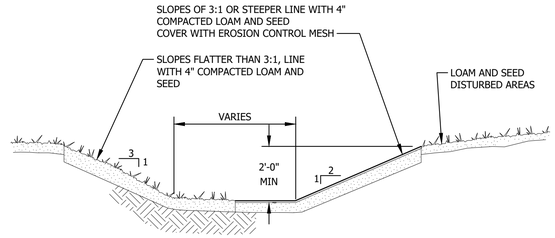


NOTES:

1. SUBGRADE PREPARATION: SHAPE THE SUBGRADE TO THE LINES AND GRADES AS SHOWN ON THE DRAWINGS AND AS SHOWN ON THE DETAILS. REMOVE ALL ORGANIC MATTER, DEBRIS AND SOIL THAT IS TOO WET TO SUPPORT RIPRAP. IF FILL IS REQUIRED PROVIDE SUITABLE SOIL FROM ON SITE OR COMMON BORROW (MDOT 703.18) COMPACTED TO A DENSITY APPROXIMATELY THAT OF THE SURROUNDING UNDISTURBED SOIL BUT NOT LESS THAN 92% (ASTM D1557).
2. GEOTEXTILE FABRIC: PLACE AND ANCHOR GEOTEXTILE (FILTER FABRIC) IMMEDIATELY AFTER SUBGRADE PREPARATION IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
3. STONE PLACEMENT: PLACE RIPRAP IMMEDIATELY AFTER PLACING GEOTEXTILE FABRIC. PLACE RIPRAP SO THAT IT PRODUCES A DENSE, WELL-GRADED MASS OF STONE WITH A MINIMUM OF VOIDS
4. MAINTENANCE: INSPECT RIPRAP FOLLOWING SIGNIFICANT RAINFALL EVENTS (3 INCHES OR MORE IN 24 HOURS) AND AFTER THE SPRING THAW. REPAIR DAMAGED AREAS IMMEDIATELY.
5. RIPRAP: SOUND DURABLE ROCK WHICH WILL NOT DISINTEGRATE BY EXPOSURE TO WATER OR WEATHER. EITHER FIELD STONE OR ROUGH, UNEVEN QUARRY STONE MAY BE USED. STONES SHALL BE ANGULAR AND AS NEARLY RECTANGULAR IN CROSS-SECTION AS PRACTICABLE. DO NOT USE ROUNDED BOULDERS OR COBBLES. USE A WELL GRADED MIXTURE OF STONE SIZES WITH 50 PERCENT OF THE MIXTURE BY WEIGHT BEING LARGER THAN THE D SIZE SPECIFIED AND 50 PERCENT SMALLER.

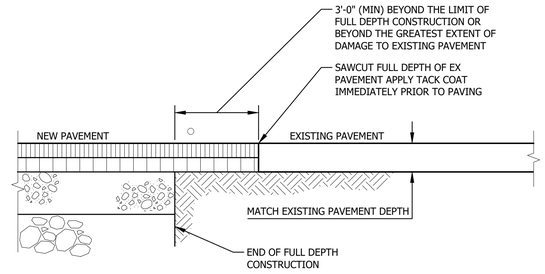
BASIN OVERFLOW SECTION

NTS



GRASS SWALE SECTION

NTS



PAVEMENT CUTTING AND MATCHING SECTION

NTS

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REV.	BY	DATE	STATUS
B	TMH/SME	01/19/2026	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION
A	TMH/SME	11/17/25	ISSUED FOR REVIEW

COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
Civil
No. 45045
REGISTERED PROFESSIONAL ENGINEER
1-19-2026

APPLICANT:
AGAWAM ENERGY CENTER, LLC
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

SITE DETAILS

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DATE:	CLR/SME
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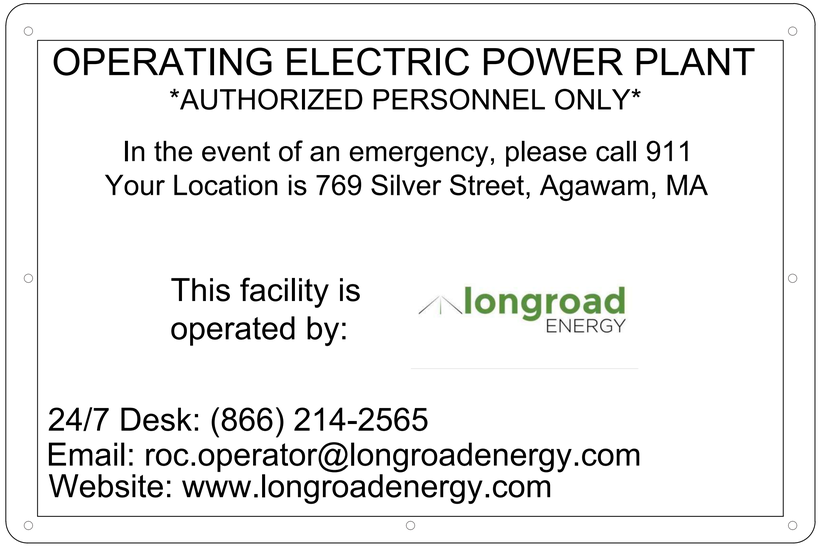
LMN:	09/15/2025
CTB:	NONE

JOB NO. 250741.02 DWG FILE AW1-C-301 REV B



HIGH VOLTAGE WARNING SIGN

SIGN NOTES:
1. SIGNS MUST BE NESC AND ANSI 8535-2011 COMPLIANT.
2. MINIMUM SAFE VIEWING DISTANCE IS 21 FEET PER ANSI Z535.2–2011 TABLE B1. RECOMMENDED SIGN SPACING 42–63 FEET APART.
3. SIGNS TO BE LOCATED 25 FEET FROM EACH CORNER OF FENCE, ON ALL GATES AND NO MORE THAN 50–FOOT SPACING ON THE REMAINING PORTIONS OF THE FENCE.
4. THE MOUNTING HEIGHT SHALL BE APPROXIMATELY 5 FEET ABOVE GROUND SURFACE.
5. SIGNS SHALL BE MOUNTED ON THE OUTSIDE OF THE FENCE WITH RUST RESISTANT TAMPERPROOF MOUNTS.
6. SIGN SHALL BE UTICOM SYSTEMS INC. PART# U1420W–G–U2650



SITE INFO/911 SIGN

SIGN NOTES:
1. SIGNS TO BE LOCATED ON ALL GATES.
2. THE MOUNTING HEIGHT SHALL BE APPROXIMATELY 5 FEET ABOVE GROUND SURFACE.
3. SIGNS SHALL BE MOUNTED ON THE OUTSIDE OF THE FENCE WITH RUST RESISTANT TAMPERPROOF MOUNTS.
4. SIGN SHALL BE 24"X36"

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COMMONWEALTH OF MASSACHUSETTS
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1-19-2026

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SIGN DETAILS

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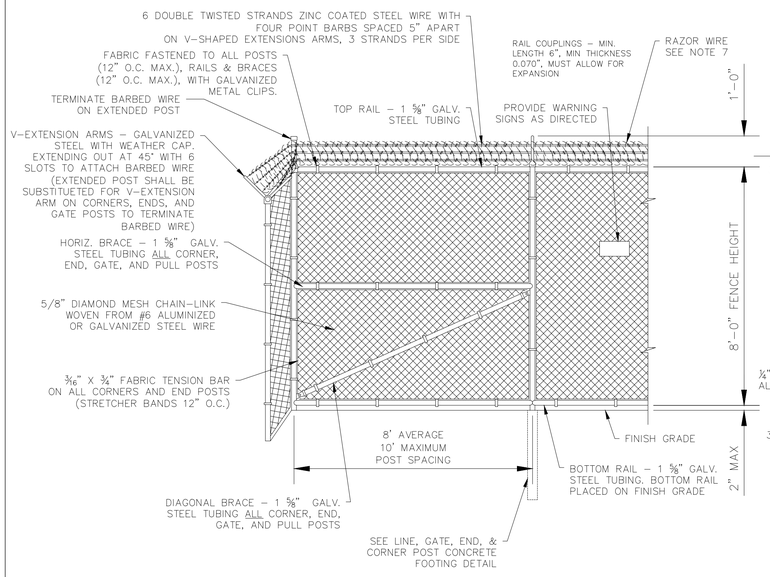
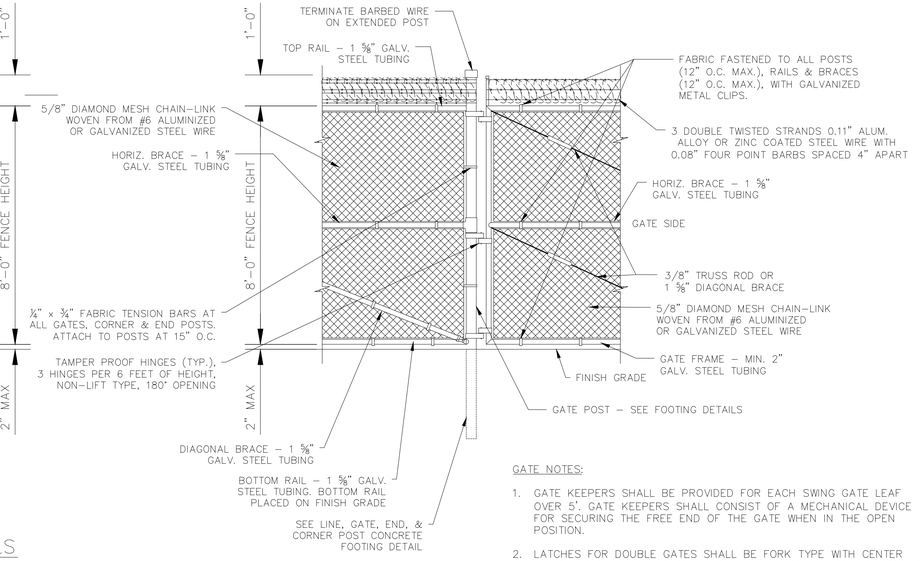
LMN:	09/15/2025
CTB:	NONE

JOB NO. 250741.02 DWG FILE AW1-C-302

REV A



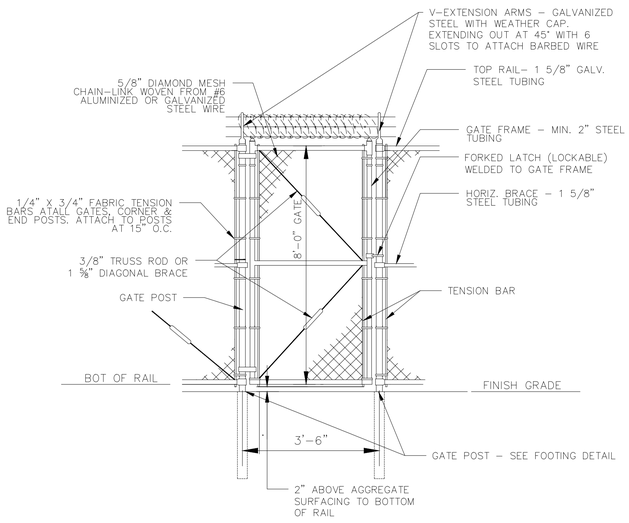
F1 MATERIAL AND STRUCTURAL DETAILS
N.T.S



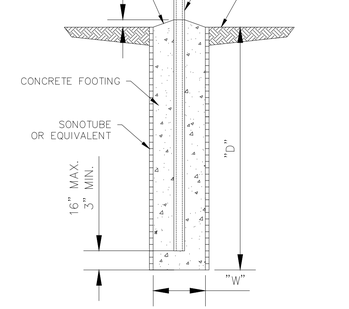
GATE NOTES:

1. GATE KEEPERS SHALL BE PROVIDED FOR EACH SWING GATE LEAF OVER 5'. GATE KEEPERS SHALL CONSIST OF A MECHANICAL DEVICE FOR SECURING THE FREE END OF THE GATE WHEN IN THE OPEN POSITION.
2. LATCHES FOR DOUBLE GATES SHALL BE FORK TYPE WITH CENTER DROP ROD OR PLUNGER BAR TYPE OF FULL GATE HEIGHT ARRANGED TO ENGAGE THE GATE STOP, OR A POSITIVE LOCKING GRAVITY DEVICE. LOCKING DEVICES SHALL BE CONSTRUCTED SO THE CENTER DROP ROD OR PLUNGER BAR CANNOT BE RAISED WHEN LOCKED.

F2 GATE FRAME DETAIL
N.T.S



F3 PERSONNEL GATE DETAIL
N.T.S



POST USE	LINE	GATE	CORNER	END
POST SIZE	3" STD.	4" STD.	4" STD.	4" STD.
"W"-MINIMUM FOOTING DIAMETER	1'-0"	2'-0"	1'-0"	1'-0"
"D"-MINIMUM FOOTING DEPTH	5'-6"	7'-0"	5'-6"	5'-6"

FOOTING NOTES:
1. UNLESS OTHERWISE INDICATED, FENCE POST SIZES ARE INDUSTRY STANDARD NOMINAL SIZES IN ACCORDANCE WITH ASTM F 1043, GALVANIZED STEEL PIPE.
2. BACKFILL SONOTUBE WITH MIN. 3,000 PSI CONCRETE.
3. ALL CONCRETE SHALL BE SINGLE POUR TO TOP OF GRAVEL.

F4 FENCE POST CONCRETE FOOTING DETAIL
N.T.S

F5 CENTER GATE STOP DETAIL
N.T.S

NOTES:

1. ALL ITEMS SHALL BE GALVANIZED AND ZINC COATED TO ASTM SPECIFICATIONS, INCLUDING ALL POSTS, RAILS, GATES, AND HARDWARE.
2. ALL POST AND FRAMES SHALL CONFORM ASTM 1043, A53 GRADE B, AND A123 AS APPLICABLE.
3. CHAIN LINK FABRIC SHALL BE TWISTED AND BARBED SELVAGE ON TOP, KNUCKLED SELVAGE AT THE BOTTOM. ZINC COATED PER ASTM A392 CLASS 1, OR ALUMINUM COATED PER ASTM A491.
4. FENCE FITTINGS, TIE WIRE, AND HOG WIRE SHALL BE PER ASTM F626 WITH 1.2 OZ/FT^2 ZINC.
5. BARBED WIRE SHALL BE ASTM A121 CLASS 1, WITH TWO TWISTED STRANDS OF 12.5 GAGE WIRE, WITH 4 POINT 14 GAGE BARBS SPACED 5" O.C.
6. TENSION WIRES:
   6.1. SHALL BE ZINC COATED ASTM A824 TYPE II CLASS 4
   6.2. STRETCHED TIGHT.
7. RAZOR WIRE SHALL BE GALVANIZED WITH STAINLESS STEEL BLADES. THE ROLL SHALL BE 18" DIAMETER WITH COIL CYLINDERS SPACED AT 4.5 O.C. THE ROLL SHALL BE SECURED TO ALL OF THE BARBED WIRES AT A MAXIMUM OF 4.5" SPACING.
8. GATE FENCE FABRIC SHALL BE MOUNTED INSIDE THE FRAME.
9. BOLTS AND HINGES SHALL BE OF A TAMPER-PROOF TYPE.
10. EXPOSED BOLTS AND NUTS SHALL BE SPOT WELDED.
11. CHAIN LINK FABRIC SHALL BE STRETCHED AND FASTENED TO END, CORNER, AND GATE POSTS WITH STRETCHER BARS AND STRETCHER BANDS.
12. BARBED WIRE SHALL BE INSTALLED ON EXTENSION ARMS. EACH WIRE SHALL BE PULLED TAUT. WIRE SHALL BE ATTACHED TO END, CORNER, & GATE POSTS WITH WIRE STRENCHER BANDS.
13. EXTENSION ARMS SHALL BE DESIGNED TO SECURELY ANCHOR SIX ROWS OF BARBED WIRE (THREE PER SIDE OF V-ARM) EQUALLY SPACED AND SUPPORT A VERTICAL LOAD OF 200 POUNDS AT THE OUTER END.
14. CORNER OR END POSTS SHALL BE INSTALLED AT ALL POINTS WHERE THE FENCE CHANGES DIRECTION OR AT A MAXIMUM SEPARATION OF 200'.
15. TOP OF CONCRETE FOOTINGS SHALL BE TROWELED TO A SLOPE TO PROVIDE A NEAT APPEARANCE AND TO SHED WATER.
16. FENCE TRANSITIONS SHALL BE AS FOLLOWS:
   16.1. TO NON-CONDUCTIVE FENCE: CHAIN LINK FENCE AND BARBED WIRE SHALL NOT BE CONNECTED TO NON-CONDUCTIVE FENCE AND BARBED WIRE.
   16.2. TO BUILDINGS/WALLS: GAP BETWEEN THE WALL & THE FENCE SHALL NOT EXCEED 2".
17. INSTALL RAZOR WIRE AROUND BARBED WIRE ON ALL EXTERIOR FENCING AND GATES.

COMMONWEALTH OF MASSACHUSETTS
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CHAIN LINK FENCE DETAILS

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A	TMH/SME	01/19/2026	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION

APPLICANT:
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SCALE:	N.T.S

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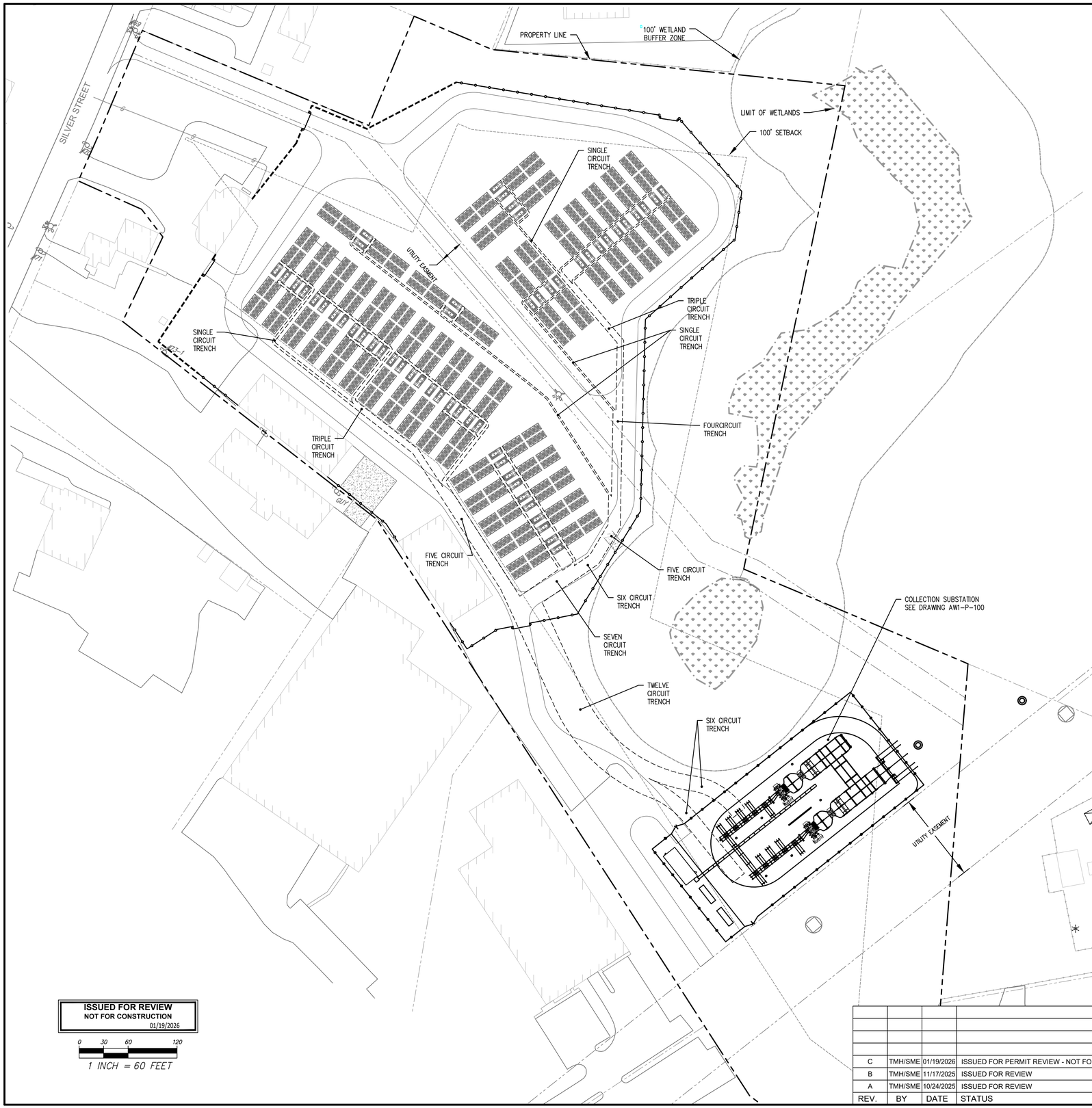

LEGEND

COLLECTION TRENCH LAYOUT

BESS UNIT

NOTES

1. THE PROPOSED PROJECT IS A 250 MW CAPACITY FACILITY. THE SITE LAYOUT INCLUDES ADDITIONAL BESS UNITS TO ACCOUNT FOR ELECTRICAL LOSSES AND FUTURE DEGRADATION OF UNIT PERFORMANCE REQUIRED TO MAINTAIN A 250 MW CAPACITY OVER THE PROJECT LIFE.
2. THE CURRENT COLLECTION LAYOUT INCLUDES 9 BESS UNITS PER CIRCUIT. THIS REPRESENTS 3 ADDITIONAL BESS UNITS (SEE NOTE 1) PER CIRCUIT.
3. TRENCH WIDTHS ARE BASED ON THE ASSUMPTION THAT THE MAXIMUM POWER CAPACITY IS LIMITED TO 25.2 MW PER FEEDER DUE TO THERMAL AND AMPACITY CONSIDERATIONS.
4. BESS EQUIPMENT LAYOUT IS BASED ON THE UL SMARTSTACK 7.5, 4 HOUR SYSTEM MANUFACTURED BY FLUENCE.
5. ALL CABLES FROM BESS EQUIPMENT TO THE PROJECT SUBSTATION WILL BE UNDERGROUND. PRELIMINARY ALIGNMENT OF CABLE TRENCHES ARE SHOWN. FINAL CONFIGURATION AND SIZING OF CABLES WILL BE PREPARED DURING DETAILED ENGINEERING. SEE ADDITIONAL INFORMATION ON DRAWING AW1-U-600.
6. CABLE CROSSING DETAILS AT UTILITY EASEMENT SHALL BE COORDINATED WITH THE UTILITY.

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0 30 60 120
1 INCH = 60 FEET

REV.	BY	DATE	STATUS
C	TMH/SME	01/19/2026	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION
B	TMH/SME	11/17/2025	ISSUED FOR REVIEW
A	TMH/SME	10/24/2025	ISSUED FOR REVIEW

COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
Civil
No. 45045
REGISTERED PROFESSIONAL ENGINEER
1-19-2026

LONGROAD ENERGY
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COLLECTION GENERAL ARRANGMENT

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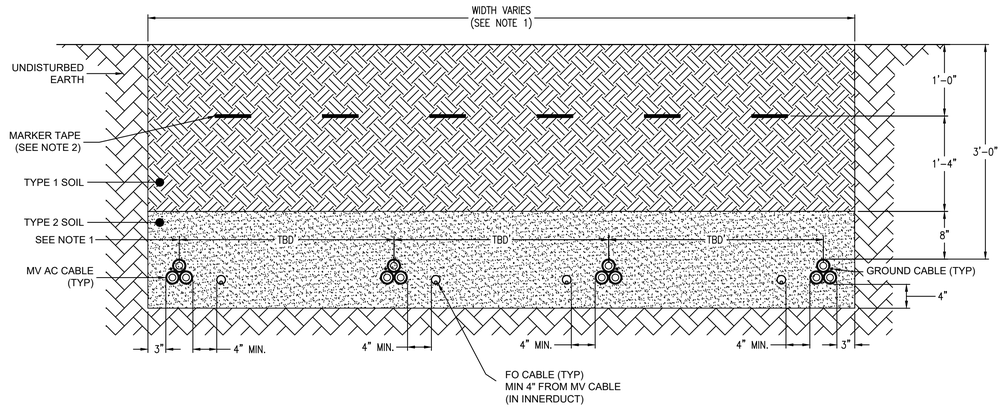
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	11/14/2025
SCALE:	1"=60'

JOB NO. 250741 DWG FILE AW1-U-200 REV C



TYPICAL POWER CABLE TRENCH SPACING

SCALE: NTS
MVAC (3-1/C TRIPLEX)

NOTES:

1. THIS DRAWING IS DIAGRAMMATIC AND INTENDED TO SHOW THE TYPICAL BACKFILL AND MINIMUM SPACING BETWEEN CABLES WITHIN THE TRENCH. THE EXACT TYPE OR NUMBER OF CABLES WILL VARY BASED ON THE NUMBER OF CIRCUITS. SEE DRAWING AW1-U-200 FOR TRENCH LAYOUT.
2. INSTALL 6" WIDE RED DETECTABLE MARKER TAPE IN ALL TRENCHES EVERY 18" ACROSS EXCAVATED AREA.
3. BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 85% OF THE MAXIMUM DRY DENSITY. AT ROAD CROSSINGS, BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 95%. FILL LIFT SHALL NOT EXCEED 9". SEE PROJECT GEOTECHNICAL REPORT FOR SITE SPECIFIC REQUIREMENTS.
4. CLEAN FILL REQUIREMENTS:
   - 8A. TYPE 1: NATIVE SOIL, SHALL BE USED FOR BACKFILL AS SHOWN IN SECTIONS CONTAINING PARTICLES NO LARGER THAN 3" IN DIAMETER.
   - 8B. TYPE 2: FILL SHALL BE CLEAN MATERIAL CONTAINING PARTICLES NO LARGER THAN 3/8" IN DIAMETER IN THE AREA 8" ABOVE AND 4" BELOW.
5. TREFOIL CABLE SHALL BE SECURED AT INTERVALS NOT EXCEEDING 3'.
6. TYPE 2 FILL MAY BE REPLACED WITH THERMAL BACKFILL TO REDUCE SPACING AND LIMIT TRENCH WIDTH.

PRELIMINARY
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01/19/2026

REV.	BY	DATE	STATUS
C	TMH/SME	01/19/26	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION
B	TMH/SME	10/24/25	ISSUED FOR REVIEW - INCORPORATING CLIENT COMMENTS (NOT FOR CONSTRUCTION)
A	TMH/SME	09/15/25	ISSUED FOR REVIEW (NOT FOR CONSTRUCTION)

COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
Civil
No. 45045
REGISTERED PROFESSIONAL ENGINEER
1-19-2026

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AGAWAM ENERGY CENTER
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TRENCH DETAILS

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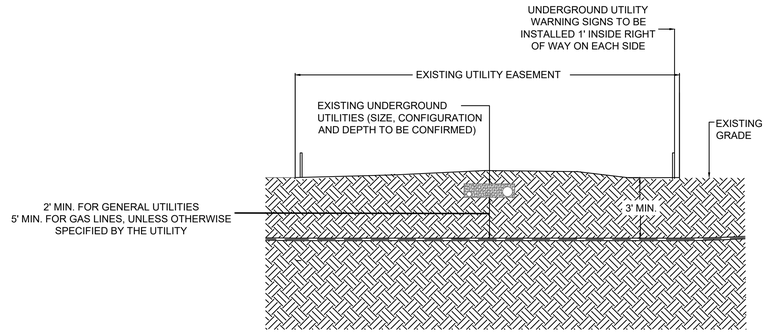
DATE:	09/15/2025
SCALE:	NONE

JOB NO. 250741.02 DWG FILE AW1-U-600

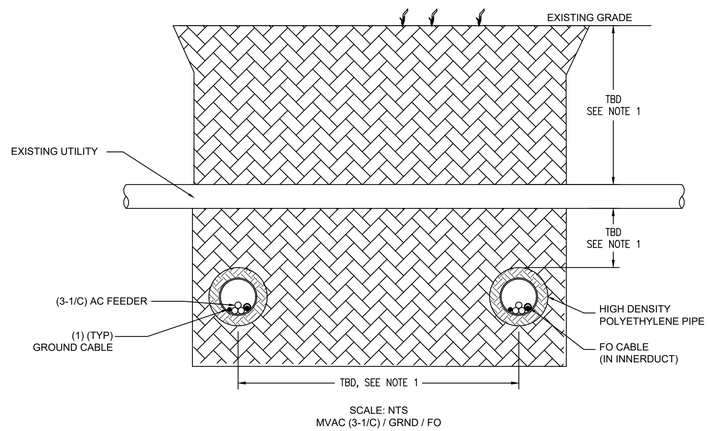
REV C

NOTES:

1. THIS DRAWING IS DIAGRAMMATIC AND INTENDED TO SHOW THE TYPICAL ORIENTATION AND RELATION BETWEEN CONDUITS AND EXISTING UTILITIES WITHIN THE EASEMENT. FINAL DIMENSIONS TO BE DETERMINED DURING DETAILED DESIGN BASED ON REVIEW AND APPROVAL FROM THE UTILITY/EASEMENT HOLDER AND RECEIPT OF AS-BUILT INFORMATION ON EXISTING UTLITIES WITHIN THE EASEMENT.
2. THE EXACT TYPE OR NUMBER OF CABLES MAY VARY FROM WHAT IS SHOWN.
3. FOR UTILITY CROSSING LOCATIONS SEE DRAWING AW1-U-200.
4. BORE DEPTH TO BE MINIMUM AS SHOWN OR PURSUANT TO CROSSING AGREEMENTS.
5. CONSTRUCTION MEANS AND METHODS FOR UTILITY CROSSING TO BE DETERMINED DURING DETAILED DESIGN.



THE MINIMUM VERTICAL CLEARANCE SHALL ACCOUNT FOR EXISTING FEATURES SUCH AS DITCHES, UNDERGROUND UTILITIES AND OTHER OBSTRUCTIONS, AND SHALL MEET ALL CLEARANCE REQUIREMENTS SET FORTH BY THE GOVERNING JURISDICTION. THE FULL CLEARANCE DEPTH MUST BE MAINTAINED THROUGHOUT THE ENTIRETY OF THE RIGHT OF WAY. THE LOCATION AND DEPTH OF EXISTING UTILITIES MUST BE DETERMINED PRIOR TO DRILLING.



SCALE: NTS
MVAC (3-1/C) / GRND / FO

TRENCHLESS SECTION - UTILITIES

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01/19/2026

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D	TMH/SME	01/19/26	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION
C	TMH/SME	11/17/25	ISSUED FOR REVIEW
B	TMH/SME	10/24/25	ISSUED FOR REVIEW - INCORPORATING CLIENT COMMENTS (NOT FOR CONSTRUCTION)
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COMMONWEALTH OF MASSACHUSETTS
THOMAS M. HENAGHEN
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1-19-2026

LONGROAD ENERGY
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TRENCHLESS INSTALLATION DETAILS

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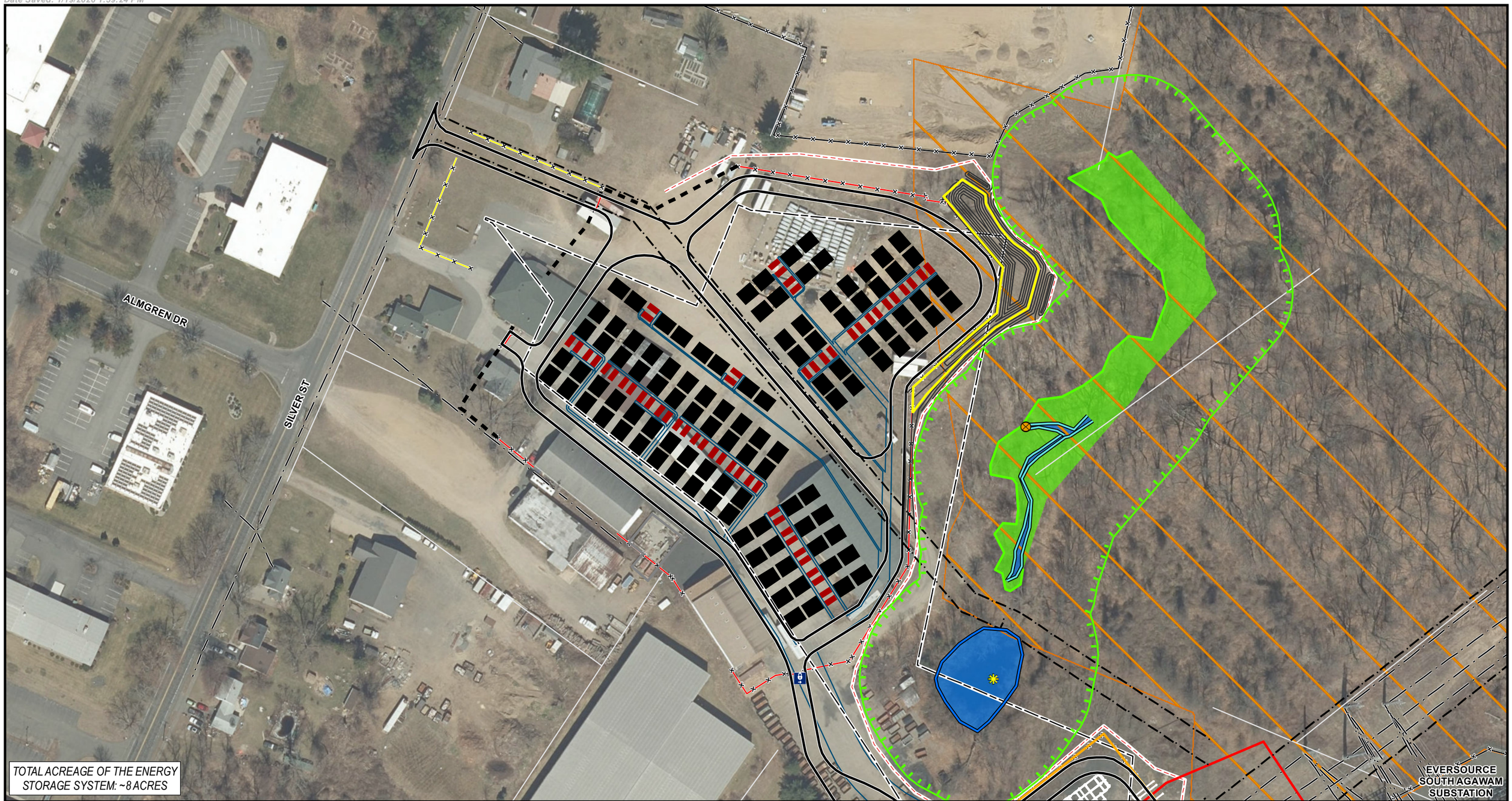
APRV'D BY:	TMH/SME
DATE:	09/15/2025
SCALE:	NONE

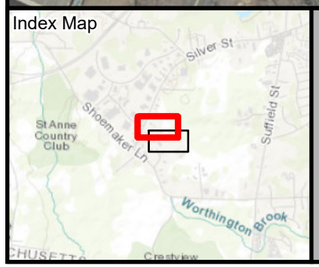
JOB NO. 250741.02 DWG FILE AW1-U-601

REV D

DRAFT



Index Map



Legend

- BESS Equipment
- Transformer
- Proposed Substation Perimeter
- Proposed Substation Infrastructure
- 115KV Generator Tie Line
- Stormwater Management Area
- Proposed Pavement
- Proposed Grading
- Underground Collection Trench
- Limit of Work
- Proposed Chain Link Fence
- Proposed Wood Privacy Fence
- Proposed Soundwall
- 100ft Setback
- Existing Easement
- Existing Overhead Line
- Existing Fence
- Existing Concrete
- Parcel Boundary
- Field Delineated Stream Bank
- Field Delineated Pond Bank
- Field Delineated Open Water*
- Field Delineated Wetland Boundary
- Field Delineated Wetland*
- 100ft Buffer to Wetlands & Streams
- Perennial Stream
- NHESP Priority & Estimated Habitats
- Potential Vernal Pools
- Culvert
- Gate

N

1 inch = 120 feet
0 60 120
Feet

*Indicates Layers Set to Transparency

AGAWAM ENERGY CENTER

Site Plan

Agawam, MA
Page 1 of 2

MassGIS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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BSC GROUP

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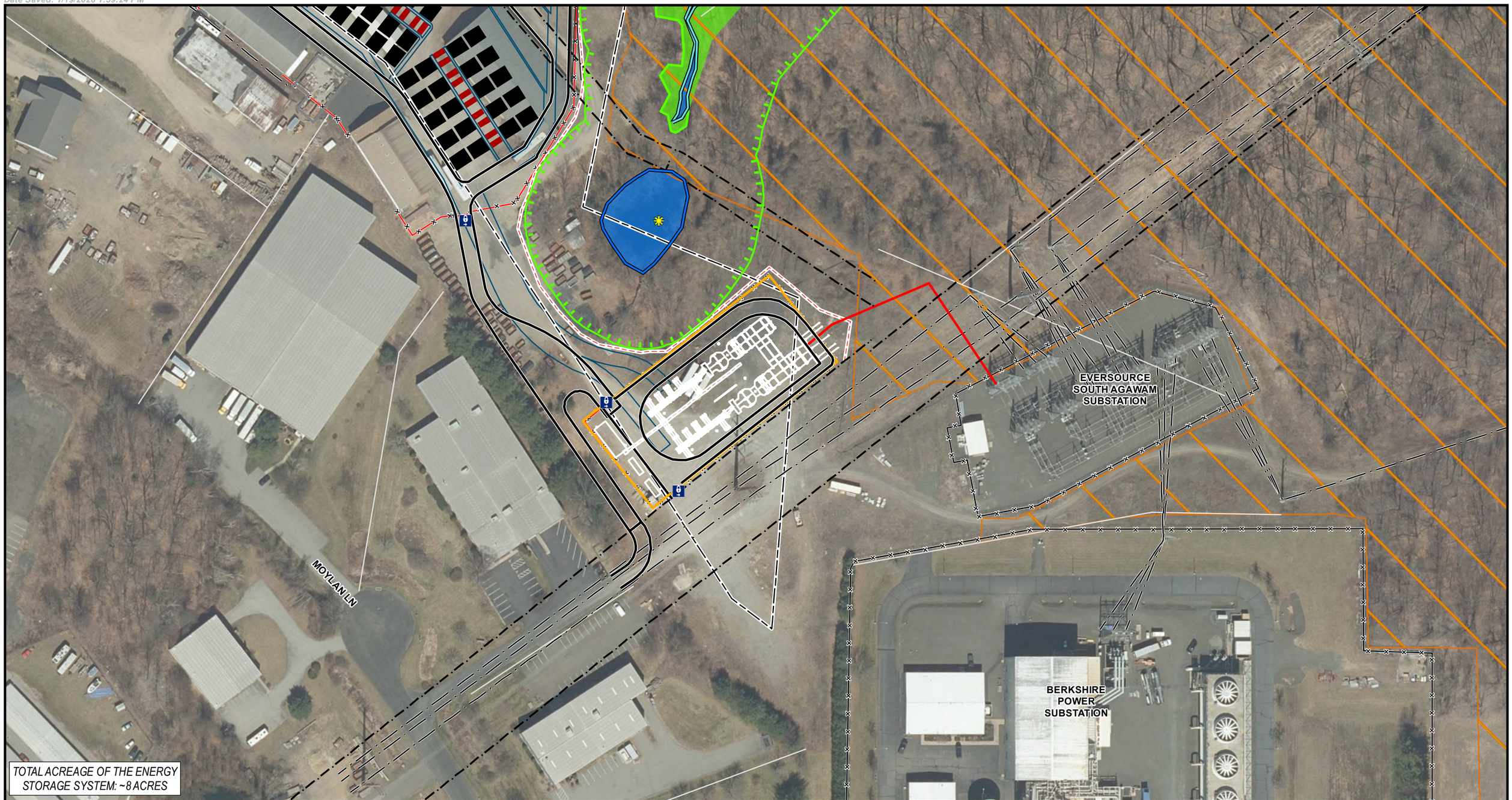
DRAFT



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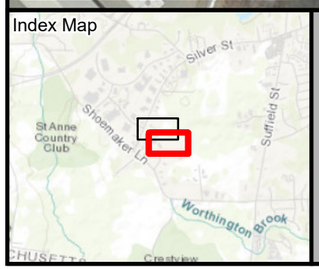

Legend

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0 60 120
Feet

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AGAWAM ENERGY CENTER

Site Plan

Agawam, MA
Page 2 of 2

MassGIS
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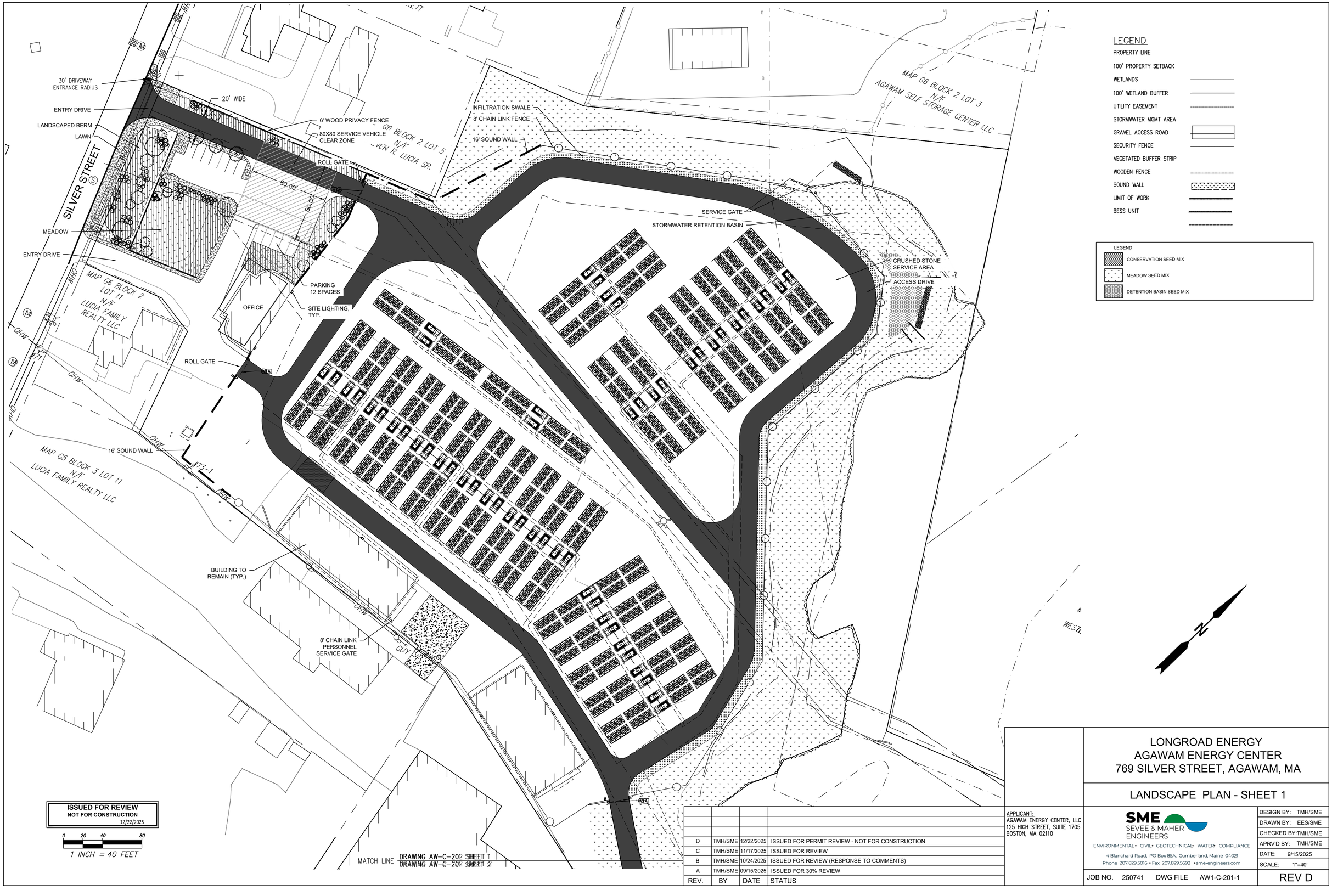


REV.	BY	DATE	STATUS
D	TMH/SME	12/22/2025	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION
C	TMH/SME	11/17/2025	ISSUED FOR REVIEW
B	TMH/SME	10/24/2025	ISSUED FOR REVIEW (RESPONSE TO COMMENTS)
A	TMH/SME	09/15/2025	ISSUED FOR 30% REVIEW

APPLICANT:
AGAWAM ENERGY CENTER, LLC
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

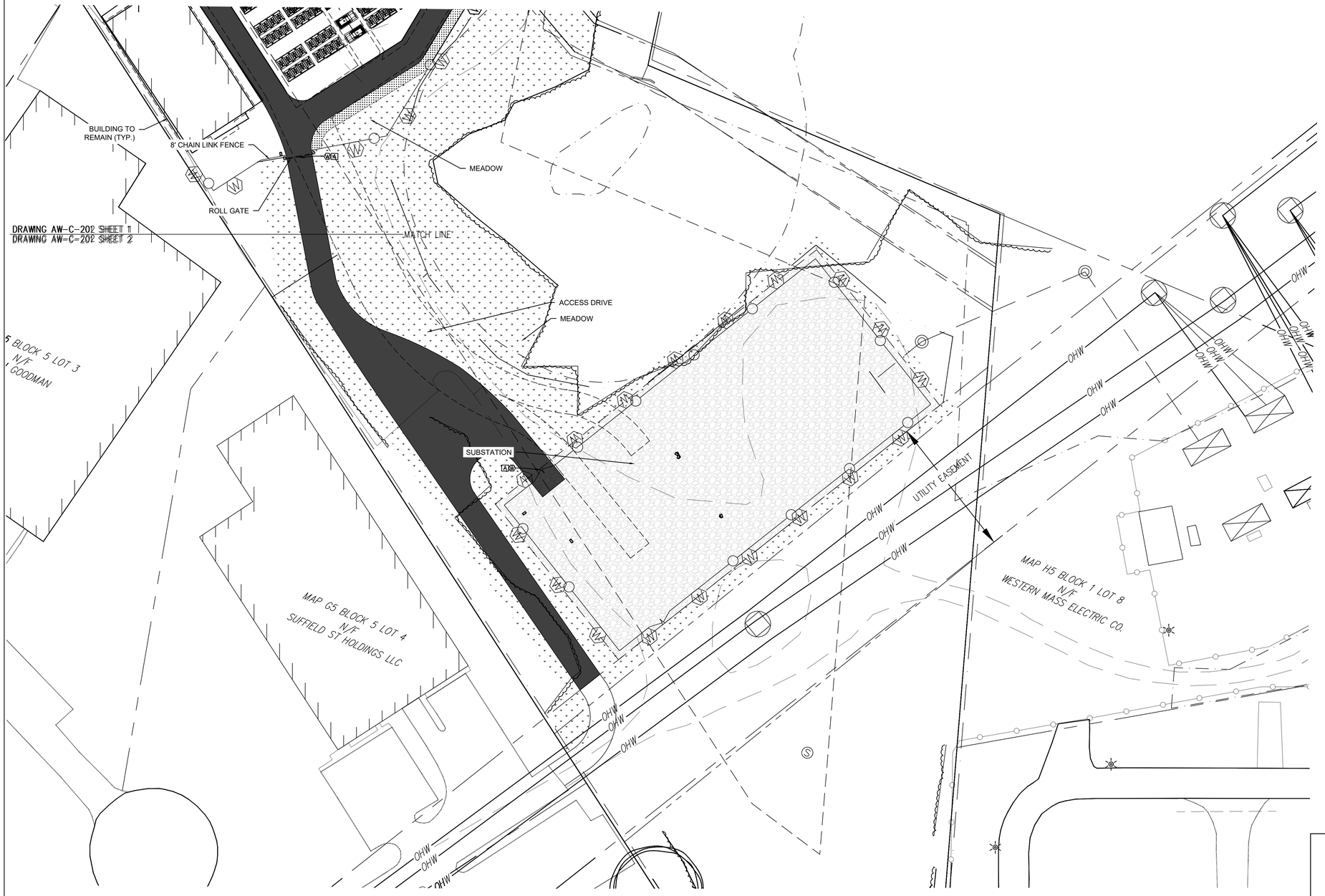
LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

LANDSCAPE PLAN - SHEET 1

SME SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	9/15/2025
SCALE:	1"=40'

JOB NO. 250741 DWG FILE AW1-C-201-1 REV D



LEGEND

PROPERTY LINE
100' PROPERTY SETBACK
WETLANDS
100' WETLAND BUFFER
UTILITY EASEMENT
GRAVEL ACCESS ROAD
VEGETATED BUFFER STRIP
SECURITY FENCE
SOUND WALL
LIMIT OF WORK
BESS UNIT

LEGEND

CONSERVATION SEED MIX
MEADOW SEED MIX
DETENTION BASIN SEED MIX

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION
12/22/2025

0 20 40 80
1 INCH = 40 FEET

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125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

LANDSCAPE PLAN - SHEET 2

SME
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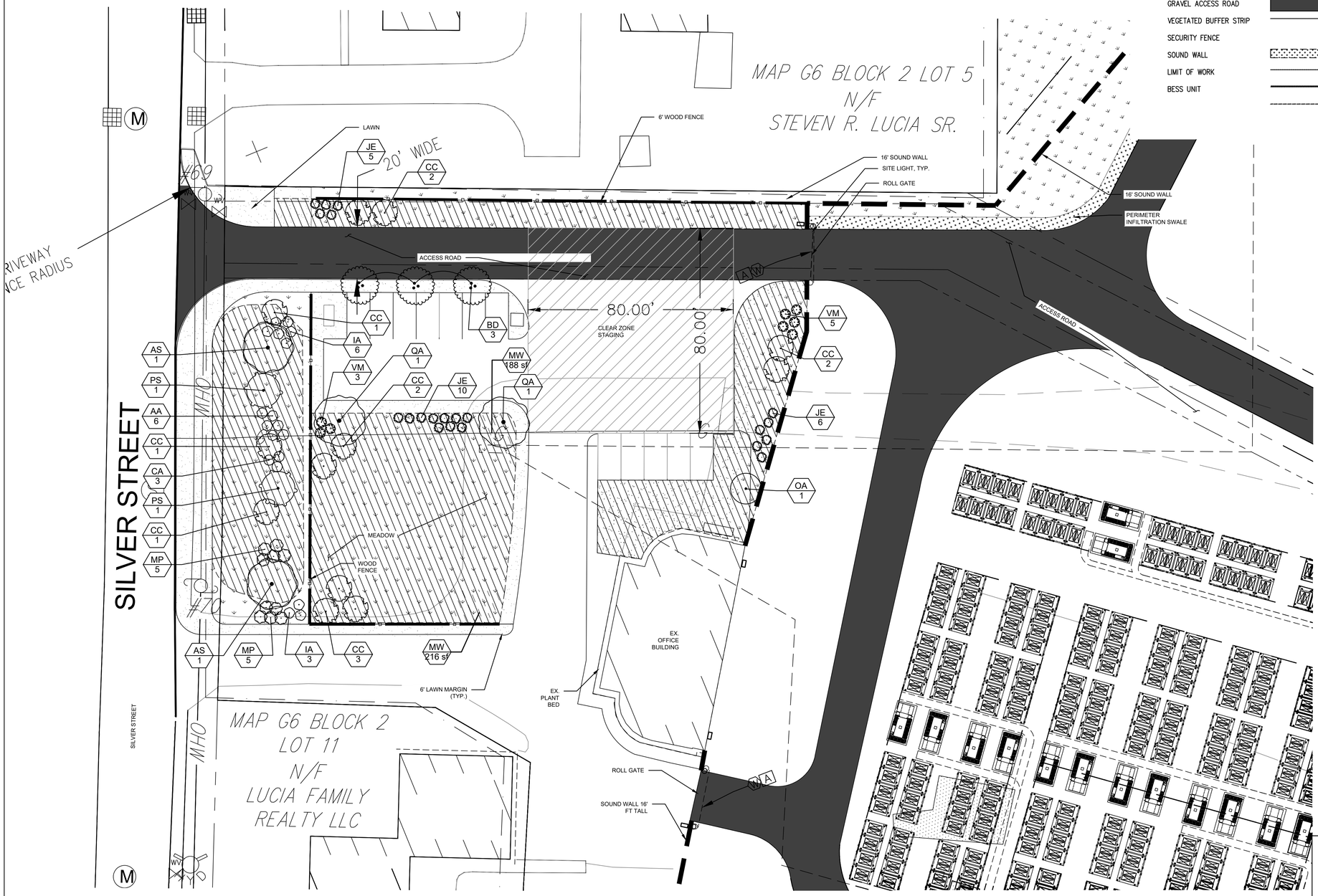
DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	9/15/2025
SCALE:	1"=40'

JOB NO. 250741 DWG FILE AW1-C-201-2



LEGEND

- PROPERTY LINE
- 100' PROPERTY SETBACK
- WETLANDS
- 100' WETLAND BUFFER
- UTILITY EASEMENT
- GRAVEL ACCESS ROAD
- VEGETATED BUFFER STRIP
- SECURITY FENCE
- SOUND WALL
- LIMIT OF WORK
- BESS UNIT

NOTES

1. REFER TO UTILITY AND GRADING PLANS FOR UTILITY LOCATION AND FINAL GRADES. IF ACTUAL SITE CONDITIONS VARY FROM WHAT IS SHOWN ON THE DRAWINGS. CONTACT LANDSCAPE ARCHITECT FOR DIRECTION ON HOW TO PROCEED.
2. REFER TO UTILITY AND GRADING PLANS AND REPORT CONFLICTS WITH PROPOSED PLANTINGS TO THE LANDSCAPE ARCHITECT.
3. CONTRACTOR SHALL COORDINATE PLANTING INSTALLATION WITH WORK BEING DONE BY OTHERS.
4. EXACT LOCATIONS OF PLANT MATERIALS TO BE APPROVED BY LANDSCAPE ARCHITECT IN THE FIELD PRIOR TO INSTALLATION. LANDSCAPE ARCHITECT RESERVES THE RIGHT TO ADJUST PLANTS TO EXACT LOCATION IN THE FIELD.
5. VERIFY PLANT COUNTS AND SQUARE FOOTAGES. QUANTITIES ARE SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR. IF QUANTITIES ON PLANT LIST DIFFER FROM GRAPHIC INDICATIONS, THEN GRAPHICS SHALL PREVAIL.
6. TREE SHALL BEAR SAME RELATION TO FINISHED GRADE AS IT BORE TO EXISTING.
7. TREES TO BE PLANTED A MINIMUM FOUR FEET FROM FACE OF BUILDINGS, OR PAVEMENT, EXCEPT AS APPROVED BY LANDSCAPE ARCHITECT.
8. PROVIDE MATCHING FORMS AND SIZES FOR PLANT MATERIALS WITHIN THE SAME SPECIES AND SIZE DESIGNATED ON THE DRAWINGS.
9. ALIGN AND EQUALLY SPACE IN ALL DIRECTIONS SHRUBS SO DESIGNATED PER THESE NOTES AND DRAWINGS.
10. FINISH GRADES OF SHRUB AREAS AND LAWNS SHALL BE 1 1/2–INCHES BELOW ADJACENT PAVING.
11. LANDSCAPE ARCHITECT TO REVIEW PLANT MATERIALS AT SOURCE OR BY PHOTOGRAPHS PRIOR TO DIGGING OR SHIPPING OF PLANT MATERIAL.
12. TOPSOIL STRIPPED FROM THE SITE AND PROPERLY STOCKPILED PRIOR TO APPLICATION MAY, UPON APPROVAL OF THE LANDSCAPE ARCHITECT, BE USED FOR PREPARATION OF LAWNS AND PLANTING BEDS. IT SHOULD BE FREE OF LARGE (ONE (1) INCH OR GREATER) COBBLES, ROOTS, OLD SOD, TRASH, WOOD OR OTHER CONTAMINANTS, AND BE OF A FRIABLE CONSISTENCY AND SUITABLE FOR PLANT GROWTH.
13. PROVIDE SOIL TEST REPORTS FOR ONSITE TOP SOIL TO BE REUSED AND FOR LOAM BORROW TO BE IMPORTED. SOIL TEST REPORT SHALL INCLUDE USDA TEXTURAL CLASSIFICATION, TEXTURAL SIEVE ANALYSIS, AS WELL AS NUTRIENT ANALYSIS, AND MICRO–NUTRIENTS.
14. DO NOT OVER COMPACT LOAM AREAS OR WORK SOIL IN A WET OR FROZEN STATE.
15. LOOSE OR CRACKED ROOTBALLS SHALL BE REJECTED.
16. THE CONTRACTOR IS RESPONSIBLE FOR FULLY MAINTAINING PLANTING (INCLUDING BUT NOT LIMITED TO: WATERING, SPRAYING, MULCHING, FERTILIZING, ETC.) OF THE PLANTING AREAS UNTIL THE WORK IS ACCEPTED IN TOTAL BY THE OWNER. PROVIDE A MINIMUM EQUIVALENT OF 1" OF RAIN PER WEEK DURING THE ESTABLISHMENT PERIOD.
17. THE CONTRACTOR SHALL COMPLETELY GUARANTEE PLANT MATERIAL FOR A PERIOD OF TWO (2) YEARS BEGINNING ON THE DATE OF TOTAL ACCEPTANCE. THE CONTRACTOR SHALL PROMPTLY MAKE REPLACEMENTS BEFORE OR AT THE END OF THE GUARANTEE PERIOD, AS DIRECTED BY THE OWNER.

N

PLANT SCHEDULE

CODE	QTY	BOTANICAL / COMMON NAME	CONT	CAL	HT
AS	2	ACER SACCHARUM / SUGAR MAPLE	B & B	3"CAL	
BD	3	BETULA DELTOIDES / GREY BIRCH	B & B		12'-14'
CC	12	CRATAEGUS CRUS-GALLI / COCKSPUR HAWTHORN	B & B	1"CAL	
OA	1	OXYDENDRUM ARBOREUM / SOURWOOD TREE	#10		4'-6'
PS	2	PRUNUS SEROTINA / BLACK CHERRY	#10	1.5"CAL	
QA	2	QUERCUS ALBA / WHITE OAK	B & B	2"CAL	
AA	6	ARONIA ARBUTIFOLIA / RED CHOKEBERRY	#3	24"-36"	
CA	3	CORYLUS AMERICANA / AMERICAN HAZELNUT	#3	24"-36"	
IA	9	ILEX VERTICILLATA / WINTERBERRY HOLLY	#3	24"-36"	
JE	21	JUNIPERUS VIRGINIANA 'GREY OWL' / GREY OWL JUNIPER	#3	18"-24"	
MP	10	MYRICA PENSYLVANICA / NORTHERN BAYBERRY	#3	24"-36"	
VM	8	VIBURNUM ACERIFOLIUM / MAPLELEAF VIBURNUM	#3	24"-36"	
	100 SF	ASCLEPIAS SYRIACA / COMMON MILKWEED	PLUG		
	TBD	BLACK BEAUTY TALL FESCUE MIX / ERNST SEEDS	SEED		

LEGEND

- CONSERVATION SEED MIX
- MEADOW SEED MIX
- DETENTION BASIN SEED MIX

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION
12/22/2025

20 0 10 20
1 inch = 20 ft.

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LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

LANDSCAPE PLAN ELARGEMENT - SHEET 3

BSC GROUP
BUILD | SUPPORT | CONNECT

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL• CIVIL• GEOTECHNICAL• WATER• COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	CLB/TR
DRAWN BY:	TR/RNS
CHECKED BY:	CLB/RNS
APRV'D BY:	CLB
DATE:	1/19/2026
SCALE:	1"=20'

JOB NO. 250741 DWG FILE AW1-C-201-2

REV D

SOLID FENCING



Sound wall: Sound absorbing composite



Traditional cedar picket or board fence



Composite formal screening fence option

CHAIN LINK FENCE



PVC (vinyl) coated chain-link fence w/ vertical slats



Chain-link fence with privacy slats



Welded wire security fence



chain link standard 2“ for screening

Native low branching canopy trees selected for screening and pollinator habitat value



White Pine, Pinus strobus



Pin Oak, Quercus palustris



River Birch, Betula nigra

Native Understory flowering trees selected for screening and pollinator habitat value



Sourwood, Oxydendrum arboreum



Shad tree, Amelanchier canadensis



Dogwood, Cornus florida



Tupelo, Nyssa sylvatica



White Oak, Quercus alba



Sugar Maple, acer saccharum



Hornbeam, Carpinus carolineana



Hawthorn, Crataegus phaenopyrum



Black Cherry, Prunus serotina

Native shrubs and meadow options for screening and pollinator habitat value



NE Pollinator Meadow part sun



NE Native Pollinator Meadow low mix



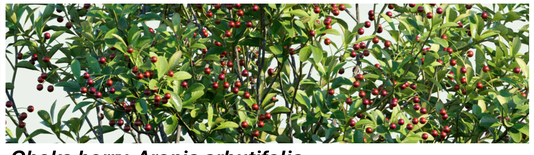
Hazelnut, Corylus americana



Red Cedar, Juniperus v.



Cranberrybush viburnum Viburnum acerifolium



Choke berry, Aronia arbutifolia

SITE ELEMENTS

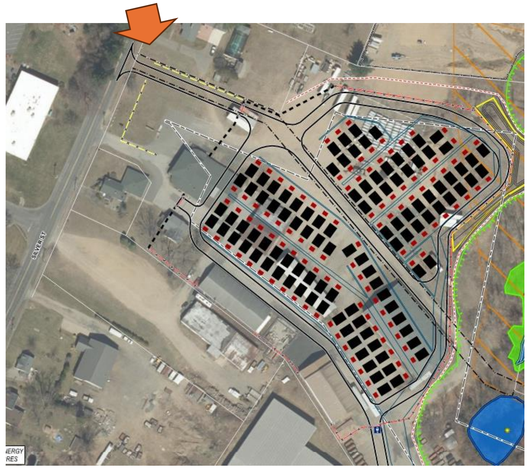
Existing Condition Photos



Proposed condition



Camera Location Plan



North Driveway near 777 Silver St.

Existing Condition Photos



Proposed condition



Camera Location aerial photo



South Driveway near 777 Silver St.

SITE ELEMENTS

Birds eye perspective site layout





Entry from Silver St. North



Entry from Silver St. South

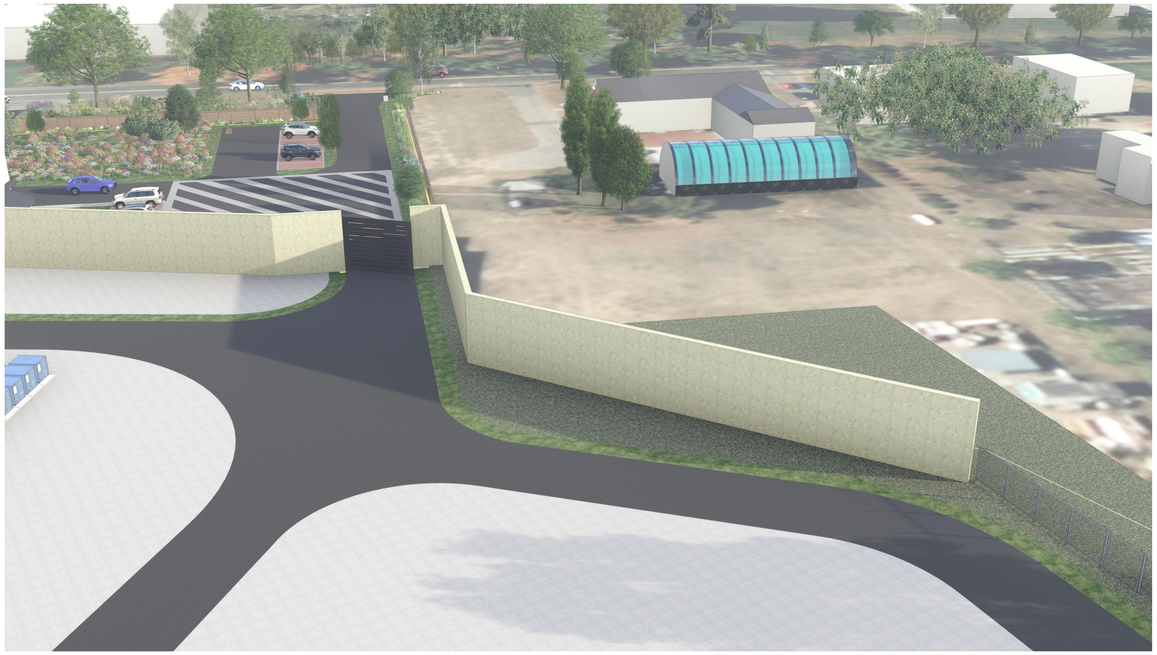


SITE ELEMENTS

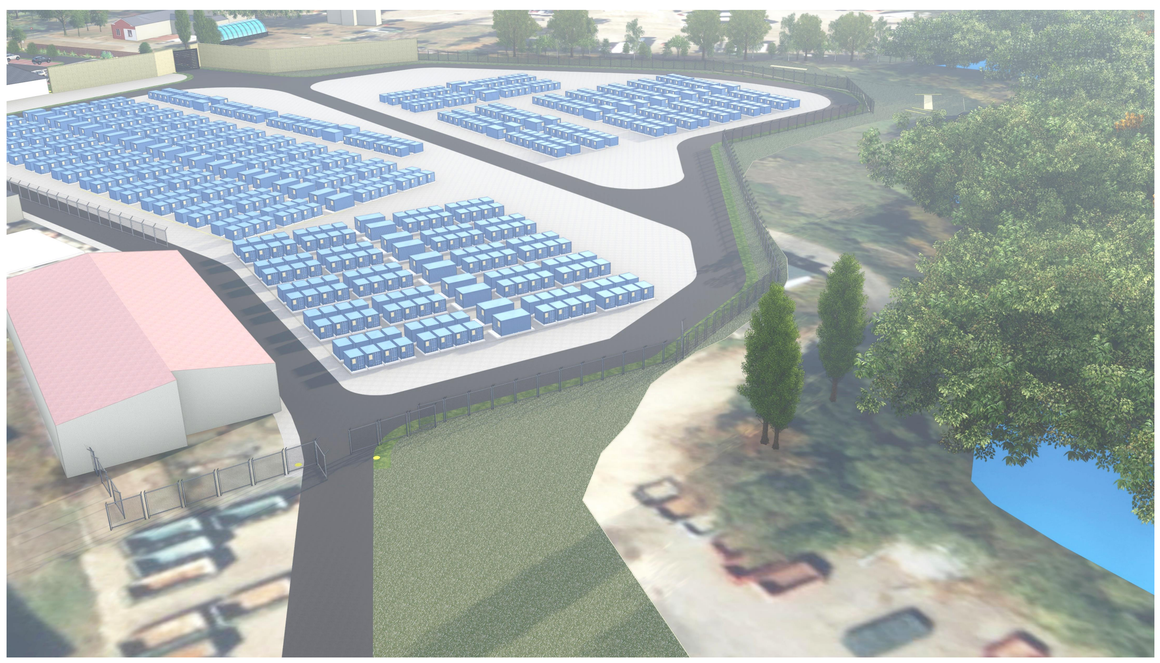
Birds eye along Silver St.



Birds eye toward Silver St. from inside the site



Birds eye from the power station toward the BESS



Front gardens Office parking & staging



SITE ELEMENTS

South Side warehouses



North Side Self Storage



East Side Power Substation



West side, Opposite Silver St. Light Industrial



SITE ELEMENTS

ATTACHMENT G – SOUND STUDY

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January 20, 2026

Ms. Melissa Kaplan, PWS
Senior Associate
BSC Group, Inc.
655 Winding Brook Drive
Glastonbury, CT 06033

Re: Battery Energy Storage System (BESS), Agawam, MA – Sound Study ***Ref. 4983***

Dear Melissa:

Tech Environmental, Inc. (Tech) prepared this sound study for BSC Group, Inc. (BSC Group) for a proposed 250-megawatt (MW) battery energy storage system (BESS) (the "Project") at 769 Silver Street in Agawam, Massachusetts. Based on Project design drawings[1], Longroad Energy plans to install one hundred eight (108) BESS units which consist of two (2) Fluence Smartstacks and a transformer. The 108 BESS units are served by a substation that has two (2) 162 MVA transformers. For modeling purposes, Tech assumed daytime peak-power operation, with all equipment capable of operating during both daytime and nighttime hours. The objective of this study is to determine whether the Project complies with the Town of Agawam BESS ordinance, which requires adherence to the MassDEP Noise Policy.

Acoustic modeling evaluated sound propagation to eleven residential receptor locations surrounding the site. The analysis determined that an 18-foot-tall noise barrier along the northwest property boundary facing Silver Street is required to reduce sound levels at the nearest residences. With this mitigation, predicted worst-case sound levels range from 40 to 45 dBA at upper-story windows, demonstrating full compliance with the MassDEP Noise Policy.

1.0 THE DECIBEL SCALE FOR SOUND

All sounds originate with a source – a human voice, vehicles on a roadway, or an airplane overhead. The sound energy moves from the source to a person's ears as sound waves, which are minute variations of air pressure. The loudness of a sound depends on the sound pressure level, which has units of decibel (dB). The decibel scale is logarithmic to accommodate the wide range of sound intensities to which the human ear is subjected. On this scale, the quietest sound we can hear is 0 dB, while the loudest is 120 dB. Every 10-dB increase is perceived as a doubling of loudness. Most sounds we hear in our daily lives have sound pressure levels in the range of 30 dB to 90 dB.

Community noise studies and regulations use an A-weighting scale (dBA) when measuring sound pressure levels as this approximates the response of the human ear to sounds, we experience in everyday life. Typical sound levels associated with various activities and environments are presented in **Figure 1**. Here are examples of sound levels we all encounter. A quiet suburban area at night without any traffic typically has an average sound level of 40 to 45 dBA. The freight train you hear in the distance may be 50 dBA, and crickets and tree frogs in the summer sing a sound level of 55 dBA. Two people having a conversation

[1] Longroad Energy, Agawam BESS Preliminary Conceptual Drawing, Revision 12, Revised January 2, 2026.

in a normal tone of voice will hear each other speak at 65 dBA. Standing near a road, a car passing by can produce 75 dBA, and a truck passing by is louder at 80 dBA.

There are various measures of sound pressure designed for different purposes. To establish the background ambient sound level in an area, the L_{90} metric, which is the sound level exceeded 90 percent of the time, is typically used. The L_{90} can also be thought of as the level representing the quietest 10 percent of any time period. The L_{10} metric, which is the sound level exceeded 10 percent of the time, represents the louder periods of time and is sometimes used to characterize highway traffic noise. The L_{eq}, or equivalent sound level, is the steady-state sound level over a period of time that has the same acoustic energy as the fluctuating sounds that actually occurred during that same period. It is commonly referred to as the average sound level. The L_{max}, or maximum sound level, represents the one second peak level experienced during a given time period. These are broadband sound pressure measurements, i.e., it includes sounds at all frequencies. Sound level measurements typically include an analysis of the sound spectrum into its various frequency components to determine tonal characteristics. The unit of frequency is Hertz (Hz), measuring the cycles per second of the sound pressure waves, and typically the frequency analysis examines eleven octave bands from 16 to 16,000 Hz.

2.0 APPLICABLE NOISE REGULATIONS

The Town of Agawam has battery energy storage system (BESS) ordinance which discusses sound under part 5 of §180- 167 General Requirements, which states, *"Any application to construct a Tier 2 or Tier 3 battery energy storage system where the energy storage units are located within two hundred fifty (250) feet of a sensitive noise receptor may be required to include an acoustic study in order to ensure that any increase in sound complies with Massachusetts DEP requirements."* Since the project is a Tier 3 BESS (having an aggregate energy capacity greater than 50 MWh), an acoustic study was prepared in accordance with the Massachusetts Department of Environmental Protection (MassDEP) requirements.

The MassDEP regulates noise through 310 CMR 7.10, "Air Pollution Control". In these regulations, "air contaminant" is defined to include sound, and a condition of "air pollution" includes the presence of an air contaminant in such concentration and duration as to "cause a nuisance" or "unreasonably interfere with the comfortable enjoyment of life and property." Regulation 7.10 prohibits "unnecessary emissions" of noise. The MassDEP Noise Policy (Policy Statement 90-001, February 1, 1990) interprets a violation of this noise regulation to have occurred if the source causes either:

a) An increase in the broadband sound pressure level of more than 10 A-weighted decibels(dBA) above the ambient, or
b) A "pure tone" condition.

The ambient background level is defined as the background sound level that exceeds 90 percent of the time (L_{90}) level, as measured during equipment operating hours. A "pure tone" condition occurs when any octave band sound pressure level exceeds both of the two adjacent octave band sound pressure levels by 3 dB or more.

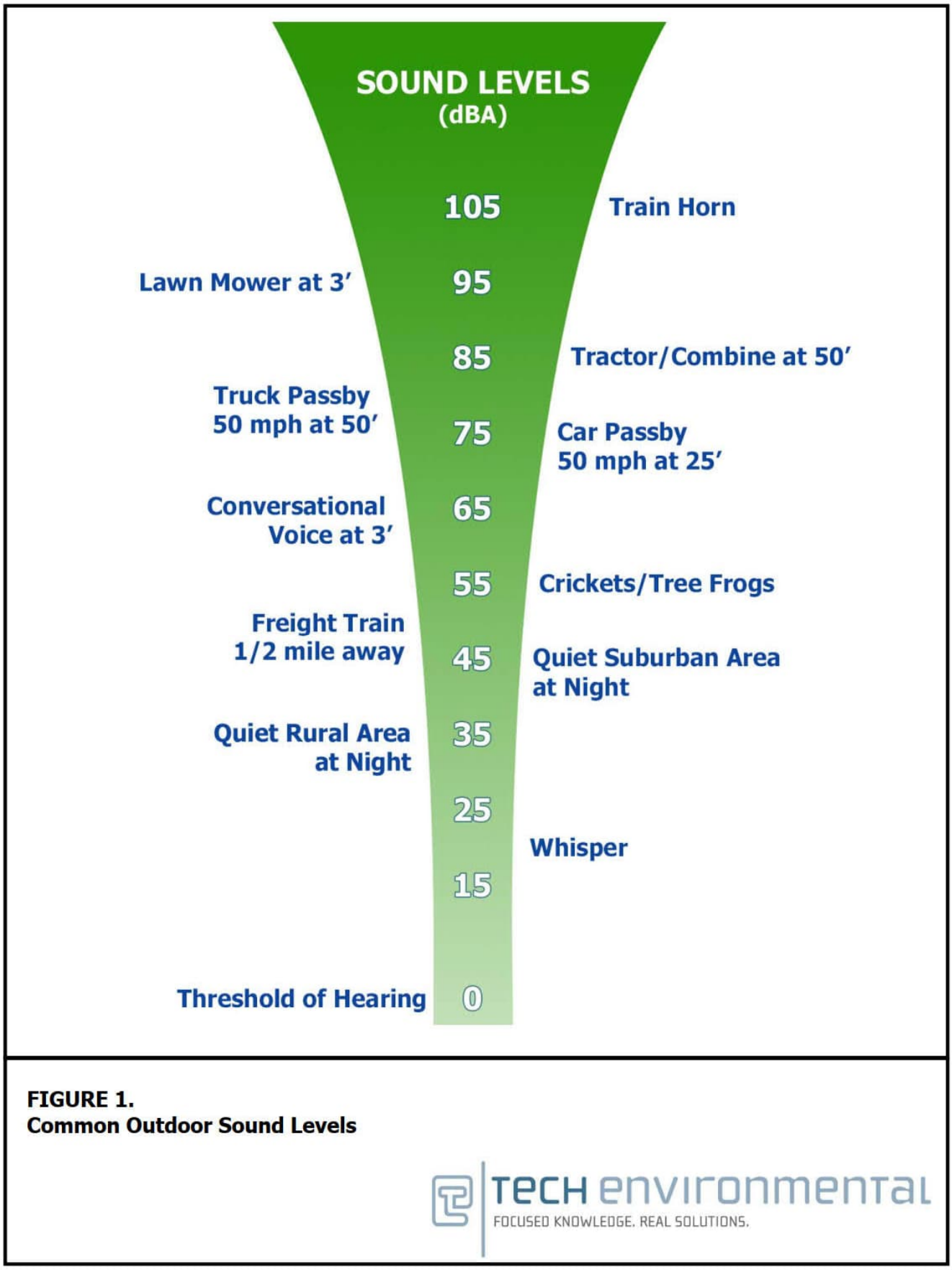

FIGURE 1.
Common Outdoor Sound Levels

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3.0 PRE-CONSTRUCTION SOUND MONITORING

This section provides a summary of the pre-construction sound monitoring procedures and results.

3.1 Monitoring Procedures

Tech set up a sound monitoring station to collect sound measurements over an eight- (8) day period starting at 12:00 p.m. on Thursday, September 10, 2025, to 12:00 p.m. on Thursday, September 17, 2025, at 769 Silver Street, see **Figure 2.** The purpose of the monitoring was to establish the ambient sound levels for the Project site. Sound measurements were taken with a Larson Davis 831 real-time sound level analyzer. The analyzer was equipped with a 1/2" precision condenser microphone and has an operating range of 5 dB to 140 dB, and an overall frequency range of 3.5 to 20,000 Hz. The analyzer meets or exceeds all requirements set forth in the American National Standards Institute (ANSI) Standards for Type 1 for quality and accuracy. Prior to and immediately following the measurement session, the sound analyzer was calibrated (no level adjustment was required) with an ANSI Type 1 calibrator, which has an accuracy traceable to the National Institute of Standards and Technology (NIST). All instrumentation was laboratory calibrated per ANSI recommendations, see **Appendix A** for the calibration records. For the measurement session, the microphone was fitted with an environmental windscreen to minimize the effect of air movement and tripod-mounted at a height of five feet. The monitoring equipment was situated within a weatherproof case and installed at ground level. The sound monitoring was performed in conformance with the requirements of American National Standards Institute (ANSI) S12.18.[2] The sound analyzer was programmed to measure continuous real-time peak (L_{max}), average (L_{eq}), and background level (L_{90}), higher transient levels (L_{10}), and one-third octave band frequency measurements throughout the monitoring period. Weather data was retrieved from Iowa Environmental Mesonet ASOS-AWOS-METAR Data Download [3] for the Westfield-Barnes Regional Airport weather station (BAF), and weather conditions were generally favorable for ambient sound monitoring. The lowest average one-hour L_{90} sound level was used to establish ambient conditions.

3.2 Monitoring Results

The sound monitoring results are summarized in **Table 1**, **Figure 3**, and **Figure 4**. The dominant sound source at the Project site was traffic along local roads. The ambient (L_{90}) sound measurements that included high-frequency natural sounds, such as from insects, were removed and broadband L_{90} sound levels were recalculated.[4]

Table 1 and **Figure 3** present the hourly broadband L_{90} sound levels, which ranged from 28 to 48 dBA—typical of ambient conditions in a suburban environment. Average hourly sound levels were calculated for each of the 24 hours of the day and are shown in **Table 1** and **Figure 4**. Ambient sound levels were highest between 6:00 a.m. and 10:00 a.m., averaging 42 to 44 dBA, while the lowest average one-hour L_{90} level (35 dBA) occurred between 1:00 a.m. and 2:00 a.m. Based on this minimum hourly L_{90} level, the sound limit for the Project is 45 dBA (i.e., 35 dBA + 10 dBA).

[2] Acoustic Society of America, American National Standard S12.18-1994, "Procedures for Outdoor Measurement of Sound Pressure Level," reaffirmed 2009.
[3] https://mesonet.agron.iastate.edu/request/download.phtml?network=MA_ASOS
[4] Acoustical Society of America, American National Standard ANSI/ASA S3/SC1.100-2014 and ANSI/ASA S12.100 "Methods to Define and Measure the Residual Sound in Protected Natural and Quiet Residential Areas", 2014.



FIGURE 2.
Long-term Sound Meter Location
Agawam, MA

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TABLE 1

EXISTING SOUND LEVELS MEASURED AT 769 SILVER STREET, AGAWAM MA

Thursday September 10, 2025, to Thursday September 17, 2025

Hour Starting	Measured $L_{90\text{-}i}$ Broadband Hourly Sound Levels (dBA)								Average Sound Level (dBA)
	Fri. 3/7	Sat. 3/8	Sun. 3/9	Mon. 3/10	Tues. 3/11	Wed. 3/12	Thurs. 3/13	Fri. 3/14	
Midnight	--	41	37	32	29	36	34	41	35
1 a.m.	--	40	36	36	29	34	34	36	35*
2 a.m.	--	39	36	34	29	35	34	38	35
3 a.m.	--	38	40	34	28	39	39	38	37
4 a.m.	--	39	40	35	33	39	38	38	38
5 a.m.	--	40	41	34	34	41	40	40	38
6 a.m.	--	46	44	34	36	45	43	45	42
7 a.m.	--	46	45	37	36	48	42	47	44
8 a.m.	--	43	44	36	38	46	42	43	42
9 a.m.	--	46	43	37	41	44	44	44	43
10 a.m.	--	43	40	41	41	42	43	44	42
11 a.m.	--	44	41	39	38	41	44	44	42
Noon	48	47	43	36	39	43	44	--	42
1 p.m.	43	46	44	36	42	43	45	--	42
2 p.m.	41	46	43	36	40	43	45	--	42
3 p.m.	44	41	43	40	40	45	46	--	41
4 p.m.	40	40	43	39	38	41	45	--	41
5 p.m.	40	44	38	40	38	38	41	--	40
6 p.m.	41	40	41	33	37	38	42	--	39
7 p.m.	38	41	39	34	38	38	44	--	39
8 p.m.	39	40	35	32	40	37	43	--	38
9 p.m.	39	36	32	31	39	35	42	--	36
10 p.m.	38	37	34	30	38	35	42	--	36
11 p.m.	37	38	34	30	36	33	41	--	36

* Lowest average hourly sound level of 26 dBA was measured between 12:00 a.m. and 1:00 a.m.

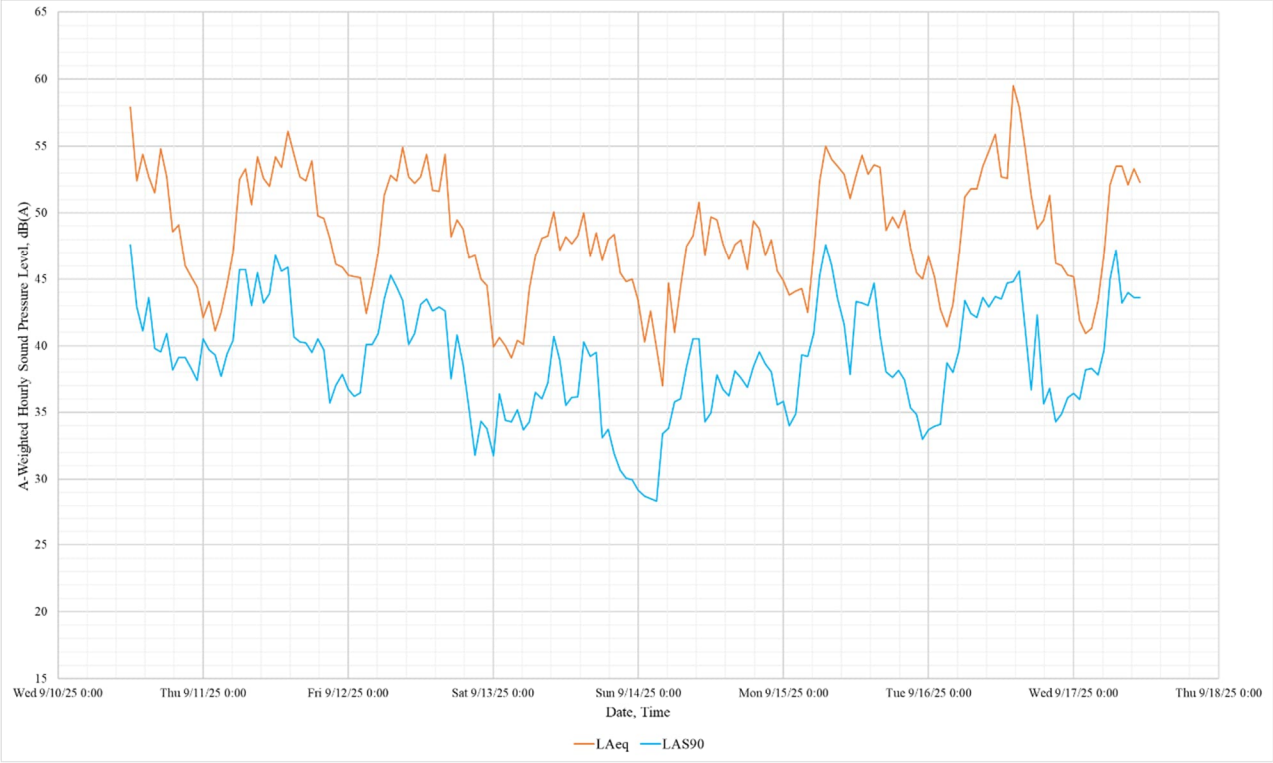

FIGURE 3. EXISTING SOUND LEVELS MEASURED AT 769 SILVER STREET

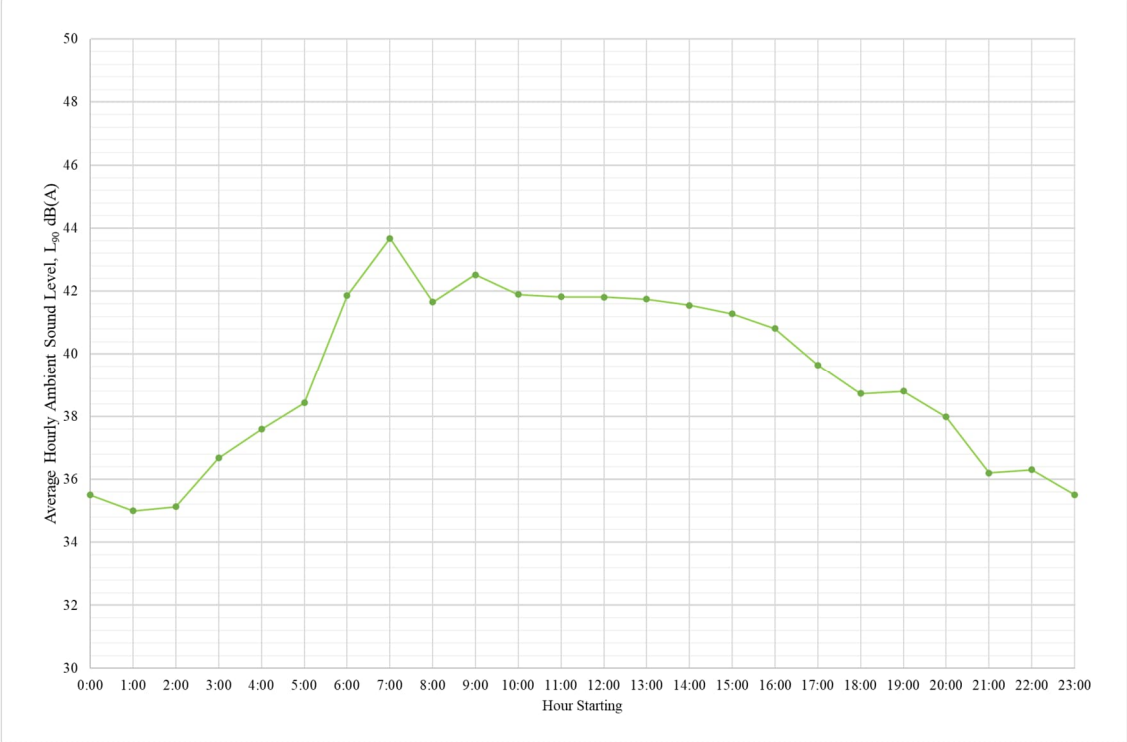

FIGURE 4. AVERAGE HOURLY AMBIENT SOUND LEVELS AT 769 SILVER STREET

4.0 ACOUSTIC MODELING APPROACH AND RESULTS

This section provides a summary of the acoustic modeling approach and results.

4.1 Acoustic Modeling Approach

The future sound levels from the Project, when it is producing maximum electrical power, were calculated with the Cadna/A acoustic model. Cadna/A is a three-dimensional model for sound propagation and attenuation based on International Standard ISO 9613-2 (2024)[5]. Atmospheric absorption, the process by which sound energy is absorbed by the air, was calculated using ANSI S1.26-1995.[6] On- and off-site topography was determined using MassGIS digital terrain and elevation data.[7] Ground absorption assumes mixed ground types (i.e., G = 0.5) for all areas. The model assumes the most-favorable sound propagation conditions, as occur under downwind conditions or during a ground-based temperature inversion on a clear night. Under these atmospheric conditions, sound travels further than if a person is upwind from a source and the atmosphere is well mixed, which would dampen the sound.

The battery energy storage system will include one hundred eight (108) BESS units which consist of two (2) Fluence Smartstacks and a transformer. The 108 BESS units are served by a substation that has two (2) 162 MVA transformers at the Project site. at the Project site. For the mitigation case, an 18-foot-tall noise barrier is used to reduce the propagation of sound from the Project to the nearest residential receptor on Silver Street. Sound level data for the BESS Unit vary by ambient temperature and power output of the units. This study used the worst case (highest sound level) for the project site under nighttime conditions: 35 degrees C (95 degrees F) and 100% power output. All equipment is understood to potentially run during any time of the day or night. Broadband and octave band sound source data used in the model was from the manufacturer's sound measurements and is summarized in **Table 2**.

TABLE 2

REFERENCE SOUND POWER LEVELS FOR ACOUSTIC MODELING (L_w, dB)

Equipment	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1K Hz	2K Hz	4K Hz	8K Hz	Total (dBA)
162 MVA Transformer	74	83	107	101	99	81	68	55	44	**98**
BESS Unit	50	69	71	79	82	86	84	79	71	**90**

The broadband and octave band sound data for the BESS Unit were determined from collected sound pressure levels by the manufacturer[8]. The broadband sound data was obtained from a JSHP transformer[9]. The octave band sound data for the transformers were estimated using the standardized National Electrical Manufactures Associations sound level rating (NEMA 87)[10]. All sound sources are represented in the acoustic model as area sources with heights equivalent to their unit dimensions.

[5] International Standard, ISO 9613-2, Acoustics – Attenuation of Sound During Propagation Outdoors, -- Part 2 General Method of Calculation, 2024.
[6] American National Standards Institute, ANSI S1.26-1995, "American National Standard Method for the Calculation of the Absorption of Sound by the Atmosphere," 1995.
[7] https://www.mass.gov/info-details/massgis-data-lidar-terrain-data
[8] Fluence, "Noise Design Report", September 4, 2025
[9] "JSHP FAT Report", Pages 61, 68-70
[10] Transformer dimensions: 13.3 ft wide, 15.4 ft long, 13.4 ft tall.

The equipment sound levels presented in **Table 2** represent the maximum sound levels to be emitted by equipment operating during daytime hours at peak power, although all system components are understood to potentially be operational during both daytime and nighttime hours. However, the operating condition of the equipment during non-peak hours will be less, and the sound levels emitted during non-peak hours will also be less. Thus, this analysis compares the predicted impacts of the Project's equipment at maximum load, to the lowest average one-hour ambient sound level, which is not likely to occur simultaneously, but is a conservative means of demonstrating compliance with the MassDEP Noise Policy.

4.2 Acoustic Modeling Results

Up to twenty-four (24) residential locations were analyzed in the model at both 5 feet and 15 feet above grade at each of the residential locations to represent the appropriate first and second story windows for each residence. For the purpose of this analysis, results are shown at the worst-case locations which are eleven (11) residential locations surrounding the Project site, at the second story window (15 feet). **Figure 5** shows the location of the BESS Units and the two(2) 162 MVA transformers at the Project site. **Figure 6** shows the modeling receptors included in the model representing the eleven (11) residential locations surrounding the Project site. Two (2) conditions were modeled:

1) The base condition represents the proposed site plan with no mitigation (i.e., noise barriers); and

2) A mitigated condition, installing sixteen (18) feet tall a noise barrier wall along the northwest edge of the property facing Silver Street which reduces the propagation of sound from the Project to the nearest residential receptors on Silver Street. The locations of the noise barrier walls are illustrated in **Figure 5**. All noise barrier walls are assumed to meet ISO 9613-2 requirements for a screening object: a) the surface density is at least 10 kg/m^2 (i.e., 2 lbs./sf), and b) the object has a closed surface without large cracks or gaps.

Both modeling analyses assume that all equipment will operate at maximum load during operation hours and compare the predicted sound levels to the measured lowest average one-hour ambient level at the project site (35 dBA), a condition unlikely to occur, and the presumed sound limit for the project of 45 dBA (i.e., 35 dBA +10 dBA).

4.2.1 No Mitigation Measures

The base condition, not employing any mitigation measures, does not show compliance with the MassDEP criteria of 45 dBA with impacts ranging from 37 dBA to 50 dBA at the second story windows. The predicted impacts at residencies further away are less. And those impacts warrant noise mitigation measures to demonstrate compliance at locations 6, 7 and 8. **Figure 7** illustrates the impacts of the Project, with no mitigation, with colored contours representing equivalent impacts. The predicted results for all modeling receptors with no mitigation are detailed in **Table 3** and **Table 4**.

4.2.2 Mitigation Measure – Barrier Wall Installation

The mitigated condition, installing a 18-foot-tall noise barrier wall along the northwest edge of the property facing Silver Street, reduces the propagation of sound from the Project towards receptor locations 6, 7, and 8. The predicted worst-case operational sound levels with those mitigation measures shows full compliance with the MassDEP criteria of 45 dBA with predicted worst-case operational sound levels of 40 to 45 dBA at the second story windows. This worst-case condition is unlikely to occur regularly. Thus, the Project with mitigation demonstrates compliance with the MassDEP Noise Policy. **Figure 8** illustrates the impacts of the Project, with mitigation, with colored contours representing equivalent impacts. Additionally, no pure tones as defined by MassDEP are predicted at any receptors. The predicted results for all modeling receptors with mitigation are detailed in **Table 5** and **Table 6**.

5.0 CONCLUSION

A sound study was conducted for the proposed energy storage system at 769 Silver Street in Agawam, Massachusetts, and the results were evaluated against the MassDEP Noise Policy. With the inclusion of an 18-foot-tall noise barrier along the northwest edge of the property to reduce sound propagation toward residential receptors 6, 7, and 8, predicted worst-case operational sound levels range from 40 to 45 dBA at second-story windows—fully compliant with the MassDEP 45 dBA criterion. This worst-case condition is unlikely to occur frequently. Therefore, the Project meets the requirements of the MassDEP Noise Policy.

Please call if you have any questions regarding this report.

Sincerely,

TECH ENVIRONMENTAL, INC.



Marc C. Wallace, QEP, INCE
Vice President

4983/Sound Study Report for Agawam BESS_1.20.2026

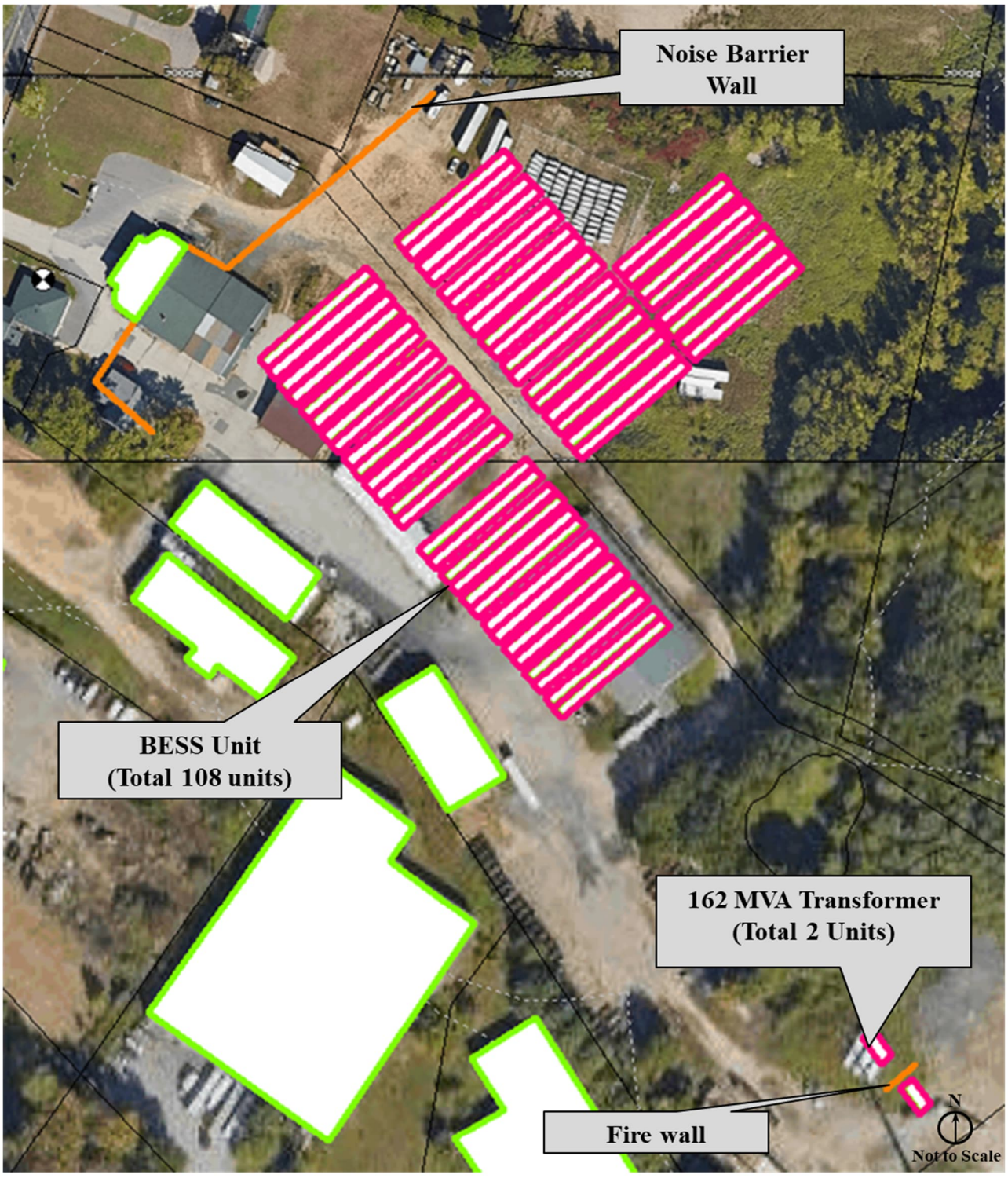

FIGURE 5.
Sound Source Locations
769 Silver Street, Agawam, MA

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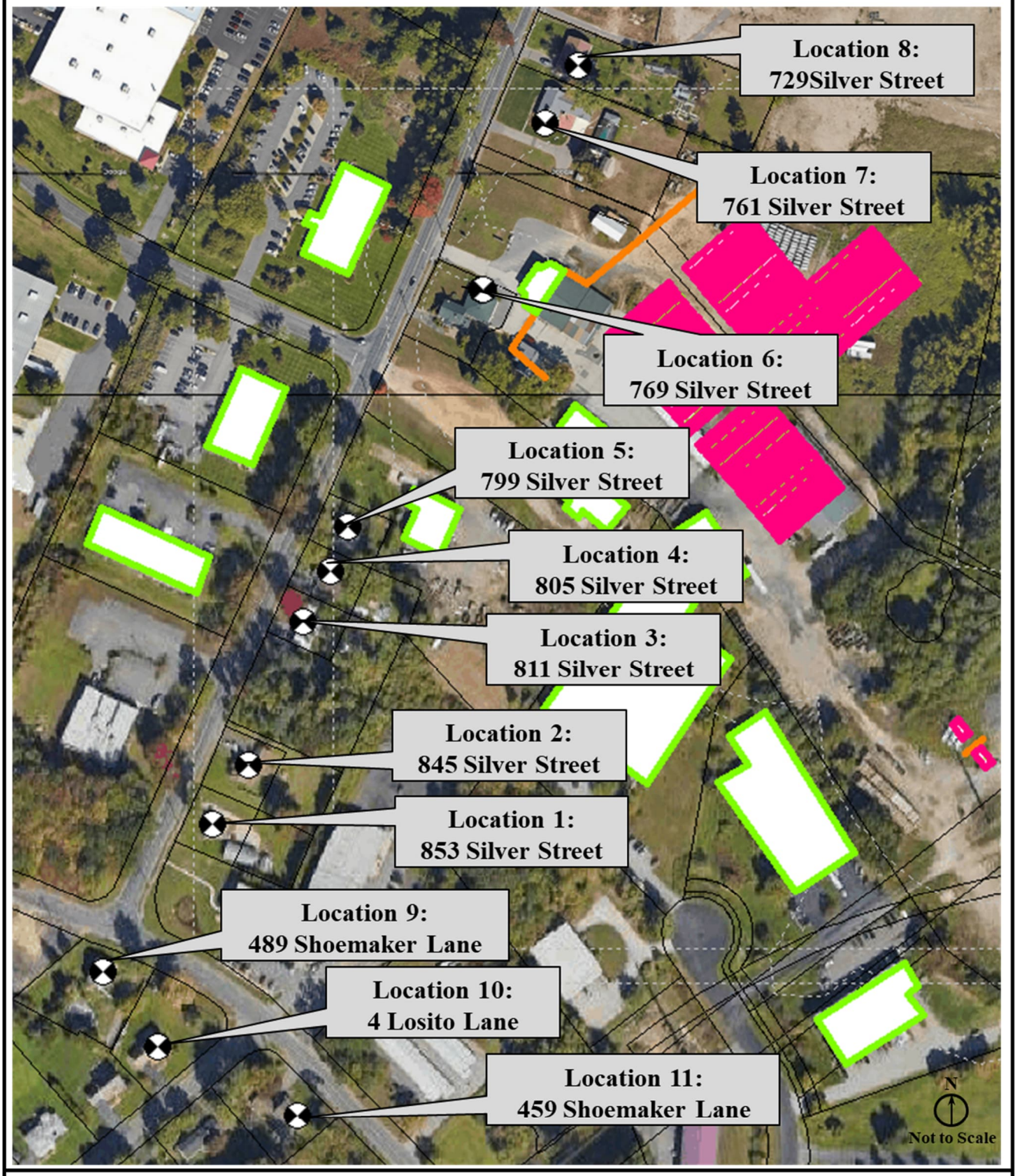

FIGURE 6.
Modeling Receptor Locations
769 Silver Street, Agawam, MA

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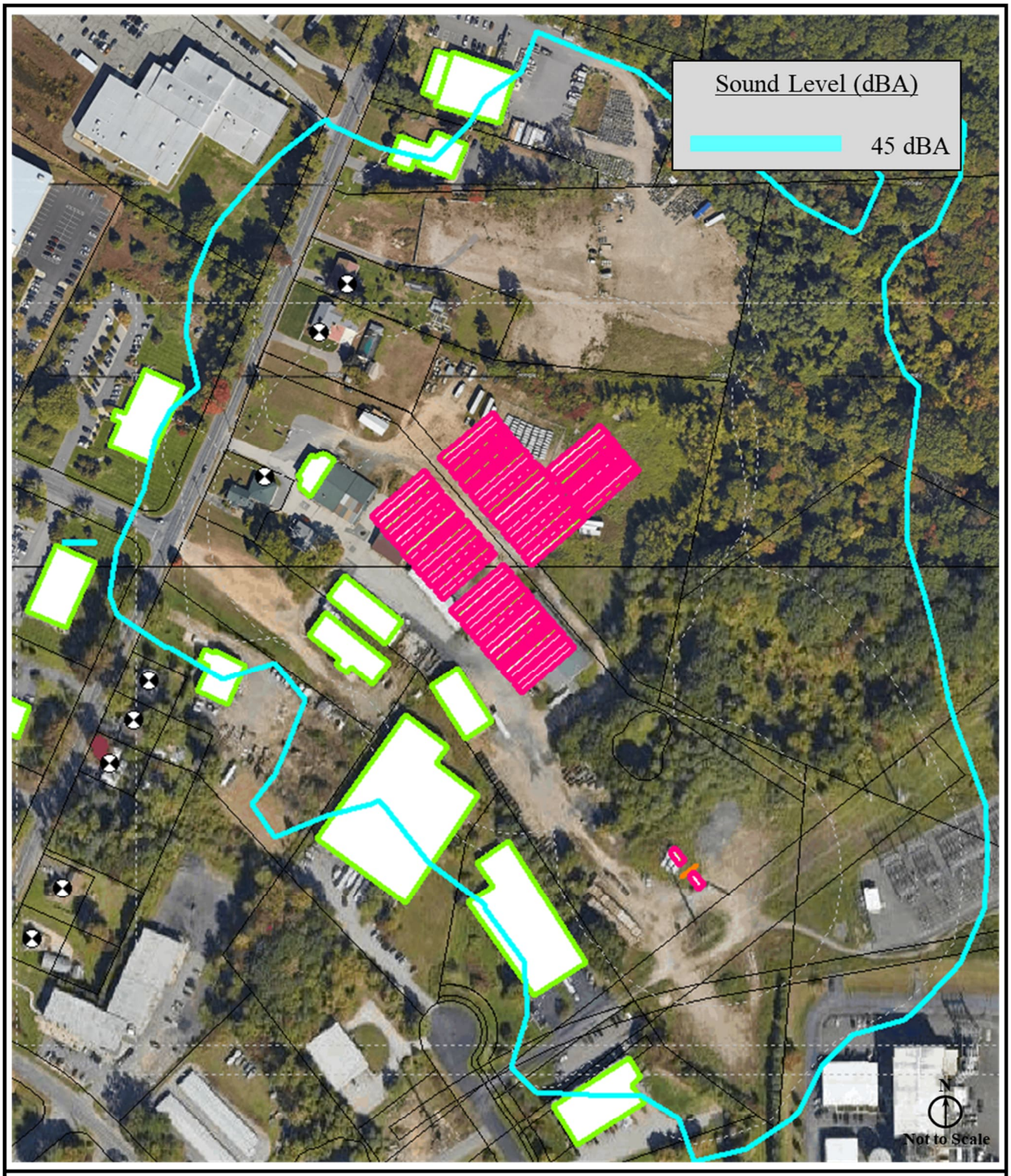

FIGURE 7.
Noise Contours of Modeling Results (5 ft): Unmitigated
769 Silver Street, Agawam, MA

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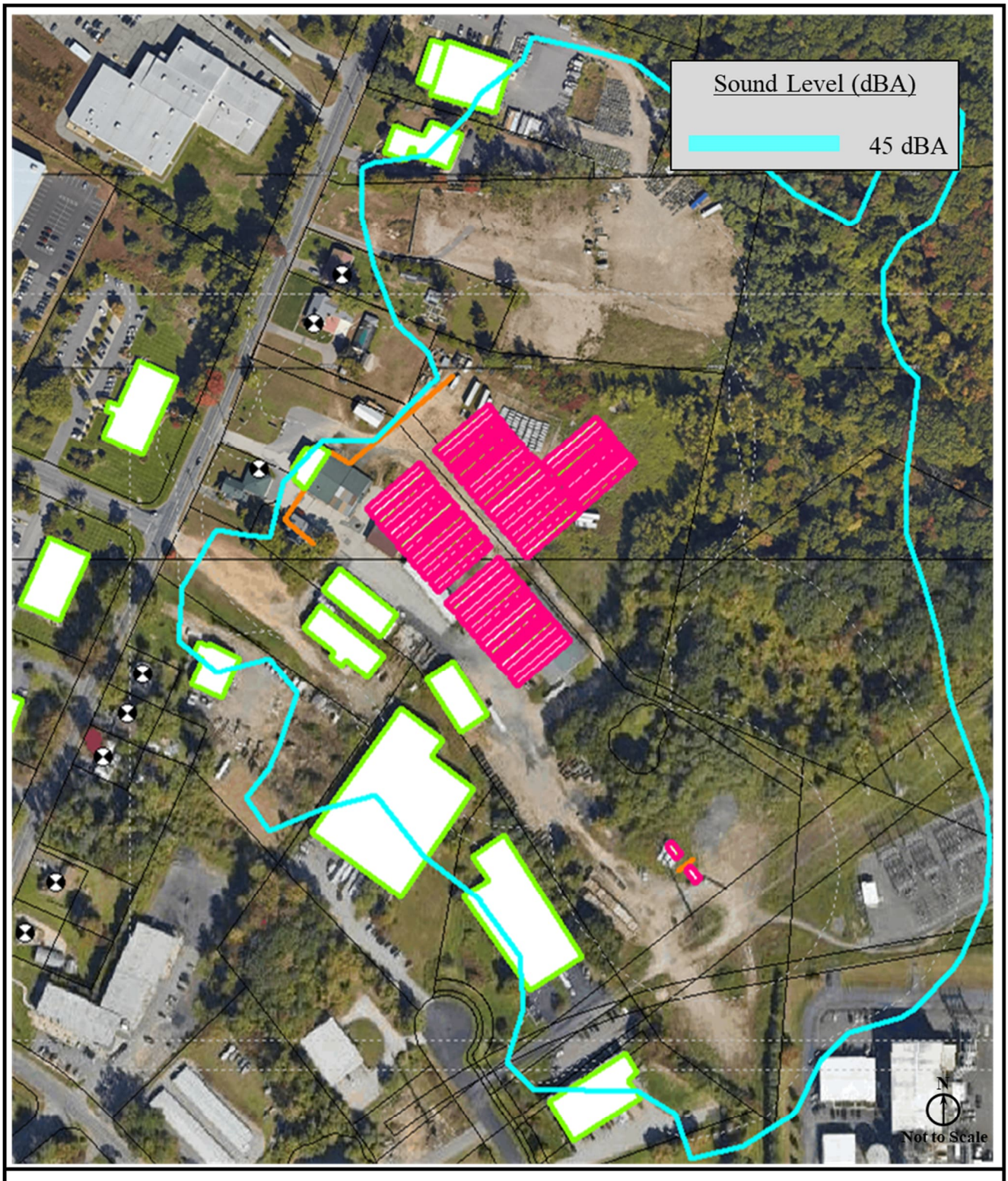

FIGURE 8.
Noise Contours of Modeling Results (5 ft): Mitigated
769 Silver Street, Agawam, MA

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TABLE 3 - OCTAVE BAND RESULTS & PURE TONE ASSESSMENTS (dB)

Continuous Sound Level Impacts of Project with No Mitigation (i.e., Modeling Results)

Sensitive Receptor Location	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1K Hz	2K Hz	4K Hz	8K Hz	Total (dBA)
853 Silver St 2ndFlr	-24	3	28	30	35	37	35	21	-17	**40**
845 Silver St 2ndFlr	-23	3	28	30	35	36	34	22	-14	**40**
811 Silver St 2ndFlr	-22	3	29	30	35	35	34	23	-9	**39**
805 Silver St 2ndFlr	-23	2	28	30	34	33	35	23	-9	**39**
799 Silver St 2ndFlr	-23	4	28	31	36	40	41	31	4	**45**
769 Silver St 2ndFlr	-20	8	29	32	39	44	43	34	14	**48**
761 Silver St 2ndFlr	-21	8	29	33	40	47	46	36	16	**50**
729 Silver St 2ndFlr	-21	7	28	32	39	46	45	35	13	**49**
489 Shoemaker Lane 2ndFlr	-25	2	27	29	34	36	34	18	-28	**40**
4 Losito Lane 2ndFlr	-24	2	27	30	35	35	33	18	-29	**39**
459 Shoemaker Lane 2ndFlr	-23	1	29	30	35	32	31	15	-30	**37**

Table 4 – OCTAVE BAND RESULTS & PURE TONE ASSESSMENTS (dB)

Assumed Background Sound Level*

Average Measured L_{90} Hourly Sound Level	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1K Hz	2K Hz	4K Hz	8K Hz	Pure Tone?
1:00 am	47	49	43	37	34	31	26	26	14	**No**

* The average L_{90} sound level measured by the long-term meter at the quietest hour. Background sound levels at other times were higher. This is a conservative approach for demonstrating compliance with the pure tone restriction.

Estimated Total Continuous Sound Levels & Pure Tone Assessment with No Mitigation

Sensitive Receptor Location	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1K Hz	2K Hz	4K Hz	8K Hz	Total (dBA)
853 Silver St 2ndFlr	47	49	43	38	37	38	35	27	14	**42**
845 Silver St 2ndFlr	47	49	43	38	37	37	35	27	14	**41**
811 Silver St 2ndFlr	47	49	43	38	37	37	35	28	14	**41**
805 Silver St 2ndFlr	47	49	43	38	37	35	36	28	14	**41**
799 Silver St 2ndFlr	47	49	43	38	38	41	41	32	14	**45**
769 Silver St 2ndFlr	47	49	43	38	40	44	43	35	17	**48**
761 Silver St 2ndFlr	47	49	43	38	41	47	46	37	18	**50**
729 Silver St 2ndFlr	47	49	43	38	40	46	45	36	16	**50**
489 Shoemaker Lane 2ndFlr	47	49	43	37	37	37	35	26	14	**41**
4 Losito Lane 2ndFlr	47	49	43	38	37	37	34	26	14	**41**
459 Shoemaker Lane 2ndFlr	47	49	43	38	37	35	32	26	14	**40**

Table 5 – OCTAVE BAND RESULTS & PURE TONE ASSESSMENTS (dB)

Continuous Sound Level Impacts of Project with Mitigation (i.e., Modeling Results)

Sensitive Receptor Location	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1K Hz	2K Hz	4K Hz	8K Hz	Total (dBA)
853 Silver St 2ndFlr	-24	3	28	30	35	37	35	21	-17	**40**
845 Silver St 2ndFlr	-23	3	28	30	35	36	34	22	-15	**40**
811 Silver St 2ndFlr	-22	3	29	30	35	35	34	23	-9	**39**
805 Silver St 2ndFlr	-23	2	28	30	34	33	34	21	-10	**38**
799 Silver St 2ndFlr	-23	4	28	31	36	40	40	30	4	**44**
769 Silver St 2ndFlr	-22	7	27	31	37	41	39	29	9	**44**
761 Silver St 2ndFlr	-23	6	27	30	37	40	37	26	2	**43**
729 Silver St 2ndFlr	-23	5	26	30	37	40	39	27	3	**43**
489 Shoemaker Lane 2ndFlr	-25	2	27	29	34	36	34	19	-28	**40**
4 Losito Lane 2ndFlr	-24	2	27	30	35	35	33	18	-29	**39**
459 Shoemaker Lane 2ndFlr	-23	1	29	30	35	32	31	16	-30	**37**

Table 6 – OCTAVE BAND RESULTS & PURE TONE ASSESSMENTS (dB)

Assumed Background Sound Level*

Average Measured L_{90} Hourly Sound Level	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1K Hz	2K Hz	4K Hz	8K Hz	Pure Tone?
1:00 am	47	49	43	37	34	31	26	26	14	**No**

* The average L_{90} sound level measured by the long-term meter at the quietest hour. Background sound levels at other times were higher. This is a conservative approach for demonstrating compliance with the pure tone restriction.

Estimated Total Continuous Sound Levels & Pure Tone Assessment with Mitigation

Sensitive Receptor Location	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1K Hz	2K Hz	4K Hz	8K Hz	Total (dBA)
853 Silver St 2ndFlr	47	49	43	38	37	38	35	27	14	**42**
845 Silver St 2ndFlr	47	49	43	38	37	37	35	27	14	**41**
811 Silver St 2ndFlr	47	49	43	38	37	37	35	27	14	**41**
805 Silver St 2ndFlr	47	49	43	38	37	35	34	27	14	**41**
799 Silver St 2ndFlr	47	49	43	38	38	41	40	31	14	**45**
769 Silver St 2ndFlr	47	49	43	38	39	41	39	31	15	**45**
761 Silver St 2ndFlr	47	49	43	38	39	40	38	29	14	**44**
729 Silver St 2ndFlr	47	49	43	38	38	41	39	30	14	**44**
489 Shoemaker Lane 2ndFlr	47	49	43	37	37	37	35	26	14	**41**
4 Losito Lane 2ndFlr	47	49	43	38	37	37	34	26	14	**41**
459 Shoemaker Lane 2ndFlr	47	49	43	38	37	35	32	26	14	**40**

APPENDIX A – CERTIFICATES OF CALIBRATION FOR EQUIPMENT

Calibration Certificate

Certificate Number 2025002223
Customer:
Tech Environmental

,

Model Number	831	***Procedure Number***	D0001.8378
Serial Number	0003143	***Technician***	Jacob Cannon
Test Results	**Pass**	***Calibration Date***	2025-02-11
Initial Condition	Inoperable	***Calibration Due***	
Description	Larson Davis Model 831 Class 1 Sound Level Meter Firmware Revision: 2.403	***Temperature***	23.56 °C ± 0.25 °C
		Humidity	50.6 %RH ± 2.0 %RH
		Static Pressure	85.21 kPa ± 0.13 kPa

Evaluation Method Tested electrically using Larson Davis PRM831 S/N 029590 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1
IEC 61260:2001 Class 1	ANSI S1.11 (R2009) Class 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). The results documented in this certificate relate only to the item(s) calibrated or tested. It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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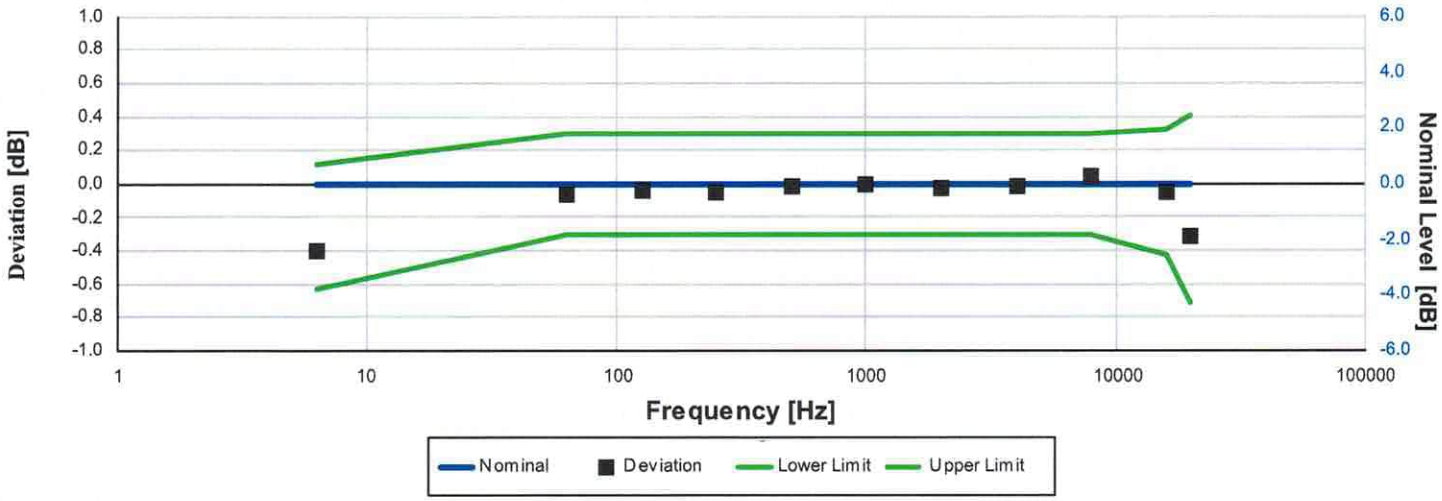
Correction data from Larson Davis Model 831 Sound Level Meter Manual, I831.01 Rev S, 2019-09-10

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa; Reference Range: 0 dB gain

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Hart Scientific 2626-S Humidity/Temperature Sensor	2024-05-07	2025-11-07	006943
SRS DS360 Ultra Low Distortion Generator	2024-09-03	2025-09-03	007167

Z-weight Filter Response

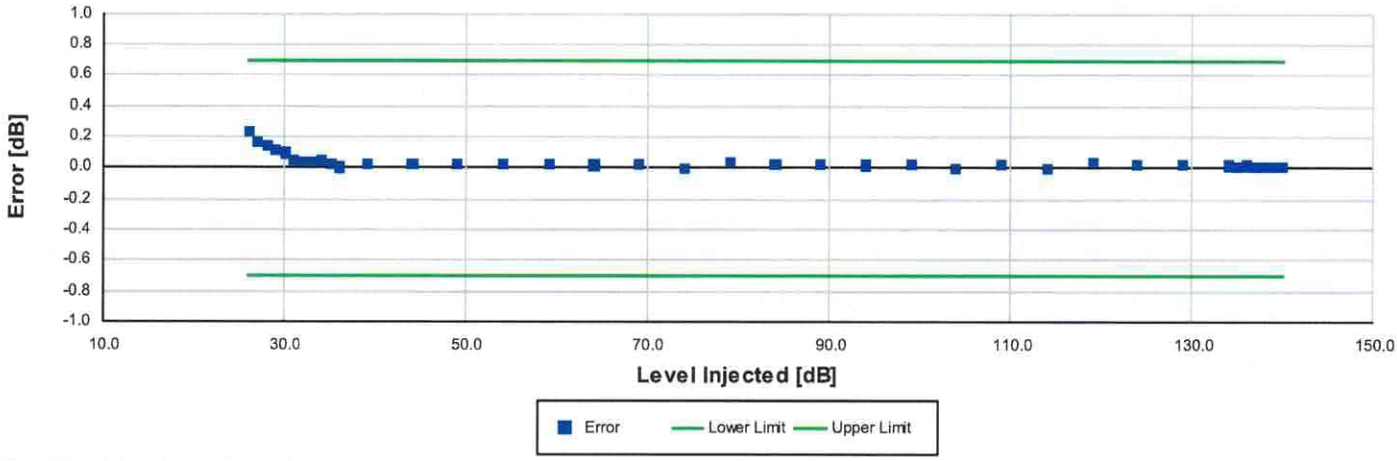


Electrical signal test of frequency weighting performed according to IEC 61672-3:2013 13 and ANSI S1.4-2014 Part 3: 13 for compliance to IEC 61672-1:2013 5.5; IEC 60651:2001 6.1 and 9.2.2; IEC 60804:2000 5; ANSI S1.4:1983 (R2006) 5.1 and 8.2.1; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Deviation [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
6.31	-0.40	-0.40	-0.63	0.12	0.15	Pass
63.10	-0.06	-0.06	-0.30	0.30	0.15	Pass
125.89	-0.03	-0.03	-0.30	0.30	0.15	Pass
251.19	-0.06	-0.05	-0.30	0.30	0.15	Pass
501.19	-0.01	-0.01	-0.30	0.30	0.15	Pass
1,000.00	0.00	0.00	-0.30	0.30	0.15	Pass
1,995.26	-0.03	-0.03	-0.30	0.30	0.15	Pass
3,981.07	-0.01	-0.01	-0.30	0.30	0.15	Pass
7,943.28	0.04	0.04	-0.30	0.30	0.15	Pass
15,848.93	-0.05	-0.05	-0.42	0.32	0.15	Pass
19,952.62	-0.32	-0.32	-0.71	0.41	0.15	Pass

-- End of measurement results--

A-weighted 0 dB Gain Broadband Log Linearity: 8,000.00 Hz



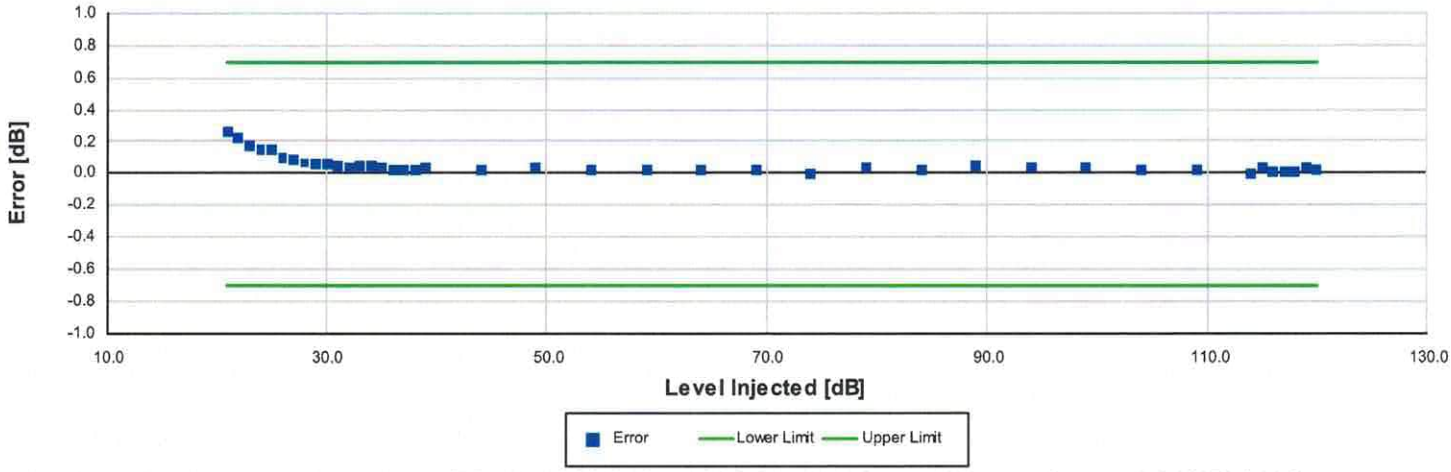
Broadband level linearity performed according to IEC 61672-3:2013 16 and ANSI S1.4-2014 Part 3: 16 for compliance to IEC 61672-1:2013 5.6, IEC 60804:2000 6.2, IEC 61252:2002 8, ANSI S1.4 (R2006) 6.9, ANSI S1.4-2014 Part 1: 5.6, ANSI S1.43 (R2007) 6.2

Level [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
26.00	0.23	-0.70	0.70	0.16	Pass
27.00	0.17	-0.70	0.70	0.16	Pass
28.00	0.14	-0.70	0.70	0.16	Pass
29.00	0.11	-0.70	0.70	0.16	Pass
30.00	0.10	-0.70	0.70	0.16	Pass
31.00	0.05	-0.70	0.70	0.16	Pass
32.00	0.04	-0.70	0.70	0.16	Pass
33.00	0.04	-0.70	0.70	0.16	Pass
34.00	0.05	-0.70	0.70	0.16	Pass
35.00	0.03	-0.70	0.70	0.16	Pass
36.00	0.01	-0.70	0.70	0.16	Pass
39.00	0.02	-0.70	0.70	0.16	Pass
44.00	0.03	-0.70	0.70	0.16	Pass
49.00	0.03	-0.70	0.70	0.16	Pass
54.00	0.02	-0.70	0.70	0.16	Pass
59.00	0.03	-0.70	0.70	0.16	Pass
64.00	0.02	-0.70	0.70	0.16	Pass
69.00	0.03	-0.70	0.70	0.16	Pass
74.00	0.00	-0.70	0.70	0.16	Pass
79.00	0.04	-0.70	0.70	0.16	Pass
84.00	0.02	-0.70	0.70	0.16	Pass
89.00	0.03	-0.70	0.70	0.16	Pass
94.00	0.02	-0.70	0.70	0.16	Pass
99.00	0.02	-0.70	0.70	0.16	Pass
104.00	0.00	-0.70	0.70	0.15	Pass
109.00	0.03	-0.70	0.70	0.15	Pass
114.00	0.00	-0.70	0.70	0.15	Pass
119.00	0.03	-0.70	0.70	0.15	Pass
124.00	0.02	-0.70	0.70	0.15	Pass
129.00	0.02	-0.70	0.70	0.15	Pass
134.00	0.02	-0.70	0.70	0.15	Pass
135.00	0.02	-0.70	0.70	0.15	Pass
136.00	0.02	-0.70	0.70	0.15	Pass
137.00	0.02	-0.70	0.70	0.15	Pass
138.00	0.02	-0.70	0.70	0.15	Pass
139.00	0.02	-0.70	0.70	0.15	Pass

Level [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
140.00	0.01	-0.70	0.70	0.15	Pass

-- End of measurement results--

A-weighted 20 dB Gain Broadband Log Linearity: 8,000.00 Hz



Broadband level linearity performed according to IEC 61672-3:2013 16 and ANSI S1.4-2014 Part 3: 16 for compliance to IEC 61672-1:2013 5.6, IEC 60804:2000 6.2, IEC 61252:2002 8, ANSI S1.4 (R2006) 6.9, ANSI S1.4-2014 Part 1: 5.6, ANSI S1.43 (R2007) 6.2

Level [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
21.00	0.26	-0.70	0.70	0.16	Pass
22.00	0.22	-0.70	0.70	0.16	Pass
23.00	0.18	-0.70	0.70	0.16	Pass
24.00	0.15	-0.70	0.70	0.16	Pass
25.00	0.15	-0.70	0.70	0.16	Pass
26.00	0.10	-0.70	0.70	0.16	Pass
27.00	0.08	-0.70	0.70	0.16	Pass
28.00	0.07	-0.70	0.70	0.16	Pass
29.00	0.06	-0.70	0.70	0.16	Pass
30.00	0.06	-0.70	0.70	0.16	Pass
31.00	0.05	-0.70	0.70	0.16	Pass
32.00	0.04	-0.70	0.70	0.16	Pass
33.00	0.05	-0.70	0.70	0.16	Pass
34.00	0.05	-0.70	0.70	0.16	Pass
35.00	0.04	-0.70	0.70	0.16	Pass
36.00	0.03	-0.70	0.70	0.16	Pass
37.00	0.02	-0.70	0.70	0.16	Pass
38.00	0.02	-0.70	0.70	0.16	Pass
39.00	0.04	-0.70	0.70	0.16	Pass
44.00	0.03	-0.70	0.70	0.16	Pass
49.00	0.03	-0.70	0.70	0.16	Pass
54.00	0.03	-0.70	0.70	0.16	Pass
59.00	0.03	-0.70	0.70	0.16	Pass
64.00	0.02	-0.70	0.70	0.16	Pass
69.00	0.03	-0.70	0.70	0.16	Pass
74.00	0.00	-0.70	0.70	0.16	Pass
79.00	0.04	-0.70	0.70	0.16	Pass
84.00	0.02	-0.70	0.70	0.16	Pass
89.00	0.04	-0.70	0.70	0.16	Pass
94.00	0.04	-0.70	0.70	0.16	Pass
99.00	0.04	-0.70	0.70	0.16	Pass
104.00	0.02	-0.70	0.70	0.15	Pass
109.00	0.03	-0.70	0.70	0.15	Pass
114.00	0.00	-0.70	0.70	0.15	Pass
115.00	0.03	-0.70	0.70	0.15	Pass
116.00	0.01	-0.70	0.70	0.15	Pass

Level [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
117.00	0.02	-0.70	0.70	0.15	Pass
118.00	0.02	-0.70	0.70	0.15	Pass
119.00	0.04	-0.70	0.70	0.15	Pass
120.00	0.02	-0.70	0.70	0.15	Pass

-- End of measurement results--

Peak Rise Time

Peak rise time performed according to IEC 60651:2001 9.4.4 and ANSI S1.4:1983 (R2006) 8.4.4

Amplitude [dB]	Duration [µs]		Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
139.00	40	Negative Pulse	135.97	134.51	136.51	0.15	Pass
		Positive Pulse	136.01	134.52	136.52	0.15	Pass
	30	Negative Pulse	135.07	134.51	136.51	0.15	Pass
		Positive Pulse	135.08	134.52	136.52	0.15	Pass

-- End of measurement results--

Positive Pulse Crest Factor

200 µs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
138.00	3	OVLD	± 0.50	0.15 ‡	Pass
	5	OVLD	± 1.00	0.15 ‡	Pass
	10	OVLD	± 1.50	0.15 ‡	Pass
128.00	3	-0.12	± 0.50	0.15 ‡	Pass
	5	-0.11	± 1.00	0.15 ‡	Pass
	10	OVLD	± 1.50	0.15 ‡	Pass
118.00	3	-0.12	± 0.50	0.16 ‡	Pass
	5	-0.12	± 1.00	0.15 ‡	Pass
	10	-0.07	± 1.50	0.15 ‡	Pass
108.00	3	-0.12	± 0.50	0.18 ‡	Pass
	5	-0.11	± 1.00	0.15 ‡	Pass
	10	0.01	± 1.50	0.15 ‡	Pass

-- End of measurement results--

Negative Pulse Crest Factor

200 µs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
138.00	3	OVLD	± 0.50	0.15 ‡	Pass
	5	OVLD	± 1.00	0.15 ‡	Pass
	10	OVLD	± 1.50	0.15 ‡	Pass
128.00	3	-0.12	± 0.50	0.15 ‡	Pass
	5	-0.13	± 1.00	0.15 ‡	Pass
	10	OVLD	± 1.50	0.15 ‡	Pass
118.00	3	-0.12	± 0.50	0.15 ‡	Pass
	5	-0.11	± 1.00	0.15 ‡	Pass
	10	-0.08	± 1.50	0.15 ‡	Pass
108.00	3	-0.12	± 0.50	0.15 ‡	Pass
	5	-0.12	± 1.00	0.15 ‡	Pass
	10	-0.17	± 1.50	0.15 ‡	Pass

-- End of measurement results--

Gain

Gain measured according to IEC 61672-3:2013 17.3 and 17.4 and ANSI S1.4-2014 Part 3: 17.3 and 17.4

Measurement	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
0 dB Gain	93.99	93.89	94.09	0.15	Pass
0 dB Gain, Linearity	29.07	28.29	29.69	0.16	Pass
20 dB Gain	94.01	93.89	94.09	0.15	Pass
20 dB Gain, Linearity	24.11	23.29	24.69	0.16	Pass
OBA Low Range	93.99	93.89	94.09	0.15	Pass
OBA Normal Range	93.99	93.20	94.80	0.15	Pass

-- End of measurement results--

Broadband Noise Floor

Self-generated noise measured according to IEC 61672-3:2013 11.2 and ANSI S1.4-2014 Part 3: 11.2

Measurement	Test Result [dB]	Upper limit [dB]	Result
A-weight Noise Floor	7.12	15.00	Pass
C-weight Noise Floor	12.44	17.30	Pass
Z-weight Noise Floor	21.18	24.50	Pass

-- End of measurement results--

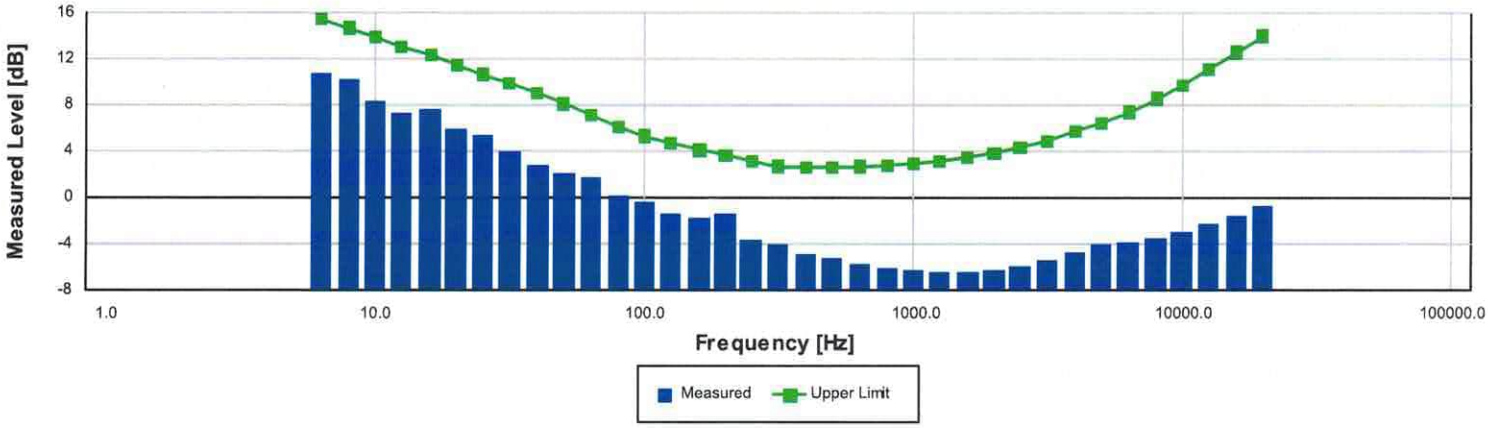
Total Harmonic Distortion

Measured using 1/3-Octave filters

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
10 Hz Signal	137.53	137.20	138.80	0.15	Pass
THD	-73.87		-60.00	0.01 ‡	Pass
THD+N	-66.26		-60.00	0.01 ‡	Pass

-- End of measurement results--

1/3-Octave Self-Generated Noise



The SLM is set to low range and 20 dB gain.

Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
6.30	10.86	15.50	Pass
8.00	10.24	14.70	Pass
10.00	8.39	13.90	Pass
12.50	7.34	13.10	Pass
16.00	7.74	12.30	Pass
20.00	5.89	11.50	Pass
25.00	5.40	10.70	Pass
31.50	4.06	9.90	Pass
40.00	2.74	9.10	Pass
50.00	2.14	8.10	Pass
63.00	1.67	7.10	Pass
80.00	0.15	6.10	Pass
100.00	-0.42	5.30	Pass
125.00	-1.42	4.70	Pass
160.00	-1.69	4.10	Pass
200.00	-1.33	3.60	Pass
250.00	-3.58	3.10	Pass
315.00	-4.07	2.70	Pass
400.00	-4.91	2.60	Pass
500.00	-5.28	2.60	Pass
630.00	-5.74	2.70	Pass
800.00	-6.15	2.80	Pass
1,000.00	-6.29	3.00	Pass
1,250.00	-6.48	3.20	Pass
1,600.00	-6.42	3.50	Pass
2,000.00	-6.24	3.80	Pass
2,500.00	-5.86	4.30	Pass
3,150.00	-5.31	4.90	Pass
4,000.00	-4.66	5.70	Pass
5,000.00	-4.07	6.40	Pass
6,300.00	-3.76	7.40	Pass
8,000.00	-3.47	8.60	Pass
10,000.00	-3.01	9.80	Pass
12,500.00	-2.33	11.20	Pass
16,000.00	-1.56	12.60	Pass
20,000.00	-0.69	14.00	Pass

-- End of measurement results--

-- End of Report--

Signatory: Jacob Cannon

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716-684-0001

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CERT #3622.01

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Calibration Certificate

Certificate Number 2025003296

Customer:
Tech Environmental Inc

,

Model Number	377B20	***Procedure Number***	D0001.8387		
Serial Number	LW134517	***Technician***	Abraham Ortega		
Test Results	**Pass**	***Calibration Date***	2025-02-28		
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***			
Description	1/2 inch Microphone - Random Incidence - 0V	***Temperature***	22.3	°C	± 0.01 °C
		Humidity	40.8	%RH	± 0.5 %RH
		Static Pressure	101.53	kPa	± 0.03 kPa

Evaluation Method Tested electrically using an electrostatic actuator.

Compliance Standards Compliant to Manufacturer Specifications.

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). The results documented in this certificate relate only to the item(s) calibrated or tested. It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.
Test points marked with a ‡ do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

For microphone sensitivity measurements, simple acceptance criteria is used with an expanded uncertainty not to exceed 0.25 dB for microphone sensitivities above 1 mV/Pa and 0.65 dB for microphone sensitivities below 1 mV/Pa.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
Agilent 34401A DMM	2024-12-11	2025-12-11	001329
Larson Davis 1/2" Preamplifier 7-pin LEMO	2024-07-11	2025-07-11	006507
1/2 inch Microphone - Random Incidence - 200V	2024-11-12	2025-11-12	006511
1/2 inch Microphone - Random Incidence - 200V	2024-07-10	2025-07-10	006519
Larson Davis 1/2" Preamplifier 7-pin LEMO	2024-07-11	2025-07-11	006530
Larson Davis CAL250 Acoustic Calibrator	2025-01-16	2026-01-16	PCB0013615
Larson Davis 1/2" Preamplifier 7-pin LEMO	2024-07-26	2025-07-26	PCB0070355
Microphone Calibration System	2024-08-19	2025-08-19	PCB0089382
Larson Davis Model 2900 Real Time Analyzer	2024-10-29	2025-10-29	PCB0089383
1/2" Preamplifier	2024-08-29	2025-08-29	PCB0089384
1/2" Preamplifier	2024-07-11	2025-07-11	PCB0089385

Sensitivity

Measurement	Test Result [mV/Pa]	Lower limit [mV/Pa]	Upper limit [mV/Pa]	Expanded Uncertainty [mV/Pa]	Result
Open Circuit Sensitivity	52.2	43.2	58.2	1.2	Pass

-- End of measurement results--

Capacitance

Measurement	Test Result [pF]				
Capacitance	12.00				‡

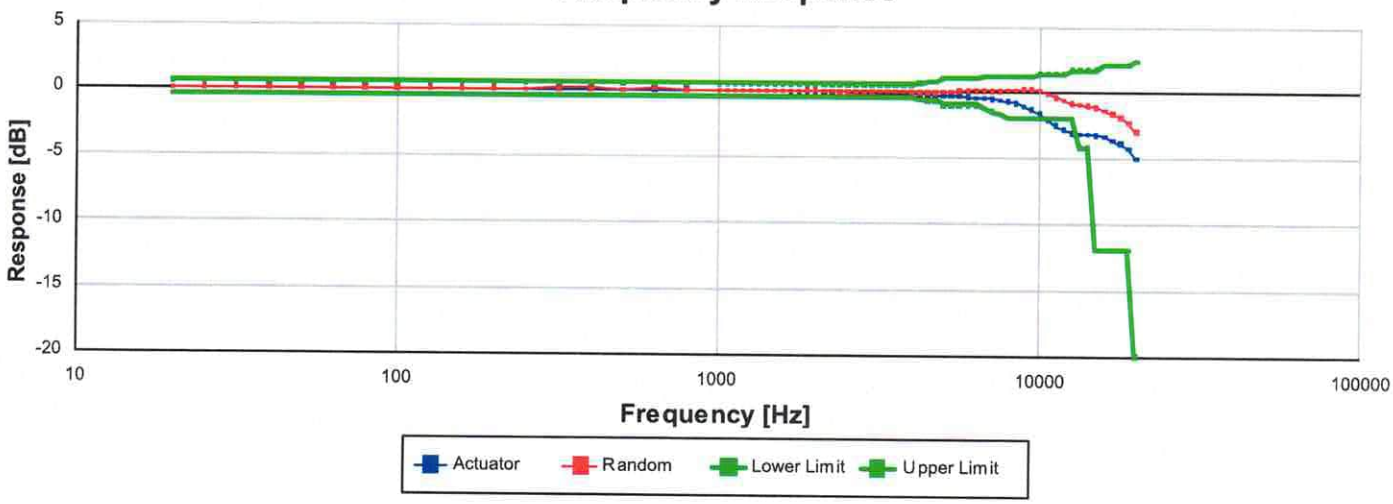
-- End of measurement results--

Lower Limiting Frequency

Measurement	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Result
-3 dB Frequency	1.70	1.00	2.40	Pass ‡

-- End of measurement results--

Frequency Response



Data is normalized for 0 dB @ 251.19 Hz.

Frequency [Hz]	Actuator [dB]	Random [dB]	Lower limit [dB]	Upper limit [dB]	Result
19.95	-0.01	-0.01	-0.50	0.50	Pass ‡
25.12	0.02	0.02	-0.50	0.50	Pass ‡
31.62	0.03	0.03	-0.50	0.50	Pass ‡
39.81	0.04	0.04	-0.50	0.50	Pass ‡
50.12	0.04	0.04	-0.50	0.50	Pass ‡
63.10	0.03	0.03	-0.50	0.50	Pass ‡
79.43	0.03	0.03	-0.50	0.50	Pass ‡
100.00	0.02	0.02	-0.50	0.50	Pass ‡
125.89	0.02	0.02	-0.50	0.50	Pass ‡
158.49	0.01	0.01	-0.50	0.50	Pass ‡
199.53	0.01	0.01	-0.50	0.50	Pass ‡
251.19	0.00	0.00	-0.50	0.50	Pass ‡
316.23	0.00	0.06	-0.50	0.50	Pass ‡
398.11	-0.01	0.05	-0.50	0.50	Pass ‡
501.19	-0.02	0.00	-0.50	0.50	Pass ‡
630.96	-0.02	0.12	-0.50	0.50	Pass ‡
794.33	-0.03	0.04	-0.50	0.50	Pass ‡
1,000.00	-0.04	-0.02	-0.50	0.50	Pass ‡
1,059.25	-0.04	-0.04	-0.50	0.50	Pass ‡
1,122.02	-0.04	-0.03	-0.50	0.50	Pass ‡
1,188.50	-0.05	-0.03	-0.50	0.50	Pass ‡
1,258.93	-0.05	-0.01	-0.50	0.50	Pass ‡
1,333.52	-0.05	0.00	-0.50	0.50	Pass ‡
1,412.54	-0.05	0.00	-0.50	0.50	Pass ‡
1,496.24	-0.06	-0.02	-0.50	0.50	Pass ‡
1,584.89	-0.06	-0.02	-0.50	0.50	Pass ‡
1,678.80	-0.07	-0.02	-0.50	0.50	Pass ‡
1,778.28	-0.07	-0.01	-0.50	0.50	Pass ‡
1,883.65	-0.07	0.01	-0.50	0.50	Pass ‡
1,995.26	-0.08	0.01	-0.50	0.50	Pass ‡
2,113.49	-0.08	0.00	-0.50	0.50	Pass ‡
2,238.72	-0.09	-0.04	-0.50	0.50	Pass ‡
2,371.37	-0.09	-0.07	-0.50	0.50	Pass ‡
2,511.89	-0.10	-0.10	-0.50	0.50	Pass ‡
2,660.73	-0.11	-0.10	-0.50	0.50	Pass ‡
2,818.38	-0.12	-0.09	-0.50	0.50	Pass ‡
2,985.38	-0.14	-0.07	-0.50	0.50	Pass ‡
3,162.28	-0.15	-0.05	-0.50	0.50	Pass ‡
3,349.65	-0.16	-0.03	-0.50	0.50	Pass ‡
3,548.13	-0.18	-0.05	-0.50	0.50	Pass ‡
3,758.37	-0.19	-0.06	-0.50	0.50	Pass ‡
3,981.07	-0.21	-0.08	-0.50	0.50	Pass ‡
4,216.97	-0.23	-0.09	-0.63	0.63	Pass ‡
4,466.84	-0.25	-0.08	-0.70	0.70	Pass ‡
4,731.51	-0.28	-0.07	-0.70	0.70	Pass ‡
5,011.87	-0.31	-0.05	-1.00	1.00	Pass ‡
5,308.84	-0.34	-0.02	-1.00	1.00	Pass ‡
5,623.41	-0.37	0.02	-1.00	1.00	Pass ‡
5,956.62	-0.42	0.05	-1.00	1.00	Pass ‡
6,309.57	-0.46	0.07	-1.00	1.00	Pass ‡
6,683.44	-0.51	0.08	-1.25	1.20	Pass ‡
7,079.46	-0.56	0.08	-1.50	1.20	Pass ‡
7,498.94	-0.65	0.06	-1.70	1.20	Pass ‡

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Frequency [Hz]	Actuator [dB]	Random [dB]	Lower limit [dB]	Upper limit [dB]	Result
7,943.28	-0.74	0.09	-2.00	1.20	Pass ‡
8,413.95	-0.86	0.15	-2.00	1.20	Pass ‡
8,912.51	-1.06	0.18	-2.00	1.20	Pass ‡
9,440.61	-1.34	0.17	-2.00	1.20	Pass ‡
10,000.00	-1.65	0.12	-2.00	1.38	Pass ‡
10,592.54	-2.17	-0.19	-2.00	1.38	Pass ‡
11,220.19	-2.53	-0.40	-2.00	1.38	Pass ‡
11,885.02	-2.83	-0.62	-2.00	1.38	Pass ‡
12,589.25	-3.10	-0.87	-2.00	1.68	Pass ‡
13,335.21	-3.17	-0.96	-4.20	1.68	Pass ‡
14,125.38	-3.19	-1.04	-4.20	1.68	Pass ‡
14,962.36	-3.23	-1.16	-11.90	1.68	Pass ‡
15,848.93	-3.36	-1.36	-11.90	2.08	Pass ‡
16,788.04	-3.61	-1.64	-11.90	2.08	Pass ‡
17,782.80	-3.87	-1.90	-11.90	2.08	Pass ‡
18,836.49	-4.27	-2.27	-11.90	2.08	Pass ‡
19,952.62	-5.03	-2.98	-100.00	2.38	Pass ‡

-- End of measurement results--

Signatory: Abraham Ortega

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Calibration Certificate

Certificate Number 2025003004
Customer:
Tech Environmental Inc

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Model Number	PRM831	***Procedure Number***	D0001.8383
Serial Number	026008	***Technician***	Jacob Cannon
Test Results	**Pass**	***Calibration Date***	2025-02-25
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***	
Description	Larson Davis 1/2" Preamplifier for Model 831 Type 1	***Temperature***	23.07 °C ± 0.01 °C
		Humidity	52.2 %RH ± 0.5 %RH
		Static Pressure	86.12 kPa ± 0.03 kPa

Evaluation Method Tested electrically using a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). The results documented in this certificate relate only to the item(s) calibrated or tested. It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level. Tests are considered to pass when the measured value is within the acceptance limits, which are derived from industry standards.

Simple acceptance criteria is used with an expanded uncertainty not to exceed 0.20 dB for all measurements below 100 kHz and 0.50 dB for measurements above 100 kHz.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
Larson Davis Model 2900 Real Time Analyzer	2024-09-16	2025-09-16	001150
Hart Scientific 2626-S Humidity/Temperature Sensor	2024-05-07	2025-11-07	006943
SRS DS360 Ultra Low Distortion Generator	2024-03-26	2025-03-26	007635

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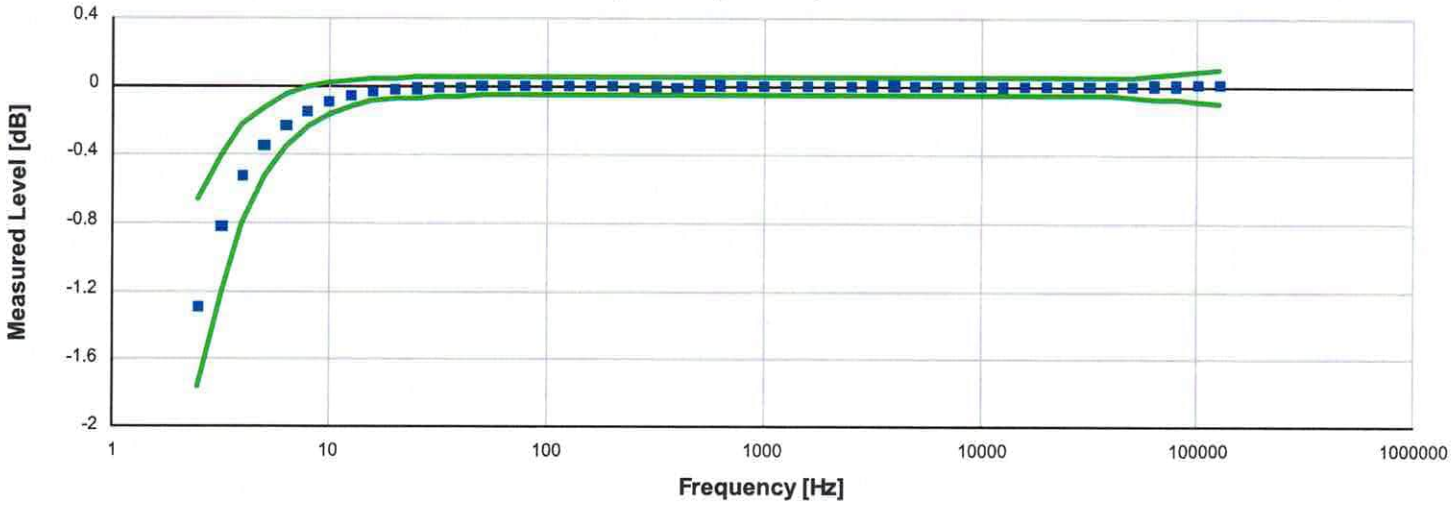
Frequency Response



Frequency response electrically tested at 120.0 dB re 1 µV

Frequency [Hz]	Test Result [dB re 1 kHz]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
2.50	-1.29	-1.76	-0.66	0.12	Pass
3.20	-0.82	-1.20	-0.40	0.12	Pass
4.00	-0.53	-0.81	-0.23	0.12	Pass
5.00	-0.35	-0.53	-0.13	0.10	Pass
6.30	-0.23	-0.36	-0.05	0.07	Pass
7.90	-0.15	-0.24	-0.01	0.07	Pass
10.00	-0.10	-0.17	0.03	0.07	Pass
12.60	-0.06	-0.13	0.04	0.04	Pass
15.80	-0.04	-0.09	0.04	0.04	Pass
20.00	-0.02	-0.08	0.05	0.04	Pass
25.10	-0.02	-0.07	0.05	0.04	Pass
31.60	-0.01	-0.07	0.05	0.04	Pass
39.80	-0.01	-0.06	0.05	0.04	Pass
50.10	0.00	-0.06	0.05	0.04	Pass
63.10	0.00	-0.05	0.05	0.04	Pass
79.40	0.00	-0.05	0.05	0.04	Pass
100.00	0.00	-0.05	0.05	0.04	Pass
125.90	0.00	-0.05	0.05	0.04	Pass
158.50	0.00	-0.05	0.05	0.04	Pass
199.50	0.00	-0.05	0.05	0.04	Pass
251.20	-0.01	-0.05	0.05	0.04	Pass
316.20	0.00	-0.05	0.05	0.04	Pass
398.10	-0.01	-0.05	0.05	0.04	Pass
501.20	0.01	-0.05	0.05	0.04	Pass
631.00	0.01	-0.05	0.05	0.04	Pass
794.30	0.01	-0.05	0.05	0.04	Pass
1,000.00	0.01	-0.05	0.05	0.04	Pass
1,258.90	0.00	-0.05	0.05	0.04	Pass
1,584.90	0.00	-0.05	0.05	0.04	Pass
1,995.30	0.00	-0.05	0.05	0.04	Pass
2,511.90	0.01	-0.05	0.05	0.04	Pass
3,162.30	0.01	-0.05	0.05	0.04	Pass

Frequency [Hz]	Test Result [dB re 1 kHz]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
3,981.10	0.01	-0.05	0.05	0.04	Pass
5,011.90	0.00	-0.05	0.05	0.04	Pass
6,309.60	0.00	-0.05	0.05	0.04	Pass
7,943.30	0.01	-0.05	0.05	0.04	Pass
10,000.00	0.01	-0.05	0.05	0.04	Pass
12,589.30	0.00	-0.05	0.05	0.04	Pass
15,848.90	0.00	-0.05	0.05	0.04	Pass
19,952.60	0.00	-0.05	0.05	0.04	Pass
25,118.90	0.00	-0.05	0.05	0.05	Pass
31,622.80	0.00	-0.05	0.05	0.05	Pass
39,810.70	0.00	-0.05	0.05	0.05	Pass
50,118.70	0.01	-0.06	0.06	0.09	Pass
63,095.70	0.01	-0.07	0.07	0.09	Pass
79,432.80	0.01	-0.08	0.08	0.09	Pass
100,000.00	0.01	-0.09	0.09	0.09	Pass
125,892.50	0.02	-0.10	0.10	0.45	Pass

Gain Measurement

Measurement	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
Output Gain @ 1 kHz	-0.18	-0.45	-0.03	0.04	Pass

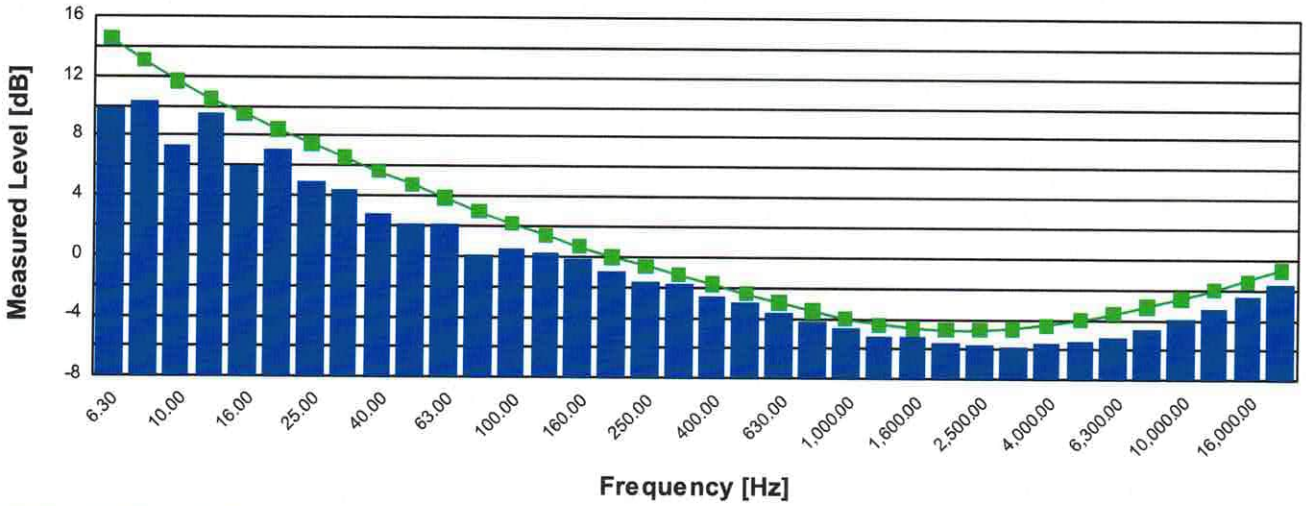
-- End of measurement results--

DC Bias Measurement

Measurement	Test Result [V]	Lower limit [V]	Upper limit [V]	Expanded Uncertainty [V]	Result
DC Voltage	17.73	15.50	19.50	0.04	Pass

-- End of measurement results--

1/3-Octave Self-Generated Noise



Frequency [Hz]	Test Result [dB re 1 µV]	Upper limit [dB re 1 µV]	Result
6.30	9.90	14.60	Pass
8.00	10.30	13.10	Pass
10.00	7.40	11.70	Pass
12.50	9.50	10.50	Pass
16.00	6.00	9.50	Pass
20.00	7.10	8.50	Pass
25.00	4.90	7.50	Pass
31.50	4.40	6.60	Pass
40.00	2.80	5.70	Pass
50.00	2.10	4.80	Pass
63.00	2.20	3.90	Pass
80.00	0.10	3.00	Pass
100.00	0.50	2.20	Pass
125.00	0.20	1.40	Pass
160.00	-0.10	0.70	Pass
200.00	-1.00	0.00	Pass
250.00	-1.70	-0.60	Pass
315.00	-1.80	-1.20	Pass
400.00	-2.60	-1.80	Pass
500.00	-3.00	-2.40	Pass
630.00	-3.70	-3.00	Pass
800.00	-4.20	-3.50	Pass
1,000.00	-4.60	-4.00	Pass
1,250.00	-5.10	-4.40	Pass
1,600.00	-5.20	-4.60	Pass
2,000.00	-5.60	-4.70	Pass
2,500.00	-5.70	-4.70	Pass
3,150.00	-5.80	-4.60	Pass
4,000.00	-5.60	-4.40	Pass
5,000.00	-5.40	-4.00	Pass
6,300.00	-5.10	-3.60	Pass
8,000.00	-4.60	-3.10	Pass
10,000.00	-3.90	-2.60	Pass
12,500.00	-3.20	-2.00	Pass
16,000.00	-2.50	-1.40	Pass
20,000.00	-1.70	-0.70	Pass

-- End of measurement results--

Self-generated Noise

Bandwidth	Test Result [µV]	Test Result [dB re 1 µV]	Upper limit [dB re 1 µV]	Result
A-weighted (1 Hz - 20 kHz)	2.32	7.30	8.00	Pass
Broadband (1 Hz - 20 kHz)	4.95	13.90	15.50	Pass

-- End of measurement results--

Signatory: *Jacob Cannon*

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Calibration Certificate

Certificate Number 2025001671

Customer:
Tech Environmental

,

Model Number	CAL200	***Procedure Number***	D0001.8386
Serial Number	10507	***Technician***	Scott Montgomery
Test Results	**Pass**	***Calibration Date***	2025-02-03
		Calibration Due	
Initial Condition	Adjusted	***Temperature***	24 °C ± 0.3 °C
Description	Larson Davis CAL200 Acoustic Calibrator	***Humidity***	30 %RH ± 3 %RH
		Static Pressure	101.3 kPa ± 1 kPa

Evaluation Method The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity. Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications per D0001.8190 and the following standards:
IEC 60942:2017 ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). The results documented in this certificate relate only to the item(s) calibrated or tested. It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
Agilent 34401A DMM	2024-06-20	2025-06-20	001021
Larson Davis Model 2900 Real Time Analyzer	2024-04-01	2025-04-01	001051
Microphone Calibration System	2024-02-22	2025-02-22	005446
1/2" Preamplifier	2024-08-15	2025-08-15	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	2024-07-26	2025-07-26	006507
1/2 inch Microphone - Random Incidence - 200V	2024-11-12	2025-11-12	006511
Pressure Sensor	2024-02-28	2025-02-28	007825

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Output Level

Nominal Level [dB]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
94	101.3	94.00	93.80	94.20	0.14	Pass
114	101.2	114.00	113.80	114.20	0.14	Pass

-- End of measurement results--

Frequency

Nominal Level [dB]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
94	101.3	1,000.01	993.00	1,007.00	0.20	Pass
114	101.2	1,000.00	993.00	1,007.00	0.20	Pass

-- End of measurement results--

Total Harmonic Distortion + Noise (THD+N)

Nominal Level [dB]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
94	101.3	0.38	0.00	2.00	0.25 ‡	Pass
114	101.2	0.34	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Level Change Over Pressure

Tested at: 114 dB, 24 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
108.0	107.9	-0.02	-0.25	0.25	0.04 ‡	Pass
101.3	101.3	0.00	-0.25	0.25	0.04 ‡	Pass
92.0	92.0	0.01	-0.25	0.25	0.04 ‡	Pass
83.0	83.0	-0.01	-0.25	0.25	0.04 ‡	Pass
74.0	74.1	-0.07	-0.25	0.25	0.04 ‡	Pass
65.0	65.1	-0.19	-0.25	0.25	0.04 ‡	Pass

-- End of measurement results--

Frequency Change Over Pressure

Tested at: 114 dB, 24 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
108.0	107.9	0.00	-7.00	7.00	0.20 ‡	Pass
101.3	101.3	0.00	-7.00	7.00	0.20 ‡	Pass
92.0	92.0	0.00	-7.00	7.00	0.20 ‡	Pass
83.0	83.0	0.00	-7.00	7.00	0.20 ‡	Pass
74.0	74.1	0.00	-7.00	7.00	0.20 ‡	Pass
65.0	65.1	0.00	-7.00	7.00	0.20 ‡	Pass

-- End of measurement results--

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Total Harmonic Distortion + Noise (THD+N) Over Pressure

Tested at: 114 dB, 24 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
108.0	107.9	0.35	0.00	2.00	0.25 ‡	Pass
101.3	101.3	0.34	0.00	2.00	0.25 ‡	Pass
92.0	92.0	0.33	0.00	2.00	0.25 ‡	Pass
83.0	83.0	0.33	0.00	2.00	0.25 ‡	Pass
74.0	74.1	0.33	0.00	2.00	0.25 ‡	Pass
65.0	65.1	0.33	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Signatory: *Scott Montgomery*

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Initial Assessment

Certificate Number 2025001669

Customer:
Tech Environmental

,

Model Number	CAL200	***Procedure Number***	D0001.8386
Serial Number	10507	***Technician***	Scott Montgomery
Test Results	**Pass**	***Calibration Date***	2025-02-03
Initial Condition	As Received	***Calibration Due***	
Description	Larson Davis CAL200 Acoustic Calibrator	***Temperature***	24 °C ± 0.3 °C
		Humidity	31 %RH ± 3 %RH
		Static Pressure	101.1 kPa ± 1 kPa

Evaluation Method The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity. Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications per D0001.8190 and the following standards:
IEC 60942:2017 ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). The results documented in this certificate relate only to the item(s) calibrated or tested. It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
Agilent 34401A DMM	2024-06-20	2025-06-20	001021
Larson Davis Model 2900 Real Time Analyzer	2024-04-01	2025-04-01	001051
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1/2" Preamplifier	2024-08-15	2025-08-15	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	2024-07-26	2025-07-26	006507
1/2 inch Microphone - Random Incidence - 200V	2024-11-12	2025-11-12	006511
Pressure Sensor	2024-02-28	2025-02-28	007825

Output Level

Nominal Level [dB]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
94	101.1	94.11	93.80	94.20	0.14	Pass
114	101.1	114.13	113.80	114.20	0.14	Pass

-- End of measurement results--

Frequency

Nominal Level [dB]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
94	101.1	1,000.03	993.00	1,007.00	0.20	Pass
114	101.1	999.99	993.00	1,007.00	0.20	Pass

-- End of measurement results--

Total Harmonic Distortion + Noise (THD+N)

Nominal Level [dB]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
94	101.1	0.38	0.00	2.00	0.25 ‡	Pass
114	101.1	0.34	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Level Change Over Pressure

Tested at: 114 dB, 24 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
108.0	107.9	-0.02	-0.25	0.25	0.04 ‡	Pass
101.3	101.3	0.00	-0.25	0.25	0.04 ‡	Pass
92.0	92.0	0.01	-0.25	0.25	0.04 ‡	Pass
83.0	83.0	-0.01	-0.25	0.25	0.04 ‡	Pass
74.0	74.1	-0.07	-0.25	0.25	0.04 ‡	Pass
65.0	65.1	-0.19	-0.25	0.25	0.04 ‡	Pass

-- End of measurement results--

Frequency Change Over Pressure

Tested at: 114 dB, 24 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
108.0	107.9	0.00	-7.00	7.00	0.20 ‡	Pass
101.3	101.3	0.00	-7.00	7.00	0.20 ‡	Pass
92.0	92.0	0.00	-7.00	7.00	0.20 ‡	Pass
83.0	83.0	0.00	-7.00	7.00	0.20 ‡	Pass
74.0	74.1	0.00	-7.00	7.00	0.20 ‡	Pass
65.0	65.1	0.00	-7.00	7.00	0.20 ‡	Pass

-- End of measurement results--

Total Harmonic Distortion + Noise (THD+N) Over Pressure

Tested at: 114 dB, 24 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
108.0	107.9	0.35	0.00	2.00	0.25 ‡	Pass
101.3	101.3	0.34	0.00	2.00	0.25 ‡	Pass
92.0	92.0	0.33	0.00	2.00	0.25 ‡	Pass
83.0	83.0	0.33	0.00	2.00	0.25 ‡	Pass
74.0	74.1	0.33	0.00	2.00	0.25 ‡	Pass
65.0	65.1	0.33	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Signatory: *Scott Montgomery*

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ATTACHMENT H – EMERGENCY RESPONSE PLAN

FIRE & RISK ALLIANCE

Agawam BESS ERP

Draft Emergency Response Plan RevA



Prepared for Longroad Energy

November 18, 2025

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TABLE OF CONTENTS

1 GENERAL INFORMATION 4
1.1 Scope 4
1.2 Purpose 4
1.3 Site Owner 4
1.4 Location 4
1.5 Emergency Contact 4

2 SITE OVERVIEW 5
2.1 General Site Overview 5
2.2 Energy Storage System Site Overview 6

3 MITIGATION 7
3.1 Battery Cabinet Equipment Overview 7
3.2 Fire Protection Overview 7
3.2.1 Site Access 7
3.2.2 Fire Alarm and Detection System 8
3.2.3 First Responder Station 8
3.2.4 Fire Protection Water Supply 8
3.3 Explosion Control and Prevention System 9
3.4 Battery Management System 9
3.5 Emergency Stop 10

4 PREPAREDNESS 11
4.1 Chemical Hazards 11
4.1.1 Cell Vent Gas 11
4.1.2 Hydrogen 11
4.1.3 Carbon Monoxide 11
4.1.4 Transformer Dielectric Fluid 12
4.1.5 Refrigerant 12
4.2 Electrical Hazards 12
4.3 Thermal Runaway and Fire Hazards 13
4.4 Explosion Hazard 13
4.5 Recommended PPE 13
4.6 BESS Subject Matter Expert 13

5 RESPONSE 15
5.1 Tactics 15
5.1.1 Life Safety 15

5.1.2 Community Air Monitoring 16
5.1.3 Exclusion Zone 16
5.1.4 Alarms Monitoring 16
5.1.5 Isolation of Trouble Equipment 16
5.1.6 Condition Monitoring 16
5.1.7 Exposure Assessment 17
5.1.8 Exposure Protection 17
5.2 Incident Stabilization 17
5.2.1 Under Control 17

6 RECOVERY 18

7 REVISION SHEET 19

TABLE OF FIGURES

Figure 1 Site Overview 5
Figure 2 General Equipment Arrangement 6
Figure 3 Smartstack BESS Components 7
Figure 4 Municipal Fire Hydrant Locations 8
Figure 5 Explosion Prevention System 9
Figure 6 Explosion Control System 9
Figure 7 BESS E-Stop 10
Figure 8 General 100' Exclusion Zone 16

TABLE OF TABLES

Table 1 Emergency Services Contact Information 4
Table 2 BMS Functions 10
Table 3 Hydrogen Characteristics 11
Table 4 Carbon Monoxide Characteristics 12
Table 5 Refrigerant Characteristics 12

7 REVISION SHEET

Rev. No.	Date	Written By	Reviewed By	Approved By	Notes

DRAFT

Warning, this document is draft material.

Significant changes can occur after final review.

ATTACHMENT I – DECOMMISSIONING PLAN

DECOMISSIONING PLAN
AGAWAM ENERGY CENTER

Prepared for Longroad Energy

LONGROAD ENERGY
125 High Street
Boston, MA 02210

January 2026

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P.O. Box 85A
Cumberland, Maine 04021

Tel: 207.829.5016 sme-engineers.com

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ENGINEERS

TABLE OF CONTENTS

Section No.	Title	Page No.
1.0	**Executive Summary**	**1-1**
2.0	**Acronyms and Abbreviations**	**2-2**
3.0	**Narrative Description of Decommissioning Process**	**3-2**
3.1	Objectives	3-2
3.2	Scope & Boundaries	3-3
3.3	Pre-Decommissioning Planning	3-3
3.4	De-Energization & Isolation	3-4
3.5	Equipment Removal Sequence	3-4
3.6	Site Stabilization	3-5
3.7	Health, Safety & Environmental	3-5
3.8	Documentation & Records	3-5
4.0	**Estimate of Probable Costs**	**4-6**
4.1	Disassembly & Removal	4-7
4.1.1	Project Management	4-7
4.1.2	Site Work/Civil(Site Reclamation)	4-7
4.1.3	BESS and Transformer Foundations	4-8
4.1.4	BESS Units and Step Up Transformers	4-9
4.2	Scrap/Salvage Value	4-10
4.2.1	Presumed Scrap Value of BESS Equipment	4-10
4.2.2	Presumed Value of the Step Up Transformers	4-11
4.3	Decommissioning Summary	4-12
5.0	**Decommissioning Plan Administration**	**5-12**
5.1	Roles & Responsibilities	5-12
5.2	Compliance, Permitting & Reporting	5-13
5.3	Schedule & Phasing	5-13

LIST OF APPENDICES

APPENDIX A SITE PLAN

Agawam Energy Center (AEC) Decommissioning Plan
250 MW Battery Energy Storage System (BESS)

1.0 EXECUTIVE SUMMARY

Project Summary:
Capacity: 250 MW
Assets: 216 BESS units (containerized); 54 step-up transformers
Scope: Full retirement, removal, recycling/disposal, and site restoration

This Decommissioning Plan (the Plan) has been prepared based on the requirements in the Town of Agawam BESS ordinance (Article XXIII of the Code of the Town of Agawam). In accordance with the Ordinance, the Plan includes the following information.

a. A narrative description of the activities to be accomplished, including who will perform that activity and at what point in time, for complete physical removal of all battery energy storage system components, structures, equipment, security barriers, and transmission lines from the site;
b. Disposal of all solid and hazardous waste in accordance with local, state, and federal waste disposal regulations;
c. The anticipated life of the battery energy storage system;
d. The estimated decommissioning costs and how said estimate was determined;
e. The method of ensuring that funds will be available for decommissioning and restoration;
f. The method by which the decommissioning cost will be kept current;
g. A description of the manner in which the site will be restored, including how any changes to the surrounding areas and other systems adjacent to the battery energy storage system, such as, but not limited to, structural elements, building penetrations, means of egress, and required fire detection suppression systems, will be protected during decommissioning and confirmed as being acceptable after the system is removed; and
h. A listing of any contingencies for removing an intact operational energy storage system from service, and for removing an energy storage system from service that has been damaged by a fire or other event.

To present the information above the Plan is broken down into the following Sections.

- Section 2: Narrative Description of Decommissioning Process (items a, c, g and h)
- Section 3: Description of Disposal Methods (item b)
- Section 4: Estimate of Probable Costs (item d)
- Section 5: Decommissioning Plan Administration (items e and f)

The estimate of probable costs represents an opinion of probable cost (OPC), in today's dollars.

This decommissioning plan excludes the collection Substation which has potential value even after the Site ceases operation. As such, the substation and associated transmission lines to the interconnection substation are not included as part of the decommissioning and have not been included in the discussion or calculations herein.

2.0 ACRONYMS AND ABBREVIATIONS

AEC - Agawam Energy Center
BESS – Battery Energy Storage System
PCS – Power Conversion System
MV – Medium Voltage
LV – Low Voltage
SCADA – Supervisory Control and Data Acquisition
HVAC – Heating, Ventilation, and Air Conditioning
OPC – Opinion of Probable Cost
OEM – Original Equipment Manufacturer
LOTO – Lockout/Tagout
SOC – State of Charge
AHJ – Authority Having Jurisdiction
DC – Direct Current
UN – United Nations
DOT/IATA – U.S. Department of Transportation/International Air Transport Association
ISO – Independent System Operator
QA/QC – Quality Assurance/Quality Control
OSHA – Occupational Safety and Health Administration
ERP – Emergency Response Plan
NFPA – National Fire Protection Association
EPA/RCRA – U.S. Environmental Protection Agency/Resource Conservation and Recovery Act

3.0 NARRATIVE DESCRIPTION OF DECOMMISSIONING PROCESS

3.1 Objectives

In addition to meeting the requirements of the Town of Agawam requirements, the Plan has been prepared with the following objectives:

- Safely de-energize and remove all equipment associated with the BESS project.
- Maximize material recovery and recycling (battery materials, steel, copper, aluminum, electronics).
- Comply with all applicable environmental, health, and safety regulations.

- Restore and stabilize the site to protect human health and the environment.

The decommissioning plan will be implemented upon the end of operations or abandonment for 12 consecutive months. The anticipated life of the BESS system is assumed to be 25 years.

3.2 Scope & Boundaries

The overall AEC site can be broken down into three distinct areas: 1) the entrance area and Operations and Maintenance Building at the entrance off Silver Street; 2) the BESS facility located within the limits of the security fence and sound wall perimeter; and 3) the collection Substation located at the south end of the project site. A Site Plan is included in Appendix A. The scope of this decommissioning plan focuses on the BESS facility located within the security fence. The entrance area and Operations and Maintenance building pose no threat to human health or the environment and provide reuse value in their current condition. Similarly, the collection substation and overhead transmission lines connecting it to the adjacent utility substation may provide value to the utility or for future development of the parcel. Beyond proper disconnection of the BESS facility and securing of the substation fence, no demolition or removal of the collection substation is included in the Plan.

The decommissioning will include: BESS containers, battery modules/racks, Power Conversion System (PCS)/inverters, transformers, MV and LV cables, SCADA, HVAC, fire safety systems, foundations and pads (as required), access roads (as required), and ancillary equipment.

3.3 Pre-Decommissioning Planning

The Owner or party responsible for decommissioning shall undertake the following activities prior to decommissioning, as applicable:

- Permits & Notifications: Secure required decommissioning permits; notify utility/ISO, AHJ, fire department, environmental agencies, and landowner(s).
- Hazard Assessment: Perform HAZID/HAZOP specific to lithium-ion systems; review MSDS/SDS for all chemistries; identify PCB status for legacy equipment (if any).
- Site Condition Survey: Document equipment counts, oil volumes per transformer, battery chemistry, structural conditions, and access constraints.
- Contracting Strategy: Engage licensed electrical contractors, hazmat-trained battery handlers, recycling vendors certified and approved to handle specific materials (e.g. batteries, refrigerants etc), licensed disposal facilities and waste transporters.

- Emergency Preparedness: Confirm on-site fire equipment, spill kits are available and in good working order and that the facilities emergency response plan (ERP) are current for decommissioning activities.

3.4 De-Energization & Isolation

Decommissioning Contractor shall prepare an up-to-date de-energization plan based on the condition of the site at the time of decommissioning. At a minimum, the de-energization plan shall address plans and procedures for:

1. Outage Coordination: Coordination with utility; verify lockout/tagout (LOTO) plan, if applicable.
2. System Shutdown: Following OEM procedures for controlled shutdown of PCS/inverters and battery management system (BMS).
3. Electrical Isolation: Opening and LOTO of main breakers, DC disconnects, MV switchgear, and transformer secondary/primary; verify absence of voltage with calibrated meters.
4. Residual Energy Management: Discharging battery modules per OEM specs to safe state of charge (SOC), typically ≤ 5–10% prior to removal.
5. Ancillary Systems (HVAC, Controls, Fire Safety, etc.): Disabling systems per OEM guidance and Authority Having Jurisdiction (AHJ) after safe isolation.

3.5 Equipment Removal Sequence

BESS System Removal: The following is a typical removal process but should be reviewed and modified based on final equipment and configuration.

Step 1: Remove SCADA/communications equipment; archive data logs and configurations, if required.

Step 2: Remove battery modules/racks from each BESS unit (container). Package per UN 3480/3481 and DOT/IATA regulations, using fire-retardant crates or OEM packaging.

Step 3: Remove PCS/inverters, transformers, MV/LV gear.

Step 4: Extract cabling, busways, conduits; segregate copper/aluminum for recycling.

Step 5: Remove HVAC, fire safety systems (dispose per manufacturer/environmental regs).

Step-Up Transformer Removal: Transformers will be inspected and electrically tested for resale viability. Units will be drained to minimum oil transport levels per OEM instructions, disconnected and lifted intact onto transport trucks, and shipped to the designated buyer or refurbisher. Oil will be pumped into sealed totes and shipped with the transformer.

Concrete Slab Removal: After removal of BESS units and Step Up Transformers and related equipment, each reinforced concrete equipment slab will be broken using hydraulic breakers or excavator-mounted hammers. Reinforcing steel (rebar/mesh) will be separated and recycled. Once reinforcing steel is removed the concrete may be crushed on-site and used as fill or broken into pieces sized for transport and hauled to a concrete recycling facility.

3.6 Site Stabilization

Following removal of all above ground structures and equipment and below-ground structures and equipment to 24 inches below grade, the disturbed areas will be re-graded to be consistent with surrounding areas.

The access road from the main gate along the utility easement in the center of the site will be maintained from the main gate to the substation and the secondary access point to Moylan Lane. All other areas within the security fence of the BESS yard will be finished with a 4-inch layer of loam and seed, including fertilizer and mulch to promote re-vegetation.

3.7 Health, Safety & Environmental

Decommissioning contractor shall review and follow applicable health and safety requirements in place at the time the work is performed. A typical list of requirements is provided below.

- Standards & Compliance: OSHA 29 CFR (electrical safety, hazmat); NFPA 70E; NFPA 855 (ESS); EPA RCRA (hazardous waste); DOT hazmat shipping; local/state waste rules.
- Qualifications: Only trained, certified personnel handle battery modules and transformer oil.
- PPE: Arc-rated clothing, voltage-rated gloves, cut-resistant gloves, eye/face protection, respiratory protection as needed.
- Fire Risk Controls: Hot-work permits; thermal monitoring of removed modules; designated quarantine area for suspect modules (e.g. abnormal operation, visible damage, or indications of potential failure); Appropriate extinguishing media.
- Spill Prevention: Transformer oil handling plan; secondary containment; spill kits; immediate reporting and remediation per thresholds.

3.8 Documentation & Records

Decommissioning contractor shall maintain records for the tracking and disposal of materials removed from the site. All documentation shall be included in a final Decommissioning As-Built report including the following:

- Waste Manifests: Chain-of-custody for all hazardous and universal waste.
- Certificates: Recycling certificates; destruction certificates; non-PCB confirmation for transformer oil if applicable.

- Environmental Compliance: Permits, notifications, inspection logs, spill reports, air/noise/dust monitoring logs (if required).
- Photo documentation.
- Sign-offs from AHJ/landowner.

4.0 ESTIMATE OF PROBABLE COSTS

The costs of the decommissioning process have been broken down into two parts: 1) Disassembly & Removal and 2) Scrap/Salvage Value.

The Disassembly & Removal section has been divided into four general work items.

a. Project Management (contractor costs, general conditions, equipment, etc.)
b. BESS Units and Step up Transformers
c. BESS and Transformer Foundations
d. Site Work/Civil (site reclamation)

The Scrap/Salvage Value has been broken into two separate items.

a. Presumed scrap value of the BESS units
b. Presumed re-sale value of the Step-Up Transformers

This estimate is based on the site plans, information provided by Owner, and cost data obtained from Wage rates form the Massachusetts Department of Labor, Bureau of Labor Standards, and RS Means Construction Cost Index.

Quantities and unit prices for these individual work items are presented and discussed in the following paragraphs.

This estimate is based on the following assumptions:

- Facility includes 216 BESS “Smartskid” units.
- One step up transformer provided for every four (4) “Smartskids” for a total of 54 step up transformers.
- Each “Smartskid” contains 4 battery pods for a total of 864 battery pods.
- Demolition of 24-inch thick equipment foundations (or removal to 24-inches below grade).
- Batteries are lithium-ion;

- Step-up transformers have remaining useful life and are resold.
- Decommissioning will remove all materials and structures within 2-feet of the surface. All underground cable will be disconnected and abandoned in place.
- Transport distances: up to one-hour, one-way trip for concrete rubble and up to two-hour, one-way trip for battery and scrap recycling to recycle/refurbisher/waste facilities.
- Main access road through the center of the site will be maintained. All other surfaces will be covered with 4 inches of loam and seeded.
- All perimeter security fence and sound walls will remain in place
- Substation will remain in place.
- The three existing buildings will remain.

4.1 Disassembly & Removal

4.1.1 Project Management

1.0	Mobilization. Mobilization and demobilization of ancillary equipment and disassembly teams. (i.e. bull dozers, excavators, crane etc.) is estimated to approximately 1-2% of the decommissioning cost:	$ TBD	Prior to Building Permits
2.0	Project Oversight. Oversight of the decommissioning is estimated at:	$ TBD	Prior to Building Permits
3.0	Incidentals. A budget of approximately 5% of the decommissioning scope is recommended for project incidentals:	$ TBD	Prior to Building Permits
4.0	Contingency. A contingency of approximately 10% of the decommissioning scope is recommended to cover unknowns:	$ TBD	Prior to Building Permits
Total opinion of probable costs for **Project Management:**		**$ TBD**	**Prior To Building Permts**

4.1.2 Site Work/Civil(Site Reclamation)

1.0 Re-grading of BESS Site.

A. The decommissioning plan includes restoring the area of the BESS Sites. This assumes that all foundation areas will be brought up to grade and sloped to match adjacent grade and drain. The area will be rough graded and surface scarified to prepare it to receive loam and seed. This includes utilizing a portion of the crushed concrete from foundations as fill.

Approximate area: 249,220 SF

Cost per 1,000 square feet (MSF)	$ TBD Prior to Building Permits
Total estimate - regrading of the site:	$ TBD Prior to Building Permits

B. Following the preparation of the area in item A above the site will be finished with the placement of topsoil and other organic matter to support growth, including seed, and mulch.

Approximate disturbed area:	249,220 SY
Cost per square yard (SY)	$ TBD Prior to Building Permits
Total estimate - final loam and seed:	$ TBD Prior to Building Permits

The total opinion of probable costs for **Site Work/Civil:**	**$ TBD Prior to Building Permits**

4.1.3 BESS and Transformer Foundations

1.0 Removal of BESS and Transformer Foundations. Removal of the foundations is assumed to require a hydraulic excavator equipped with hydraulic ram (hoe-ram), an additional excavator with bucket for loading, and various dozers and loaders.

Demolition Cost per Unit:	$ TBD Prior to Building Permits		/unit
Number of Units:		54	units
Total estimate - foundation demolition:			$ TBD Prior to Building Permits

2.0 Transportation of rubble and disposal. Concrete demolition rubble generated for each BESS unit is estimated to be approximately 90 cubic yards (based on a removal depth of 2 feet below grade). It is assumed the reinforcing steel will be separated from the concrete debris and the remaining materials will be an inert material suitable for disposal at a demolition debris recycling material. It is also assumed that 50% of the concrete rubble (45*54=2430 CY) generated will not be transported offsite but will be used onsite to bring foundation sites back to grade. Costs to transport the remaining foundation rubble for disposal are based on an estimate of 15 CY per truck trip transported to a location within 1 hours (one-way).

Total estimated labor & equipment cost:	$ TBD Prior to Building Permits		/dump truck trip
Truck Trips Required (45CY X 54 Units/15CY)		162	trips
Total estimate for BESS foundation concrete costs for all 54 Units:			$ TBD Prior to Building Permits
Total estimated disposal cost:	$TBD Prior to Building Permits		/ton

Total estimate for concrete disposal at recycling facility:	$ TBD Prior to Building Permits
The total opinion of probable costs for removal of **BESS Foundations:**	**$ TBD Prior to Building Permits**

4.1.4 BESS Units and Step Up Transformers

1.0 Disconnection of Step Up tranformers. Disassembly costs for the Step Up transformers are based on the assumption that it will take a 4-man crew 8 hours to test and disconnect each of the 54 transformers.

Estimated labor rate: $TBD Prior to Building Permits /man-hour

Total estimate for BESS disassembly for all 54 Units:	$ TBD Prior to Building Permits

2.0 Disassembly of BESS Units. Disassembly costs for each smartskid with 4 battery pods broken down to separate components and battery modules will take an 8-man crew an estimated 24 hours.

Estimated labor rate: $TBD Prior to Building Permits /man-hour

Total estimate for BESS disassembly for all 216 Smartskid Units:	$ TBD Prior to Building Permits

3.0 Transportation of BESS battery modules. Cost to transport the BESS modules for disposal/recycling is limited by weight. This is assumes a single "Pod" is hauled per trip.

Total estimated labor & equipment cost: $ TBD Prior to Building Permits /transport trip

Total estimate for BESS transport for all 864 battery pods:	$TBD Prior to Building Permits

4.0 Transportation of broken down BESS module residuals (rack/enclosure) and smart skid to haul to recycle, disposal or reuse. Cost to transport the residual material from BESS modules (racks, enclosures, electronics etc) for disposal/recycling is limited by weight. This is assumes a max of 22 tons per trip resulting in 212 trips.

Total estimated labor & equipment cost: $ TBD Prior to Building Permits /transport trip

Total estimate for BESS transport for all broken down materials from 216 smartskid units:	$TBD Prior to Building Permits

5.0 Recycling/Disposal Cost for Lithium Ion Battery Materials. Cost for processing and recycling of Lithium Ion Battery modules at a licensed facility. Estimated at 14.5 tons per pod for 864 pods.

Total estimated disposal cost: $ TBD Prior to Building Permits /lb

Total disposal cost for 864 battery pods:	$TBD Prior to Building Permits

The total opinion of probable costs for removal of **BESS Units and Step Up Transformers:**	**$TBD Prior to Building Permits**

Disassembly & Removal Summary

The total opinion of probable costs for disassembly and removal including, Project Management, Site Work/Civil, BESS and Transformer Foundations and BESS Units and Transformers is:	**$TBD Prior to Building Permits**

4.2 Scrap/Salvage Value

For the purposes of this decommissioning plan, we have assumed that transformers will be sold for reuse and all other scrapable metal materials from the project decommissioning will be sold as scrap to a recycling yard in the Springfield, MA area. The presumed scrap / salvage values are based on the following conservative estimates:

4.2.1 Presumed Scrap Value of BESS Equipment

In estimating the scrap value of the BESS units, the following component weight estimates were used (all weights are in pounds). The material will vary between steel for enclosures and racks as well as the PCS and other electrical components. An average scrap value is used for the purposes of this estimate.

SmartSkid	4,979,000	lbs
Battery Pod (Enclosure)	2,592,000	lbs
Battery Pod (Racks/Misc)	1,728,000	lbs

Total estimated weight for each BESS: 9,299,000 lbs

Estimated recycling value for unprepared, mixed loads :	$TBD Prior to Building Permits/lb
Total estimated scrap value of non-battery components	$TBD Prior to Building Permits

Total opinion of **presumed scrap value for broken down non-battery BESS components:** **$TBD Prior to Building Permits**

4.2.2 Presumed Value of the Step Up Transformers

The cost of the step up transformers is approximately $500,000. Based on our research, typical transformers have a life expectancy of 50 years. Therefore, at 25 years a transformer could have a value of approximately 50% of its original cost. However, to be conservative, we have estimated the value of the internal transformers at 10% of the original transformer cost:

Estimated original cost for step up transformers:	$TBD Prior to Building Permits	each
Estimated value (10%)	$TBD Prior to Building Permits	each

Total opinion of **presumed value for all 54 external transformers:** $TBD Prior to Building Permits

Scrap/Salvage Value Summary

The total Opinion of probably scrap/salvage value from summing the items above: $TBD Prior to Building Permits

4.3 Decommissioning Summary

Disassembly & Removal

1.	Project Management	$TBD Prior to Building Permits
2.	Site Work/Civil (Site Reclamation)	$TBD Prior to Building Permit
3.	BESS and Transformer Foundations	$TBD Prior to Building Permits
4.	BESS Units and Step Up Tranformers	$TBD Prior to Building Permits
	Disassembly & Removal Total	**$**TBD Prior to Building Permits

Scrap/Salvage Value

1.	Presumed scrap value of BESS equipment.	$ TBD Prior to Building Permit
2.	Presumed value of the Step Up Transformers	$TBD Prior to Building Permits
	Scrap/Salvage Value Total	**$** TBD Prior to Building Permits

The net estimated opinion of probable cost for decommissioning is:	**$TBD Prior to Building Permits**

5.0 DECOMMISSIONING PLAN ADMINISTRATION

5.1 Roles & Responsibilities

- Owner/Developer: Approves plan, funds activities, oversees compliance and stakeholder engagement.
- Decommissioning Contractor: Executes plan, provides qualified crews, LOTO authority, HSE management, waste logistics.
- Battery Vendor/Recycling Partner: Provides packaging specs, transport guidance, recycling certificates.
- Environmental Consultant: Permitting, waste classification, spill response, stormwater/erosion compliance, monitoring.
- Utility/ISO Liaison: Outage coordination, interconnection termination requirements.
- AHJ/Fire Department: Safety oversight, hot-work approvals, ERP coordination.
- Transportation Vendor (Hazmat): DOT compliance, routing, manifests, incident reporting.

- QA/QC & Documentation Lead: Asset registry, photo logs, manifests, closeout package compilation.
- Transformer Resale Coordinator: Manages testing, certification, resale documentation, buyer coordination, and transport logistics.

5.2 Compliance, Permitting & Reporting

- Regulatory Framework: OSHA (electrical safety, hazmat handling), NFPA 70E, NFPA 855 for ESS, EPA/RCRA for hazardous/universal waste, DOT for lithium-ion transport, EPA Section 608 for refrigerants, and applicable state/local rules.
- Permits/Approvals: Decommissioning permit (if required), road use/oversize load permits, waste transporter permits, air/dust control plans, stormwater/erosion control.
- Recordkeeping: Waste manifests, certificates of recycling/disposal, spill logs, incident reports, daily JHAs, toolbox talks, LOTO logs, ERP drills.
- Stakeholder Notifications: Utility, AHJ, landowner(s), neighbors (if required), environmental agencies for any reportable events.
- Closeout Certification: Submission of complete documentation set; sign-off by Owner and AHJ.

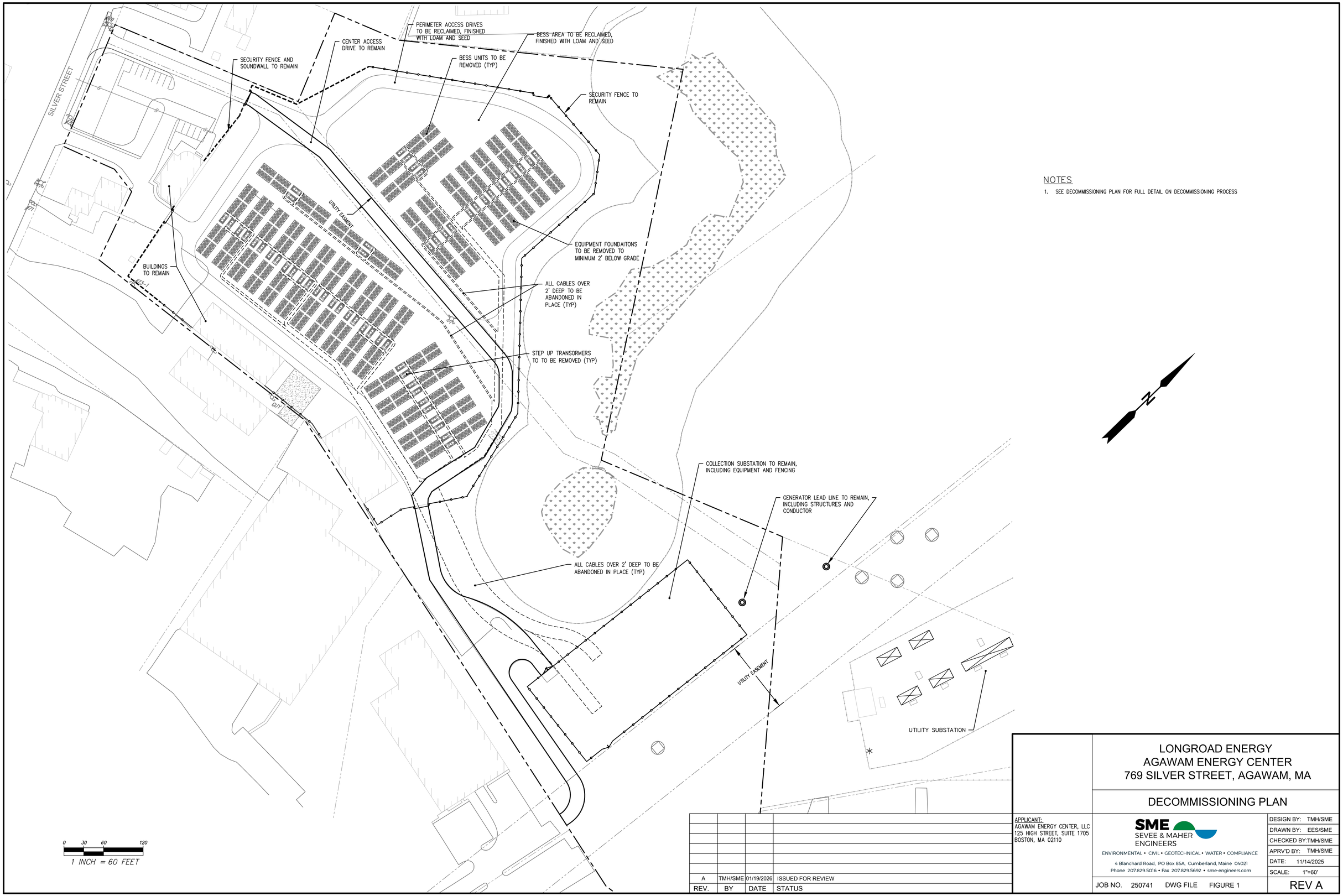
5.3 Schedule & Phasing

- Phase 1 (2–3 months): Permits, planning, mobilization, safety setup, de-energization.
- Phase 2 (6–9 months): Battery removal, packaging, transport, recycling; concurrent PCS/transformer removal for resale.
- Phase 3 (2–4 months): Civil removal (including slab demolition), site restoration, closeout.
- Total Duration: ~10–16 months (subject to vendor capacity and permit windows).

APPENDIX A

SITE PLANS

SME
SEVEE & MAHER
ENGINEERS



NOTES

1. SEE DECOMMISSIONING PLAN FOR FULL DETAIL ON DECOMMISSIONING PROCESS

REV.	BY	DATE	STATUS
A	TMH/SME	01/19/2026	ISSUED FOR REVIEW

APPLICANT:
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BOSTON, MA 02110

LONGROAD ENERGY
AGAWAM ENERGY CENTER
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DECOMMISSIONING PLAN

SME
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DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	11/14/2025
SCALE:	1"=60'

JOB NO. 250741 DWG FILE FIGURE 1 REV A

ATTACHMENT J – FIRE SAFETY COMPLIANCE PLAN

Agawam BESS Siting Assessment

Outdoor Ground Mounted Battery Energy Storage System

Agawam, Massachusetts



Prepared for
Longroad Energy
125 High Street
High Street Tower, Suite 1705
Boston, MA 02110

Prepared By
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Rockville, MD 20855

Rev0
November 18, 2025

The distribution of this document to third parties is prohibited without written approval from Fire & Risk Alliance, LLC.

Contents

1 Introduction 2
2 BESS Overview 2
3 UL 9540A Testing 4
3.1 Cell Level 4
3.2 Module Level 5
3.3 Unit Level 5
3.4 Applicability to Smartstack 6
4 Code Compliance and Emergency Planning 6
4.1 Agawam, Massachusetts – Hampden County Fire Code 6
4.2 Hazard Mitigation Analysis 6
4.3 BESS Emergency Response Plans and Training 7
5 Anticipated Hazards and Risk Considerations 8
5.1 Fire Hazards 8
5.2 Explosion Hazards 9
5.3 Smoke and Toxicity Hazards 9
5.4 Environmental Impact 10
6 Overview 10
7 Limitations 11
8 Revisions 11

Table of Figures

Figure 1 Smartstack Unit Arrangement 2
Figure 2 UL 9540A Test Levels 4

1 Introduction

Fire and Risk Alliance, LLC (FRA) performed a siting assessment for a proposed lithium-ion battery energy storage system (BESS) to be installed at the Agawam BESS Substation, located at Hampden County in Agawam, Massachusetts (Agawam BESS). This siting assessment includes a review of the proposed installation of Fluence Energy's Smartstack BESS 7.5, 4-hour system. This document presents a summary of the proposed BESS, its inherent safety features, the applicable codes/standards/test methods that would be applied to this site, a discussion of BESS hazards, and typical emergency response considerations. This siting assessment provides general guidance based on typical BESS design characteristics and common siting practices for BESS installations. It is intended as an informational resource during the planning and zoning stage and does not replace other site-specific engineering designs, analyses, or risk assessments that would be required for construction permitting.

2 BESS Overview

The proposed Smartstack installation is 7523-kilowatt hour (kWh) BESS that is populated with eighteen battery modules per pod with a lithium iron phosphate (LFP) cell chemistry. The Smartstack is a combination of one Smart Skid and four Pods installed together. Each pod contains eighteen battery modules, for a total of module count of seventy-two per Smartstack. The Smartstack is a fully integrated BESS consisting of battery modules, power electronics, control systems, a battery management system (BMS), a thermal management system (TMS), fire alarm system, explosion control, and ventilation. The Smartstack has a standardized, modular design that is not customizable or adjustable and is currently obtaining a UL 9540 factory listing. It is intended for each site installation to utilize factory-assembled/delivered Smartstack pods and Smart Skids. Each assembly is approximately 24.9 ft in length, 8.72 ft deep, 13.57 ft in height with a total weight of 155,646 pounds (Figure 1).



Figure 1 Smartstack Unit Arrangement

The lithium-ion batteries are housed inside an IP55 steel enclosure that provides protection against particle and water ingress and contact with the battery modules and power electronics. The Smartstack components are accessible through the doors. This modular, pod-style approach permits efficient maintenance/service of system components from outside the cabinets (i.e., battery modules, TMS, and power electronics), thus eliminating the need for personnel to enter an enclosure, structure, building or container to perform those activities. Since the BESS cabinets do not permit walk-in access, it is classified as a non-walk-in style (NWI) BESS; they are not defined as occupied buildings or structures. The Smartstack is designed with multiple integrated systems that work together to ensure safe operation and reduce the risk of fire and electrical hazards. These features are as follows:

- **Thermal Management System (TMS)** - Maintains optimal battery temperature through a closed-loop liquid cooling system, which automatically regulates heat buildup to prevent overheating and thermal runaway (TR).
- **Battery Management System (BMS)** - Continuously monitors voltage, current, temperature, and other critical parameters at the cell and module levels and autonomously responds to fault conditions by isolating problematic modules and activating the TMS to prevent escalation.
- **System Controller and Monitoring** - The Fluence control system allows for 24/7 monitoring of the Smartstack and critical parameters of the BESS.
- **Direct Current Protection Module (DCPM)** - The DCPM is intended to function as a means to disconnect each rack from the DC bus. The DCPM is in the Smart Skid.
- **Core Distribution, Protection and Monitoring Panel (CDPM)** - The CDPM is an outdoor electrical enclosure designed to protect the Smartstack by interrupting the flow of current when a fault occurs. The CDPM is in the Medium Voltage (MV) Skid.
- **Combustible Concentration Reduction System (CCRS)** - The CCRS, when activated, opens inlet and outlet louvers and starts the exhaust fan to lower gas concentration below flammable levels. A CCRS is contained within each pod on the Smartstack to maintain the lower flammability limit (LFL) below 25%. If the CCRS fails, deflagration panels are provided for redundancy. There are two deflagration panels per pod, designed to activate when pressure exceeds their setpoint to prevent an explosion event within the pod.
- **Master Fire Alarm Control Unit (MFACU)** - The MFACU aggregates data collected by each Smartstack Fire Alarm Control Unit (FACU) and communicates data to the customer, Fluence, and if a site fire alarm is triggered, transmits an alarm to the local emergency responders (if connected).
- **Fire Detection Systems** - Each Smartstack pod is equipped with a smoke detector/multi detector and a hydrogen detector. Each Smart Skid is equipped with three multi-detectors and a FACU. Lastly, two horn/strobe units are located on the outside of each Smart Skid.
- **Clearances Around Skids** - Limit the spread of heat and flames between modules and units, based on large-scale testing data.
- **Emergency Stop (E-Stop)** - Each Smart Skid is equipped with an E-Stop that can be initiated to stop power flow to and from the Smart Skid during an emergency.
- **Certifications and Listings** - All components are anticipated to be certified/listed per relevant product safety standards (e.g., UL 9540, UL 1973, UL 1642), ensuring the system

performance under abuse conditions is evaluated and validated for use in stationary energy storage applications.

3 UL 9540A Testing

All lithium-ion BESS deployed in the United States must be tested to UL 9540A, Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems (UL 9540A). UL 9540A details a test procedure to evaluate TR and fire propagation of a lithium-ion BESS at the cell, module, unit, and installation levels (Figure 2). Each of these procedures has exclusive test requirements and performance criteria. If acceptance criteria are satisfied at a given test level, further testing is not required. For example, cell and module level testing may be conducted, and if the module level test meets the model level performance criteria, unit and installation level tests are not required.

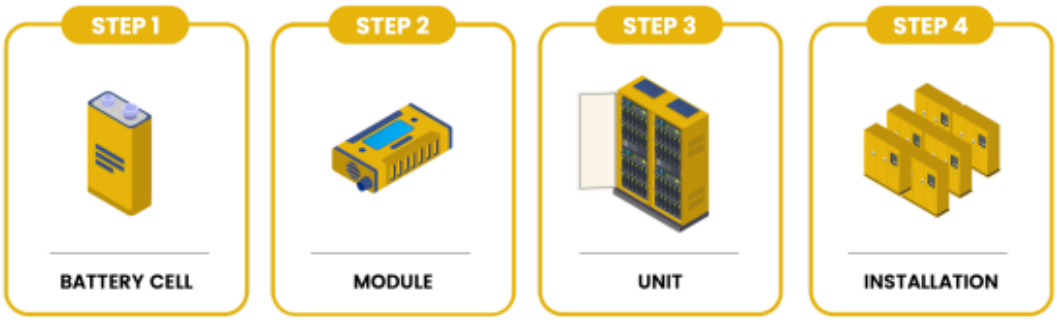

Figure 2 UL 9540A Test Levels

UL 9540A test results are used as a design basis for the fire and explosion protection systems/features required for a BESS installation. Notable test results include, but are not limited to, cell TR characteristics; cell TR gas composition; fire propagation potential from cell to cell, module to module, and unit to unit; products of combustion; heat release rate; smoke release rate; and performance of fire protection systems.

3.1 Cell Level

Cell level tests are conducted on individual battery cells that are stressed to induce TR. The first portion of the cell level test determines an effective means of forcing the cell into TR. The preferred method is to heat the cell with a flexible film heater applied to the exterior of the cell. The cell is then forced into TR using this method inside a pressure vessel to capture the vent gas. The gas composition is measured using Gas Chromatography (GC), and then the gas composition is used to determine various flammability parameters through standardized testing. Overall, cell level testing determines the venting and TR design temperature thresholds for the cells, as well as the amount and composition of flammable gases released during venting.

Key Results
Thermal Runaway Temperature
Venting Temperature
Vent Gas Composition
Vent Gas Volume
Lower Flammability Limit
Max. Explosion Pressure
Gas Burning Velocity
Performance Criteria
Thermal runaway not induced
Vent gas not flammable

UL 9540A (4th Edition) Section 7.7 specifies cell level test

acceptance criteria as follows:

1. TR cannot be induced in the cell; and
2. The cell vent gas does not present a flammability hazard when mixed with any volume of air, at both ambient and vent temperatures.

3.2 Module Level

Module level tests use the same method of inducing TR as the cell level test. The test is conducted under a smoke collection hood with the module placed on a noncombustible surface in the intended installed orientation. To induce TR propagation, one or multiple cells within the module are forced into TR to analyze if the module can contain TR to a limited number of cells. The gases generated from the module are collected in the hood and analyzed using oxygen consumption calorimetry, and smoke/gas sensors/analyzers to determine the gas composition and potential explosion hazard. Overall, module level testing evaluates if TR can propagate throughout the entire module, as well as determines the products of combustion released.

Key Results
Propagation External Venting/Flaming Heat Release Rate Smoke Release Rate Gas Composition Gas Volume Mass Loss
Performance Criteria
Thermal runaway is contained Vent gas not flammable

UL 9540A Section 8.4 specifies module level test acceptance criteria as follows:

1. TR is contained by module design; and
2. Cell vent gas is nonflammable as determined by the cell level test.

3.3 Unit Level

Unit level tests are conducted on a complete BESS unit to determine if a fire in one unit will spread to another unit or breach the walls of the adjacent BESS enclosure. The specific test configuration depends on the intended application as follows:

- Indoors or outdoors.
- Floor mounted, ground mounted, wall mounted or installed on a rooftop.
- Residential or non-residential.

Key Results
Propagation External Venting/Flaming Heat Release Rate Smoke Release Rate Gas Composition Gas Volume Surface Temperatures Heat Flux
Performance Criteria
Varies depending on the intended application/test configuration

In general, the test configuration involves the placement of initiating BESS a specified distance from target BESS units and walls. TR is induced in the initiating BESS unit using the same method as the cell/module tests. For a non-residential, outdoor, ground mounted BESS, such as the Smartstack, this test is typically conducted outdoors on a concrete pad. Unit level testing of non-residential, outdoor, ground mounted BESS (i.e., BESS units meant for outdoor installations only) can be used to demonstrate that TR/fire will not spread to adjacent units, surface temperatures and heat fluxes to adjacent walls/exposures will be limited, and explosion hazards are properly mitigated. Given

the installation will not be inside a building and unlike the cell/module tests, measurements of gas composition/products of combustion are not required

UL 9540A Section 9.8 specifies unit level test acceptance criteria as follows:

1. If flaming is observed outside the initiating BESS unit, separation distances to exposures shall be determined by greatest flame extension observed during the test.
2. Surface temperatures of the modules in the adjacent BESS unit do not exceed the temperature at which cell level gas venting occurs.
3. For BESS units intended for installation near exposures, surface temperatures of wall surfaces do not exceed 175ºF (97ºC) above ambient; and,
4. Explosion hazards are not observed.
5. Heat fluxes in the center of the accessible means of egress shall not exceed 1.3 kW/m^2.

3.4 Applicability to Smartstack

The Smartstack will be tested to the UL 9540A standard at the cell, module and unit levels. Notably, such testing would demonstrate whether or not TR could spread from module to module or unit to unit under test conditions.

4 Code Compliance and Emergency Planning

BESS are regulated by state and local codes as well as reference standards to ensure their safe installation and operation with proper emergency response planning. Notably, NFPA 855: *Standard for the Installation of Stationary Energy Storage Systems*, is a widely referenced standard with comprehensive requirements for the fire safety of BESS facilities.

4.1 Agawam, Massachusetts – Hampden County Fire Code

The regulatory authority having jurisdiction (AHJ) in Agawam, Massachusetts has adopted NFPA 1 (2021 Edition) with amendments, which incorporates NFPA 855 (2020 Edition). NFPA 855 includes requirements for separation distances, explosion control (NFPA 68/69), fire detection systems (NFPA 72), fire department access, electrical safety, security measures, signage, and the composition of a hazard mitigation analysis (HMA) for the proposed BESS. NFPA 855 also requires that BESS be listed in accordance with UL 9540 and evaluated using UL 9540A testing to determine fire and explosion behavior at the cell, module, and unit levels. As described in Section 3, these results inform critical design decisions, such as spatial separation, ventilation, and deflagration venting.

Together, these codes and standards (NFPA 1 and NFPA 855, as well as supporting codes like NFPA 68, 69, and 72) create a layered safety/compliance framework. Site developers and system integrators must work closely with AHJs to validate that installations meet the intent of these codes and standards through a combination of listings, testing, engineering analysis, and emergency planning documentation.

4.2 Hazard Mitigation Analysis

A HMA is a comprehensive technical assessment defined by NFPA 855 which identifies/evaluates potential hazards associated with a BESS installation. Furthermore, a HMA can demonstrate how

identified hazards have been—or can be—adequately mitigated through system design, site layout, operational controls, and emergency response planning.

Typically, a HMA is submitted to the AHJ as part of the overall permitting and plan review process as well as coordination with first responders. Based on the site layout, equipment placement, and utility details, it is anticipated that a HMA will be required for the proposed installation.

At a high level, a HMA typically includes the following elements:

- **Hazard Identification:** A review of the failure modes and risks associated with lithium-ion BESS technology, such as TR, fire propagation, gas generation, and deflagration. This often incorporates results from UL 9540A testing, including cell, module, and unit-level performance, to quantify the scale and timing of thermal events.
- **Mitigation Features:** A summary of safety systems integrated into the BESS product and installation, such as fire detection and suppression, explosion control measures (e.g., vents or sparkers), thermal management, and containment strategies. These features are cross-referenced with the hazard outcomes identified during testing (and modeling if utilized).
- **Code Compliance Review:** A verification that the BESS installation meets the requirements of governing codes and standards.
- **Site Layout and Spacing:** Evaluation of the proposed spatial arrangement of BESS units and their separation from structures, roadways, and exposures. This may involve prescriptive compliance or the use of performance-based alternatives supported by testing data.
- **Emergency Response Planning (ERP):** Identification of emergency shutdown procedures, response access routes, fire department interfaces, and public safety considerations. The HMA typically includes or references the ERP and may incorporate other content as needed or available from the BESS manufacturer.
- **Recommendations:** In cases where gaps exist between the product capabilities or site conditions and applicable safety criteria, the HMA will provide clear, actionable recommendations to reduce risk. This may include adding separation barriers, increasing spacing, or adding/enhancing detection and/or suppression systems.

The HMA is not a replacement for local plan reviews or code enforcement but serves to inform AHJs, emergency personnel, and stakeholders with technical justification for how fire, explosion, and toxic gas hazards will be managed. Furthermore, a HMA should provide confidence in the safety of the installation and supports effective coordination between developers, engineers, and first responders in Hampden County.

4.3 BESS Emergency Response Plans and Training

Emergency response planning is a critical component of any energy storage system installation. Per NFPA 855, authorized service personnel must be designated to respond to BESS fire emergencies. Accordingly, a site-specific ERP is typically required and should include procedures

for fire department coordination, incident response, shutdown protocols, and post-incident recovery. The ERP should also identify all major hazards, emergency access pathways, contact information, and locations of key safety equipment.

In addition, first responder training and orientation must be offered to ensure local emergency services are familiar with the ERP as it applies to the specific BESS installation. This includes access methods, hazard zones, and manufacturer-recommended response protocols.

For the specific product that has been selected (Smartstack), the ERP should reference any available product-level documentation, such as emergency response guides, design and installation manuals, and operations and maintenance manuals, which can assist with the development of the site-specific ERP and support safe and effective emergency response procedures.

5 Anticipated Hazards and Risk Considerations

BESS can experience TR at the cell level, which has the potential to propagate to modules/racks and produce a high heat release rate, flammable and toxic gases (e.g. H_2, CO, and HF), smoke, and – if gases accumulate – deflagration/overpressure risk. TR may be the result of internal defect(s), mechanical/thermal abuse, BMS/PCS failures, and/or external fires.

EPRI analysis of 81 recent incidents worldwide shows that only 11% of these failure events were attributed to cell/module defects, while the majority stemmed from system controls or balance of plant issues—demonstrating that the lithium-ion chemistry itself was not the primary risk contributor.[1] Globally, the grid-scale BESS failure rate declined by approximately 97% between 2018 and 2023, even as deployment increased.

5.1 Fire Hazards

As discussed, manufacturers mitigate fire risks through UL 9540A unit-level testing, which can demonstrate that TR would not propagate beyond a single module/unit. Such test data is referenced by the HMA as a basis for defining/designing separation distances, ventilation systems, and detection/suppression systems. Additionally, TMS and BMS systems are integrated into BESS to prevent cells from reaching TR triggering conditions. These design and testing protocols combine to create a system architecture where, in properly installed and commissioned facilities, fire spreading beyond the initiating unit is effectively prevented. Compared to large warehouse or chemical plant fires, which often burn uncontrolled and release significant heat and pollutants, fires involving BESS that are designed to modern codes, standards and safety features are rare, localized, and engineered to be contained within a single unit.

[1] Electric Power Research Institute, Pacific Northwest National Laboratory, and TWAICE. *Insights from EPRI's Battery Energy Storage Systems (BESS) Failure Incident Database: Analysis of Failure Root Cause*. May 2024. Electric Power Research Institute. Accessed 3 Aug. 2025. EPRI BESS Failure Incident Database. https://storagewiki.epri.com/index.php/BESS_Failure_Incident_Database.

5.2 Explosion Hazards

The risk of a BESS explosion arises when flammable off-gases produced by TR accumulate in the unit's enclosure and reach concentrations between the lower and upper flammability limits (LFL/UFL). If such conditions are coupled with ignition, deflagration or overpressure conditions may occur which may exceed the structural limits of the enclosure. Such risks also extend to potential cases in which oxygen is inadvertently introduced (e.g., opening the enclosure doors) and/or reignition occurs via hot surfaces or electrical arcing.

It is well established in fire science as well as reflected in NFPA and Society of Fire Protection Engineers (SFPE) guidance that when flammable gases accumulate within an enclosed volume, ignition can cause a rapid pressure rise, or overpressure, which may exceed the structural limits of the enclosure. This phenomenon is not unique to battery systems and applies broadly to any confined space containing a flammable atmosphere, from industrial process rooms to equipment housings. As discussed in the EPRI analysis, the APS 2019 Surprise, Arizona, BESS incident provides real-world validation: off-gas accumulation within a locked enclosure led to a deflagration and personal injury when first responders opened the door.

To address this hazard, current BESS designs incorporate code required explosion control systems to mitigate an overpressure event inside the cabinet. Specifically, the Smartstack mitigates the hazards of deflagration within the enclosure, with the CCRS. The CCRS, as described in Section 2, is designed to actuate inlet louvers, outlet louvers and an exhaust fan to maintain the LFL below 25% for combustible gases. If the CCRS were to fail, passive deflagration panels are located on the pods to relieve generated pressure and prevent an explosion. Therefore, the controls provided for the Smartstack effectively mitigate potential explosion hazards from TR as validated by UL 9540A and large-scale fire testing. Unlike other industrial occupancies or the APS 2019 Surprise incident, the Smartstack is not occupiable. Therefore, the risks to personnel are greatly reduced with an outdoor BESS installation.

5.3 Smoke and Toxicity Hazards

TR events have the potential to release smoke containing hazardous constituents such as hydrogen fluoride (HF), carbon monoxide (CO), volatile hydrocarbons, and particulates, which can present inhalation and environmental concerns in confined or poorly ventilated environments. The corrosive nature of HF may also pose risks to equipment and responders; however, these emissions are generally localized and, with proper ventilation, dissipate relatively quickly. Similarly, unlike other industrial occupancies or the APS 2019 Surprise incident, the Smartstack is not occupiable. Therefore, the risks to personnel are greatly reduced with an outdoor BESS installation where toxic gases are released into the ambient air (and do not accumulate within a confined, occupied space).

Emergency response plans outline PPE for responders, define standoff distances, and emergency procedures, aligning with American Clean Power public guidance.[2] While structural or industrial fires can produce widespread toxic smoke plumes affecting large communities, with

[2] American Clean Power Association. *First Responders Guide to Lithium-Ion Battery Energy Storage System Incidents.* July 1, 2023.

BESS deployed in smaller outdoor containers, the emissions are typically limited to the immediate site and dissipate quickly given the outdoor containers are comparatively small in size. Notably, fire events involving outdoor, non-occupiable BESS containers have not resulted in the detection of toxic gases outside of the BESS site's property line and should not pose a danger to the community or surrounding neighbors.

5.4 Environmental Impact

Potential environmental hazards from BESS fire events include contaminated fire-water runoff and particulate or metal deposition (e.g. Ni, Mn, Co, Li) in surrounding soil or water bodies. However, these impacts are typically localized and manageable when modern containment and remediation protocols are implemented. These strategies ensure that environmental impacts are contained and readily addressed. In contrast to large industrial incidents, with BESS deployed in smaller outdoor containers, the environmental impact from a BESS fire is limited given the outdoor containers are comparatively small in size. Notably, fire events involving outdoor, non-occupiable BESS containers have not resulted in the presence of toxic water and/or contaminated soil samples outside the BESS site's property line and should not pose a danger to the community or environment.

6 Overview

Modern lithium-ion BESS, when designed, certified, and installed in accordance with UL 9540, UL 9540A, NFPA 855, and other applicable fire codes/standards, provide sufficient safety at the site level during deployment. Unit level UL 9540A testing can be used to demonstrate that the Smartstack can contain TR events within a single unit, preventing propagation to adjacent equipment. Integrated thermal management, battery management, and explosion control systems, supplemented by site-level fire detection and clearance provisions, address the primary hazards of fire, explosion, toxic gas release, and environmental impact at the site level.

Incident data from the EPRI BESS Failure Incident Database and other public sources show that the majority of past failures have been associated with balance-of-plant or control issues rather than cell chemistry. Also, BESS incident rates have declined by approximately 97% between 2018 and 2023 despite rapid deployment growth.

When combined with appropriate siting, spacing, and permitting processes, including a site-specific HMA and ERP, these systems can be deployed in a manner that meets or exceeds current fire protection engineering best practices. Anticipated engagement with the AHJ as well as local emergency services during the design/planning phases will ensure that protective measures are understood and integrated into community response protocols.

Overall, the proposed Smartstack BESS installation at the Agawam, MA site will have the necessary safety measures in place as confirmed by specialized testing and as documented in the prospective HMA and ERP.

7 Limitations

At the request of Longroad Energy, FRA performed a site assessment for the proposed Agawam BESS installation in Hampden County, MA. The scope of services performed during this preliminary analysis may not adequately address the needs of other users of this report, and any re-use of this report or its conclusions presented herein are at the sole risk of the user. The opinions and comments formulated during this assessment are based on observations and information available at the time of the analysis, which has been provided to FRA by others. No guarantee or warranty as to future performance of any reviewed condition is expressed or implied. As the Agawam BESS site is still under development, this analysis assumed that the BESS and its associated equipment, as well as all fire protection systems, will be installed, commissioned, inspected, tested, and maintained as required by the manufacturer(s), NFPA 1, NFPA 855, and/or other applicable codes and standards throughout the lifetime of the BESS.

8 Revisions

Date	Revision	Reason for Issue	Developed By	Reviewed By	Approved By
11/18/2025	Rev0	Client Use	TS	KL	AFB

ATTACHMENT K – EMERGENCY OPERATIONS PLAN

Emergency Preparedness and Response Plan

Longroad Energy

Document #: COR-POL-E-001R3

Prepared by: C. Cote

Date Created: 10/03/2017

Revised by: Ryan Fonbuena

Last day revised: 6/16/2022

Contents

1 Approval Block: 2

2 Disclaimer 2

3 Revision History 2

4 Regulatory Requirement 2

5 Objective 3

6 Applicability/ Responsibility 3

7 Definitions 4

8 Plan 4

9 Appendix 14

1 Approval Block:

Authorized Person	Name (Printed):	Ryan Fonbuena
	Company Title:	VP, EHS
	Signature:	Ryan Fonbuena
	Date:	10/13/20

Changes to this procedure must be approved by the authorized officer and delegated manager.

2 Disclaimer

This document is Longroad Energy proprietary and confidential. It may not be distributed outside Longroad Energy without the written consent of the authorized officer named in section 1 of this document. Only approved plans will be used or circulated to execute directives. Plans in Draft mode may be used under the direction of the Authorized officer named in section 1.

3 Revision History

Revision #	Revision Date	Created / Revised By	Approved By	Section(s) Affected
1.1	10/03/2017	C Cote		All, new format
2.0	10/13/2020	R Fonbuena, EJ Martin	R Fonbuena	All
3.0	7/8/2022	R Fonbuena	R Fonbuena	All, Added 8.11, 8.13, new Appendixes A and B

4 Regulatory Requirement

Requirement	Description	–Cross Reference
OSHA 1910.38	Emergency Action Plans	1910.38(b)

5 Objective

The Objective of this Plan is to provide guidance and outline the course of action associated with preparedness and response to a variety of emergencies that may arise at Longroad Locations. This plan includes activities in offices, in the field, as well as working on wind, solar or battery energy storage sites or substations.

6 Applicability/ Responsibility

This plan applies to all locations and all persons conducting business for on behalf of Longroad Energy. The responsibilities of this are:

6.1 **EHS Department or Designee**

- 6.1.1 Ensure employees are trained annually on the Emergency Preparedness and Response Plan (EPRP) for their location.
- 6.1.2 Assist as needed in scheduling or hosting the annual emergency drill.
- 6.1.3 Annually review and as needed, revise this plan.

6.2 **Location Heads**

- 6.2.1 Ensure overall procedure implementation and coordination at their locations.
- 6.2.2 Ensure on location employees are contacted in the event of a serious injury, fire, chemical spill, or major emergency.
- 6.2.3 Determine when an evacuation should take place.
- 6.2.4 Account for every employee working at the location or in route to the location during an evacuation.
- 6.2.5 Ensure adequate emergency response/escape equipment is available at the location.

6.3 **Location EHS Coordinator**

- 6.3.1 Ensure the proper emergency and escape equipment to be used by personnel and visitors is in place and is in working condition.
- 6.3.2 If applicable to the emergency, determine if a reportable quantity of oil or hazardous waste has been spilled and contact the applicable regulatory agencies.
- 6.3.3 Determine if an emergency spill response team should be deployed.
- 6.3.4 Complete, and update annually, the location-specific information listed in **Appendices A and B**.
- 6.3.5 Ensure all inspections and associated recordkeeping are completed.
- 6.3.6 Ensure all drills and associated recordkeeping are completed.
- 6.3.7 Ensure all incidents and associated recordkeeping are completed.

6.4 **Employees**

- 6.4.1 Follow the emergency procedures listed in **Section 8**.
- 6.4.2 Notify the Location Head immediately of any possible emergency.
- 6.4.3 Control fuel and ignition sources, within limits or training and equipment.
- 6.4.4 Contact the appropriate response personnel in the event of an emergency (ambulance, fire department, police department, etc.).

7 Definitions

Term	Definition
Combustible Material	Material that will ignite with some effort when flame is applied or must be preheated in order to ignite
EPRP	Emergency Preparedness and Response Plan
EHS	Environmental, Health and Safety
Emergency Coordinator (EC)	The designated person who will be the in charge during an emergency.
Evacuation Meeting Point	A designated area where all employees will assemble during a location evacuation emergency.
Fire Detection System	An outside firm or a location monitoring system that detects and sends out a warning in the event of a fire.
Flammable Material	Material that will easily ignite in ambient temperatures with little contact with flame and no need to be preheated
Fuel/Ignition Sources	Any material, chemical, etc. that has the potential to increase the size, or possibly start, a fire (i.e.- boxes, pallets, rags, oil, fuel, paint, etc.).
Hazardous Materials	Any chemical meeting the hazardous criteria of being toxic, flammable, or corrosive defined by country regulations.
High Risk Incident (HRI)	Incidents that meet the following criteria: reportable to OSHA; hazardous material releases (liquid releases of ≥42 gallons to the environment, or ≥100 gallons into containment and solid releases which require immediate notification to regulatory agencies); fires which require response from emergency providers to protect the public; and as deemed required: near misses, equipment damage or failure, and security incidents.
Highly Combustible Materials	Any material or chemical that will readily catch fire (i.e.- fuel, oily rags, etc.).
Location	Longroad Energy owned, operated, or otherwise staffed location or facility.
Location Head	The person designated by Longroad Energy to have control of or be the highest ranked person at a Longroad Energy Location.
Location EHS Coordinator	The person designated at each location that is responsible to ensure that the EHS Program is properly administered at the location.
Reportable Quantity (RQ)	A designated quantity of a chemical that is reportable to a regulatory agency.
ROC	Remote Operations Center
Small Spill	A spill of less than 20L (5 gallons), which can be completely cleaned and contained using a Spill Kit.
WTG	Wind Turbine Generator

8 Plan

In accordance with the provisions of the Longroad Energy Corporate Policy and in support of the Company-wide emphasis on full environmental compliance and minimizing risks to employee health and safety, the Longroad Energy Location, has adopted this Emergency Preparedness and Emergency Response Plan.

8.1 **Location Description**

8.1.1 See Location Description in **Appendix A and B**.

ATTACHMENT L – STORMWATER MANAGEMENT REPORT

STORMWATER MANAGEMENT REPORT
AGAWAM ENERGY CENTER
769 SILVER STREET
AGAWAM, MASSACHUSETTS

Prepared for

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SEVEE & MAHER
ENGINEERS

TABLE OF CONTENTS

Section No.	Title	Page No.
1.0	**INTRODUCTION**	**1**
2.0	**PROJECT DESCRIPTION**	**1**
3.0	**SITE WATERSHED**	**4**
4.0	**STORMWATER MANAGEMENT STANDARDS**	**5**
4.1	Standard 1: No New Untreated Discharges	5
4.2	Standard 2: Peak Rate Attenuation	6
4.3	Standard 3: Recharge	8
4.4	Standard 4: Water Quality	8
4.5	Standard 5: Land Uses with Higher Potential Pollutant Loads	9
4.6	Standard 6: Critical Areas	9
4.7	Standard 7: Redevelopment and Other Projects Subject to the Standards only to the Maximum Extent Practicable	10
4.8	Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control	10
4.9	Standard 9: Operation and Maintenance Plan	10
4.10	Standard 10: Illicit Discharges	10
5.0	**CONCLUSION**	**11**

LIST OF ATTACHMENTS

ATTACHMENT A	NRCS SOIL SURVEY
ATTACHMENT B	STORMWATER DRAINAGE FIGURES
ATTACHMENT C	PRE-DEVELOPMENT HYDROCAD CALCULATIONS
ATTACHMENT D	POST-DEVELOPMENT HYDROCAD CALCULATIONS
ATTACHMENT E	TREATMENT VOLUME CALCULATIONS
ATTACHMENT F	LONG TERM POLLUTION PREVENTION PLAN
ATTACHMENT G	ILLICIT DISCHARGE STATEMENT

LIST OF FIGURES

Figure No.	Title	Page No.
1	SITE LOCATION MAP	3

STORMWATER MANAGEMENT REPORT
AGAWAM ENERGY CENTER
AGAWAM, MASSACHUSETTS

1.0 INTRODUCTION

This Stormwater Management Report was prepared by Sevee & Maher Engineers, Inc. (SME) to assess stormwater management for the construction of the proposed Agawam Energy Center project in Agawam, Massachusetts.

The Applicant proposes to develop an approximately 250-megawatt (MW), 4-megawatt hour (MWh), battery energy storage system (BESS) on the 17.2-acre site located at 769 Silver Street. The project will consist of battery containers, transformers, inverters, equipment pads, and associated infrastructure, including an interconnection substation. The proposed BESS site will be accessed from Silver Street. The battery containers will be surrounded by a combination of 18-foot-high solid wall, and 8-foot-high chain link and wood fencing that will act as physical, visual, and sound barriers as detailed in the attached plans. The BESS equipment will connect to the existing South Agawam Switching Station via the project's own substation and short transmission line.

The stormwater design is based on the water quality and quantity objectives identified in the stormwater management requirements pursuant to Chapter 175, §175-35 of the Code of the Town of Agawam and the Massachusetts Stormwater Management Standards.

The project will be located completely outside of all Areas Subject to Protection under M.G.L. c. 131, Section 40 listed in 310 CMR 10.02(1), as well as all buffer zones associated with Areas Subject to Protection. During construction, various Best Management Practices (BMPs) including erosion controls will be utilized to prevent impacts to adjacent resource areas and buffer zones.

2.0 PROJECT DESCRIPTION

The project property is an approximately 17-acre parcel on Silver Street in Agawam, Massachusetts. The property is zoned Industrial and is currently used for commercial/industrial purposes. The majority of the site being used for the project is currently developed with gravel and paved access roads, several buildings and other unvegetated gravel areas used or surface storage of equipment and materials. The Applicant plans to redevelop the site as an energy center with the addition of Battery Energy Storage Systems (BESS).

In accordance with the Chapter 175-35 Stormwater Management Plan, previously developed sites must meet the stormwater management standards to the maximum extent practicable. However, if it is not practicable to meet all the standards, the new system must be designed to improve existing conditions.

The addition of a open crushed stone surface over much of the site, additional plantings and vegetation at the site entrance and a vegetated buffer strip around the perimeter of the site and addition of stormwater detention pond, the proposed conditions will improve on existing conditions.

The site was identified for its gentle land slope, prior commercial/industrial use, as well as the commercial/industrial use of neighboring properties, as well as its proximity to the adjacent Eversource substation where it will make its electrical interconnection. The location of the project is shown in Figure 1, Site Location Map. More details on the project site are shown in the engineering drawing set submitted with this report.

As noted above, most of the site has been previously developed and disturbed for previous commercial use. Much of the site consists of uncontrolled, exposed gravel surfaces. To prepare the site, several of the existing buildings will be removed and the site will be graded to provide a uniform grade across the site. The proposed grading plan was prepared to generally maintain existing drainage patterns and avoid large cuts and fills.

The finished surface within the BESS yard will include a combination of compacted gravel access roads and a crushed "topping stone" surface. The topping stone used in the BESS yard and the proposed substation is a washed crushed stone used in the electrical grounding system for the facility for high electrical resistivity but also provides significant benefits in stormwater management. This crushed stone surface performs differently than most common construction practices. The stone which is washed to remove fines and contains large void ratios provides permeability plus storage.

Any disturbed areas or existing unvegetated areas on the perimeter of the site that are not required for roads, or the BESS units will be restored with loam and seed and native plantings.

The area at the front of the site, immediately off Silver Street, will include the Operations and Maintenance building and the associated entrance and parking area. The Operations and Maintenance building will utilize one of the existing buildings on site. This area will include driveway and parking improvements and landscaping improvements including a visual screening berm and plantings.

As noted above, the site will be graded to maintain existing drainage patterns. Most of the site will drain to the east towards the wetlands. In the proposed condition a detention pond will be added to provide additional treatment of stormwater and management of peak flows. The site drainage and stormwater management is discussed in more detail below.



FIGURE 1
SITE LOCATION MAP
LONGROAD ENERGY
AGAWAM ENERGY CENTER
AGAWAM, MASSACHUSETTS

SME
SEVEE & MAHER
ENGINEERS

DWG: SITE LOCATION PLAN | LMN: NONE | CTB: SME-STD.CTB | JOB#: 250579.01 | REV: 12/17/2025

3.0 SITE WATERSHED

On-site soils were identified using the Natural Resources Conservation Service (NRCS) soil information for Hampden County, Massachusetts, Central Part. A copy of the custom Soil Resource Report is included in Attachment A of this report. The report includes a soil map for the project area. Soil mapping information is also included in the watershed plans.

The soil within the area of work consists of Merrimac fine sandy loam (254A, 254B, 254C and 254D) and Amostown fine sandy loam (258B). Soil classifications for 254A, 254B, 254C and 254D are Hydrological Soil Group (HSG) A and were modeled as HSG A for purposes of water quantity calculations. Soil Classification 258B is HSG C/D and was modeled as HSG D for purposes of water quantity calculations.

Existing Conditions

The ground surface on most of the property generally slopes towards the east in the direction of wetlands, with grades in the developed area ranging from less than 1 percent to 5 percent. The site is characterized by a low wetland area on the eastern side of the site, extending beyond the property line. The majority of the parcel is developed or previously disturbed except for the vegetated areas around the wetland areas which make up approximately 2 acres of the 17-acre site. Stormwater flows currently travel uncontrolled across the primarily unvegetated surface towards the wetlands.

Under existing conditions, stormwater runoff from most of the project area comes from Subcatchment 1 (SC-1). Stormwater generally flows from the higher areas to the wetlands, identified as Analysis Point (AP-1) for this report. The far eastern side of the site (east of the wetlands), still within the SC-1 drainage area, flows west towards the same AP-1 wetland area. This area on the east side of SC-1 is largely gravel and appears to be used for access and material storage.

There is a small drainage subarea at the front of the site that is modeled as Subcatchment 2 (SC-2), where flows from the existing driveway and parking area flows to Silver Street, which is identified as Analysis Point (AP-2) for this report.

There is a third small drainage area in the southwest corner of the site, that flows to the adjacent property to the south. The subarea is made of largely of existing buildings and driveways, with some lawn area. This is modeled as Subcatchment 3 (SC-3) and identified as Analysis Point (AP-3) at the property line.

Proposed Conditions

Under the proposed conditions, the overall site drainage patterns will be similar to existing conditions. The analysis points will be the same as those described in the existing conditions analysis to allow for easy comparison of pre- and post-development peak flows. The site will be graded to provide a more uniform slope, approximately 1 to 1.5% over most of the site but still following similar drainage patterns. Under proposed conditions, all stormwater from the BESS yard (SC-1A and SC-1B) will be routed to a proposed

stormwater detention pond located on the east side of the site between the developed area and the wetlands. The pond is designed with storage below the lowest outlet invert to provide space for storage of the "first flush" before any discharge from the pond. A vegetated drainage swale will be constructed along eastern edge of the BESS yard to intercept surface flow and direct it to the pond while providing additional opportunity for removal of sediment.

The eastern portion of the site that contains the proposed substation (SC-1C) will also maintain existing stormwater flow patterns with stormwater draining east to west towards the wetlands. The substation area will be graded to a consistent 1% slope. There is no stormwater treatment proposed in this area. The addition of the substation yard and its crushed stone topping represent an overall improvement in this area, compared to the existing gravel surface. The topping stone will minimize sediment load and provide infiltration and help filter stormwater, providing an improvement over existing conditions. This area is e, the surface has little to no sediment load and provides some initial storage stormwater in the voids, helping to reduce peak flows and filter stormwater. This area is also extremely flat and the addition of additional ponds or treatment structures that require gravity would require significant fill and additional disturbance of currently undisturbed areas and areas within 100 feet of the wetlands.

The drainage areas at the front of the site (SC-2 and SC-3) that flow to Silver Street and the adjacent parcels have changed slightly in size and shape but overall, there will be no net increase in peak flows to these areas and improvements to the type and quality of vegetated and landscaped areas.

Stormwater management plans identify the on-site drainage patterns before and after development (see Drawings D-100 and D-101). These drawings are included as Attachment B for reference.

4.0 STORMWATER MANAGEMENT STANDARDS

4.1 Standard 1: No New Untreated Discharges

The proposed project consists of new point source discharge locations associated with the proposed detention basin. The outlets from proposed stormwater basin will include two level spreaders to disperse stormwater flows from broad crested overflow weir, and three discharge pipes. Both the broad crested weir and the drainage pipe outlets will include rip rap protection to disperse stormwater at acceptable velocities and minimize erosive forces at the outfall. and erosive forces. Construction details of the level spreader, overflow structure and pipe inlets and outlets are included in the engineering plan set provided for the project.

All other areas not being directed to the pond will continue to flow overland, similar to existing conditions.

4.2 Standard 2: Peak Rate Attenuation

Stormwater peak flow rates were modeled for the 2, 10-, 25- and 100-year/24-hour storm events with Type III Soil Conservation Service rainfall distribution, using HydroCAD Version 10.20. HydroCAD is based on methodologies developed by the U.S. Department of Agriculture Soil Conservation Service (SCS), namely TR-55 and TR-20, to calculate runoff rates and volumes based on descriptions of land use, ground characteristics, and size, in combination with other hydraulic and hydrologic calculations.

Rainfall depths for each of storms identified above were obtained from NOAA Atlas 14 Volume 10 (Perica et al., 2015; Rev. 2019) and accessed via the NOAA Precipitation Frequency Data Server.

The time of concentration (Tc) for each subcatchment was calculated in HydroCAD using a combination of sheet flow and shallow concentrated flow. Sheet flow uses roughness coefficients (Manning's n) and watercourse slope to calculate travel time of stormwater runoff for each subcatchment. The site was modeled using a maximum 100 foot of sheet flow. The shallow concentrated flow method was used to determine the velocity factor along the flow path of the runoff and thereby derive a travel time. The time of concentration of each subcatchment is the combination of these travel times. A minimum time of concentration of 6 minutes was used for all subcatchments, for both existing and proposed conditions.

Site drainage from the proposed development will generally follow the pre-development flow patterns.

As discussed in Section 3 above, the site was divided into the following subcatchments and analysis points. The subcatchments are shown on the Figures included in Attachment B.

Existing Conditions
Analysis Point 1 (AP-1) – Wetlands on east side of the site.
Subcatchment (SC-1) - Represents most of the site, including area to the east and west of the wetland that represents AP-1. This includes some area beyond the property line that flows onto the site.

Analysis Point 2 (AP-2) – Area along Silver Street
Subcatchment 2 (SC-2) – This area is largely made of the "front yard" of the property, including driveways and parking areas.

Analysis Point 3 (AP-3) - Southwest corner of the property.
Subcatchment 3 (SC-3) – This area is made up largely of adjacent buildings and driveway.

Proposed Conditions
Analysis Point 1 (AP-1) – Wetlands on east side of the site.
SC-1A – Northern portion of the BESS yard and a portion of the main access.

SC-1B – Southern portion of the BESS yard and a portion of the Operations and Maintenance Building and entrance area.
SC-1C – The northern and eastern perimeter areas of the site, including the wetlands and the substation area.
SC-1D – A small area on the southeast corner.

Analysis Point 2 (AP-2) – Area along Silver Street
SC-2 – The front of the property including landscaped and parking areas that flow to Silver Street.

Analysis Point 3 (AP-3) - Southwest corner of the property.
SC-3 – Area on the southwest corner of the property that includes existing buildings and driveways and a small portion of the BESS yard.

A comparison of peak flows to the three analysis points is summarized in Table 1. As shown in Table 1, our model indicates that there will be no increase in peak flow rates to any of the three analysis points under the proposed conditions for the 2-year storm, 10-year storm, 25-year and 100-year storm. The proposed detention pond before AP-1 is adequately sized to handle the stormwater flows and control the discharge rate.

SC-2 contributing to AP-2 will remain largely the same in post-development conditions with updated landscaping and plantings between the project and Silver Street, resulting in a decrease in flows.

SC-3 will be decreased in size in the post-development condition, with more drainage directed to the east. As a result, AP-3 will see a decrease in flows and there will be no risk of an increase in flows to adjacent properties.

TABLE 1
STORMWATER QUANTITY SUMMARY

	2-Year Storm		10-Year Storm		25-Year Storm		100-year Storm	
	Existing	**Proposed**	**Existing**	**Proposed**	**Existing**	**Proposed**	**Existing**	**Proposed**
Analysis Point 1 (cfs)	12.23	8.88	29.9	20.73	42	31.34	61.32	49.43
Analysis Point 2 (cfs)	<1	<1	1.32	1.31	2.17	1.98	3.65	3.08
Analysis Point 3 (cfs)	4.94	2.69	8.76	5.19	11.14	6.78	14.77	9.21

Overall, the pre- and post- is a conservative estimate of the peak flows in the post-construction condition. The area of the BESS yard that will be finished with crushed "topping" stone was modeled as a compacted gravel surface with a Runoff Curve number of 96. Due to the rough surface and high void ratio of the stone surface will result in less runoff than a smooth compacted gravel surface.

Copies of the calculations for the pre-development runoff are in Attachment C and post-development runoff is provided in Appendix D.

4.3 Standard 3: Recharge

The soil within the area of work consists of Merrimac fine sandy loam (254A, 254B, 254C and 254D) and Amostown fine sandy loam (258B). Soil classifications for 254A, 254B, 254C and 254D are Hydrological Soil Group (HSG) A and were modeled as HSG A for purposes of water quantity calculations. Soil Classification 258B is HSG C/D and was modeled as HSG D for purposes of water quantity calculations.

For A-type soils, the Stormwater Management Guidelines require that a recharge device be provided with capacity equal to 0.60-inches the impervious area. To evaluate this re-development project we looked at each subarea to confirm if there was an increase in the impervious area, to calculate the recharge volume for new impervious area.

For SC-1, a large portion of the site in proposed conditions, including the BESS area and the substation yard, will be covered with a 6-inch layer of the crushed "topping stone", as part of the electrical grounding system. Although these areas are "stone" or "gravel" they do not behave the same as the compacted gravel surfaces that currently exist on the site and are proposed for the access roads at the site. The washed crushed stone mix overlaying 18-inches of gravel fill will provide improved permeability as well as storage in this stone, given its high void ratio. For this reason, this material was not considered impervious for the purposes of the recharge calculation. As a result, for SC-1 there is a net decrease in impervious area in the proposed conditions. In addition, the 6-inch layer of crushed stone with a void ratio of approximately 0.3, will provide 1.8 inches of initial storage in the stone. As a result, no recharge volume was calculated.

For SC-2 and SC-3 there was a reduction in impervious area in the proposed condition. As a result, no recharge volume was calculated.

4.4 Standard 4: Water Quality

The minimum required water quality treatment volume for the proposed development is one half inch of runoff times the impervious surface area. As discussed in 4.3 above, there is a net decrease in impervious area for the project when considering the characteristics of the topping stone. In addition, the topping stone also has the benefits of being a washed stone with little or no sediment load and also helps to trap sediment from other areas.

However, when determining a treatment volume for stormwater from SC-1A and SC-1B that will be flowing to the proposed detention based we included all paved and gravel areas, including the topping stone, to provide a conservative volume.

A calculation of the required treatment volume as well as a comparison of the treatment volume to the proposed volume provided below the lowest outlet from the pond is included in Attachment E. The storage below the lowest invert will provide additional opportunities for sediment removal and infiltration.

The topping stone, perimeter vegetated buffer strip and vegetated drainage swale will provide removal of sediment from stormwater flows along the path to the pond, providing pre-treatment.

The proposed detention basin and the vegetated swale along the east side of the BESS yard will provide an improvement in the quality of the stormwater runoff compared to the uncontrolled runoff from the large unvegetated gravel yard in the existing conditions.

Similar to the discussion in Section 4.3, no stormwater treatment was provided for SC-2 and SC-3 due to the net decrease in impervious surface in these areas.

As required by the Stormwater Management Standards, a Long-Term Pollution Prevention Plan is provided in Attachment F. In short, the plan identifies suitable practices for source control and pollution prevention measures.

4.5 Standard 5: Land Uses with Higher Potential Pollutant Loads

The proposed facility is not considered a Land Use with Higher Potential Pollutant Loads. No exterior machinery, heavy equipment or fleet storage is proposed and projected daily vehicle traffic volumes are estimated to be very low. The precautions and procedures for maintenance of battery storage equipment will be outlined in the Operations and Maintenance Plan for the facility. Overall, the proposed site improvements will result in a more controlled environment with a lower sediment load. Therefore, Standard 5 does not apply to this project.

4.6 Standard 6: Critical Areas

The project is not located within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges are not located near or to any other critical area requiring the use of the specific source control and pollution prevention measures.

4.7 Standard 7: Redevelopment and Other Projects Subject to the Standards only to the Maximum Extent Practicable

The site was historically used as a lumber and yard for storage of various materials. Most of the site is a combination of various impervious and unvegetated surfaces, including a paved entrance driveway and parking near Silver Street, compacted gravel driveways and storage yard and several buildings. The total impervious area under current conditions for the area analyzed, which includes some off-site areas is approximately 15 acres.

Under the proposed conditions, there will be additional plantings and landscaped areas at the entrance and on the perimeter of the site. Gravel access roads to provide access to equipment and substation will be more defined and existing unvegetated areas that are not proposed for development will be revegetated. Several existing buildings will be removed. The area around the battery storage units and within the substation yard will be finished with a washed crushed stone as part of the grounding system for the equipment. In addition, the nature of the rough surface and porosity of the stone will provide initial storage and improve infiltration of stormwater and initial treatment compared to the existing gravel surface. The total impervious area under proposed conditions (gravel roads, buildings, equipment foundations) not counting the topping stone is approximately 7 acres.

The change in surface materials and the addition of the detention basin, vegetated perimeter buffer strip and swale and increased landscaping in the proposed redevelopment will result in improved stormwater quality.

4.8 Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control

In accordance with the Massachusetts Stormwater Management Standards and the NPDES General Permit, a SWPPP will be prepared prior to construction. The erosion control notes and details included in the engineering plan set submitted for the project will cover most of the SWPPP requirements. A copy of the SWPPP will be provided to the Town prior to construction.

4.9 Standard 9: Operation and Maintenance Plan

An Operations & Maintenance plan has been prepared for the project and submitted as part of the Site Plan Approval Application.

4.10 Standard 10: Illicit Discharges

The submitted Long-Term Stormwater Pollution Prevention Plan (Attachment F) specifies measures to prevent illicit discharges from entering the stormwater management system. Source control and response plans are also specified to prevent illicit discharges from being conveyed through the stormwater management system.

Consistent with the Massachusetts Stormwater Handbook, a signed Illicit Discharge Compliance Statement prior to discharging stormwater to the post-construction stormwater BMP's. A draft copy of the Illicit Discharge Statement is provided in Attachment G.

5.0 CONCLUSION

The stormwater management for the Agawam Energy Center was designed in accordance with Massachusetts Stormwater Standards and Town of Agawam requirements. Stormwater runoff will be controlled through the addition of stormwater detention pond and the stabilization of existing gravel areas with vegetative cover and a crushed stone surface and improved landscaping. As a result, we do not anticipate any adverse impacts anticipated on downstream drainage or abutting properties.

ATTACHMENT A

NRCS SOIL SURVEY

SME
SEVEE & MAHER
ENGINEERS

United States Department of Agriculture

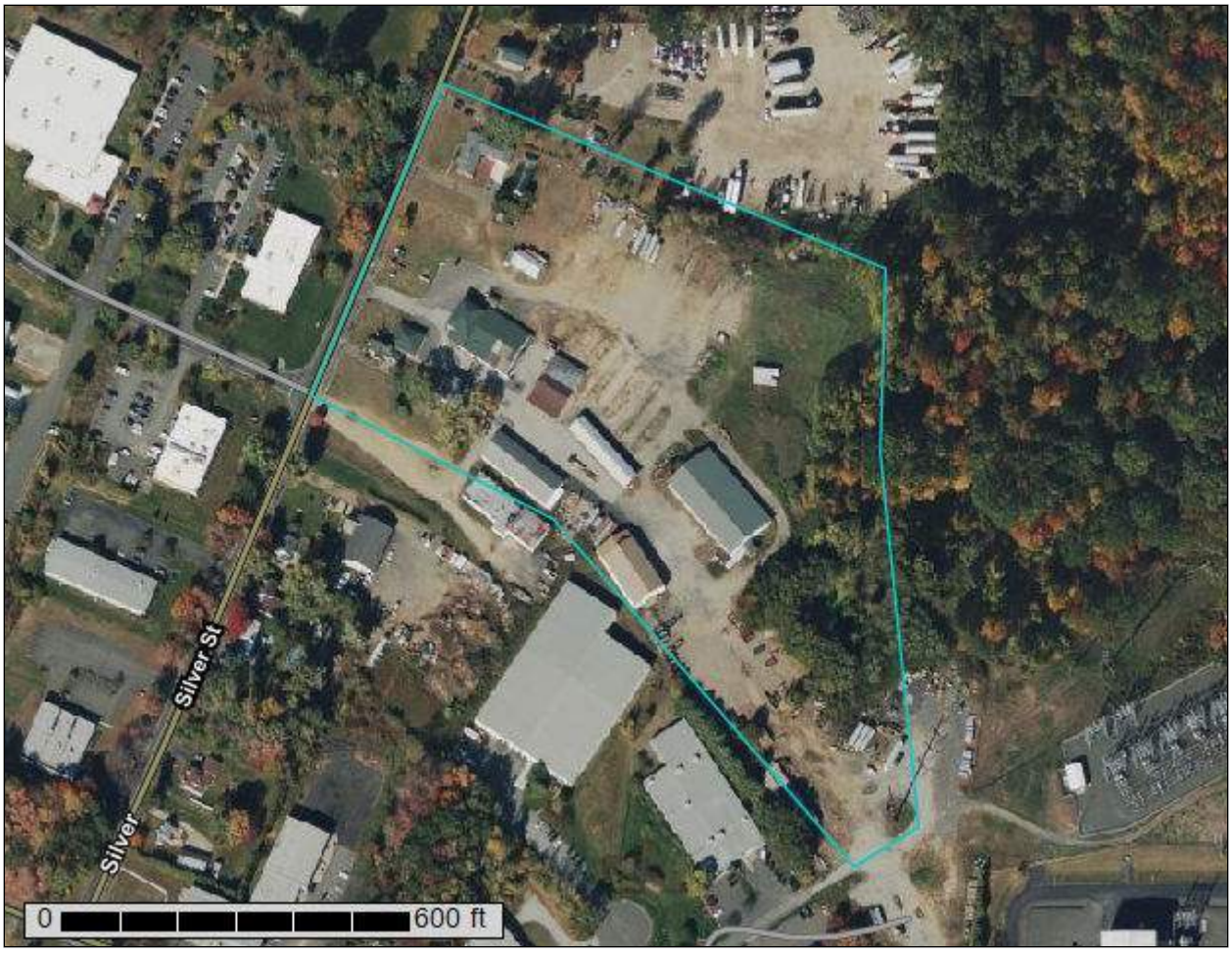
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Hampden County, Massachusetts, Central Part

Silver Street



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....12
Map Unit Descriptions.....12
Hampden County, Massachusetts, Central Part.....14
254A—Merrimac fine sandy loam, 0 to 3 percent slopes.....14
254B—Merrimac fine sandy loam, 3 to 8 percent slopes.....15
254C—Merrimac fine sandy loam, 8 to 15 percent slopes.....17
258B—Amostown fine sandy loam, 0 to 6 percent slopes.....19
References.....21

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



Map Scale: 1:2,480 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 35 70 140 210

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hampden County, Massachusetts, Central Part
Survey Area Data: Version 19, Sep 5, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	9.8	59.5%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	5.9	35.8%
254C	Merrimac fine sandy loam, 8 to 15 percent slopes	0.4	2.6%
258B	Amostown fine sandy loam, 0 to 6 percent slopes	0.4	2.2%
Totals for Area of Interest		**16.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Hampden County, Massachusetts, Central Part

254A—Merrimac fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyqr
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash

Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Walpole

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqs
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Walpole

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

254C—Merrimac fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2tyqt
Elevation: 0 to 1,030 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Eskers, outwash plains, moraines, kames, outwash terraces
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash plains, dunes, deltas, outwash terraces

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

258B—Amostown fine sandy loam, 0 to 6 percent slopes

Map Unit Setting

National map unit symbol: 99ms
Elevation: 0 to 1,000 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Amostown and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Amostown

Setting

Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable sandy glaciofluvial deposits over hard silty glaciolacustrine deposits

Typical profile

H1 - 0 to 10 inches: fine sandy loam
H2 - 10 to 32 inches: fine sandy loam
H3 - 32 to 60 inches: silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F145XY005MA - Moist Lake Plain
Hydric soil rating: No

Minor Components

Pollux

Percent of map unit: 10 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Enosburg

Percent of map unit: 10 percent
Landform: Terraces, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

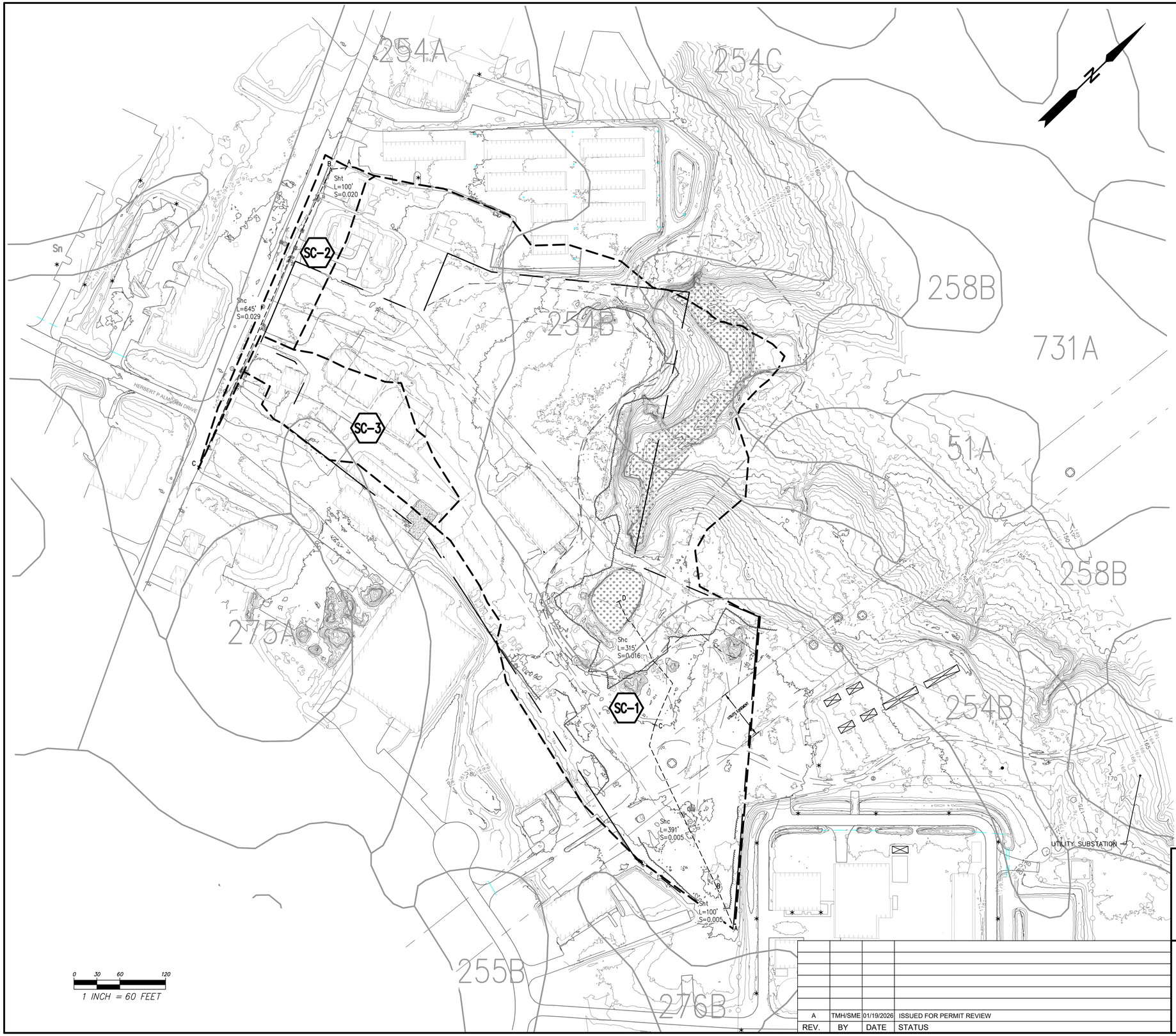
United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

ATTACHMENT B

STORMWATER DRAINAGE FIGURES

SME
SEVEE & MAHER
ENGINEERS



0 30 60 120

1 INCH = 60 FEET

LEGEND

- PROPERTY LINE
- 100' PROPERTY SETBACK
- LIMIT OF WETLANDS
- 100' WETLAND BUFFER
- UTILITY EASEMENT
- EXISTING 1-FOOT CONTOUR (181)
- EXISTING 5-FT CONTOUR (180)
- EXISTING TREE LINE
- LIMIT OF WORK

NOTES

1. EXISTING CONDITIONS SURVEY CONDUCTED BY MILLSTONE LLC.

STORMWATER MANAGEMENT LEGEND

- SC-1 — SUBCATCHMENT DESIGNATION
- SUBCATCHMENT BOUNDARY
- A B C — TIME OF CONCENTRATION SEGMENT DESIGNATION / TIME OF CONCENTRATION PATH
- Sht L=50' S=0.005 — TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE.
- Sht — SHEET FLOW
- Shc — SHALLOW CONCENTRATED FLOW
- Cf — CHANNEL FLOW
- DRAINAGE REACH
- R4 — REACH DESIGNATION (HYDROCAD)
- P3 — POND/STRUCTURE DESIGNATION (HYDROCAD)
- tc 1 — TIME OF CONCENTRATION WITH SUBCATCHMENT DESIGNATION
- SOIL TYPE BOUNDARY
- Sn — SOIL TYPE DESIGNATION

REV.	BY	DATE	STATUS
A	TMH/SME	01/19/2026	ISSUED FOR PERMIT REVIEW

LONGROAD ENERGY
AGAWAM ENERGY CENTER
AGAWAM, MA

STORMWATER MANAGEMENT PLAN
PRE-DEVELOPMENT CONDITIONS

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	11/14/2025
SCALE:	1"=60'

JOB NO. 250741 DWG FILE AW1-C-200 REV A



0 30 60 120

1 INCH = 60 FEET

LEGEND

- PROPERTY LINE
- 100' PROPERTY SETBACK
- LIMIT OF WETLANDS
- 100' WETLAND BUFFER
- UTILITY EASEMENT
- EXISTING 1-FOOT CONTOUR — 181
- EXISTING 5-FT CONTOUR — 180
- EXISTING TREE LINE
- LIMIT OF WORK

NOTES

1. EXISTING CONDITIONS SURVEY CONDUCTED BY MILLSTONE LLC.

STORMWATER MANAGEMENT LEGEND

- SC-1 — SUBCATCHMENT DESIGNATION
- SUBCATCHMENT BOUNDARY
- A B C — TIME OF CONCENTRATION SEGMENT DESIGNATION / TIME OF CONCENTRATION PATH
- Sht L=50' S=0.005 — TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE.
- Sht — SHEET FLOW
- Shc — SHALLOW CONCENTRATED FLOW
- Cf — CHANNEL FLOW
- DRAINAGE REACH
- R4 — REACH DESIGNATION (HYDROCAD)
- P9 — POND/STRUCTURE DESIGNATION (HYDROCAD)
- tc 1 — TIME OF CONCENTRATION WITH SUBCATCHMENT DESIGNATION
- SOIL TYPE BOUNDARY
- Sn — SOIL TYPE DESIGNATION

REV.	BY	DATE	STATUS
A	TMH/SME	01-19-2026	ISSUED FOR PERMIT REVIEW

LONGROAD ENERGY
AGAWAM ENERGY CENTER
AGAWAM, MA

STORMWATER MANAGEMENT PLAN
POST DEVELOPMENT CONDITIONS

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4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
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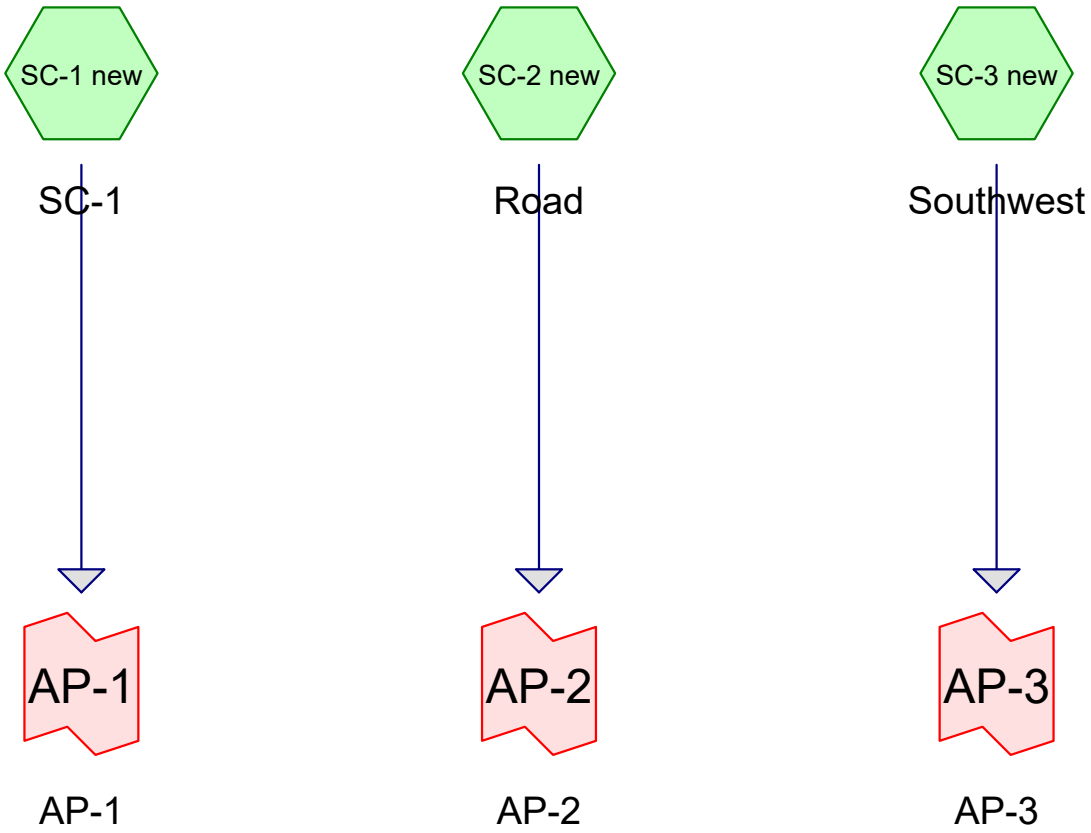
DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	11/14/2025
SCALE:	1"=60'

JOB NO. 250741 DWG FILE AW1-C-200 REV A

ATTACHMENT C

PRE-DEVELOPMENT HYDROCAD CALCULATIONS

SME
SEVEE & MAHER
ENGINEERS



Subcat Reach Pond Link

Routing Diagram for Pre-Conditions - TMH
Prepared by Sevee & Maher Engineers, Printed 12/23/2025
HydroCAD® 10.20-7a s/n 01260 © 2025 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.303	96	Gravel (SC-3 new)
12.188	96	Gravel surface, HSG A (SC-1 new)
2.779	39	Pasture/grassland/range, Good, HSG A (SC-1 new, SC-2 new, SC-3 new)
0.142	80	Pasture/grassland/range, Good, HSG D (SC-3 new)
1.383	98	Paved parking, HSG A (SC-1 new, SC-2 new, SC-3 new)
1.326	98	Roofs, HSG A (SC-1 new, SC-2 new, SC-3 new)
4.606	30	Woods, Good, HSG A (SC-1 new)

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
22.282	HSG A	SC-1 new, SC-2 new, SC-3 new
0.000	HSG B	
0.000	HSG C	
0.142	HSG D	SC-3 new
0.303	Other	SC-3 new

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentSC-1 new: SC-1 Runoff Area=858,874 sf 5.27% Impervious Runoff Depth>1.00"
Flow Length=807' Tc=38.8 min CN=75 Runoff=12.23 cfs 1.640 af

SubcatchmentSC-2 new: Road Runoff Area=49,610 sf 35.64% Impervious Runoff Depth>0.36"
Flow Length=745' Tc=13.7 min CN=60 Runoff=0.26 cfs 0.034 af

SubcatchmentSC-3 new: Southwest Runoff Area=81,511 sf 67.57% Impervious Runoff Depth>2.15"
Tc=5.0 min CN=91 Runoff=4.94 cfs 0.335 af

Link AP-1: AP-1 Inflow=12.23 cfs 1.640 af
Primary=12.23 cfs 1.640 af

Link AP-2: AP-2 Inflow=0.26 cfs 0.034 af
Primary=0.26 cfs 0.034 af

Link AP-3: AP-3 Inflow=4.94 cfs 0.335 af
Primary=4.94 cfs 0.335 af

Summary for Subcatchment SC-1 new: SC-1

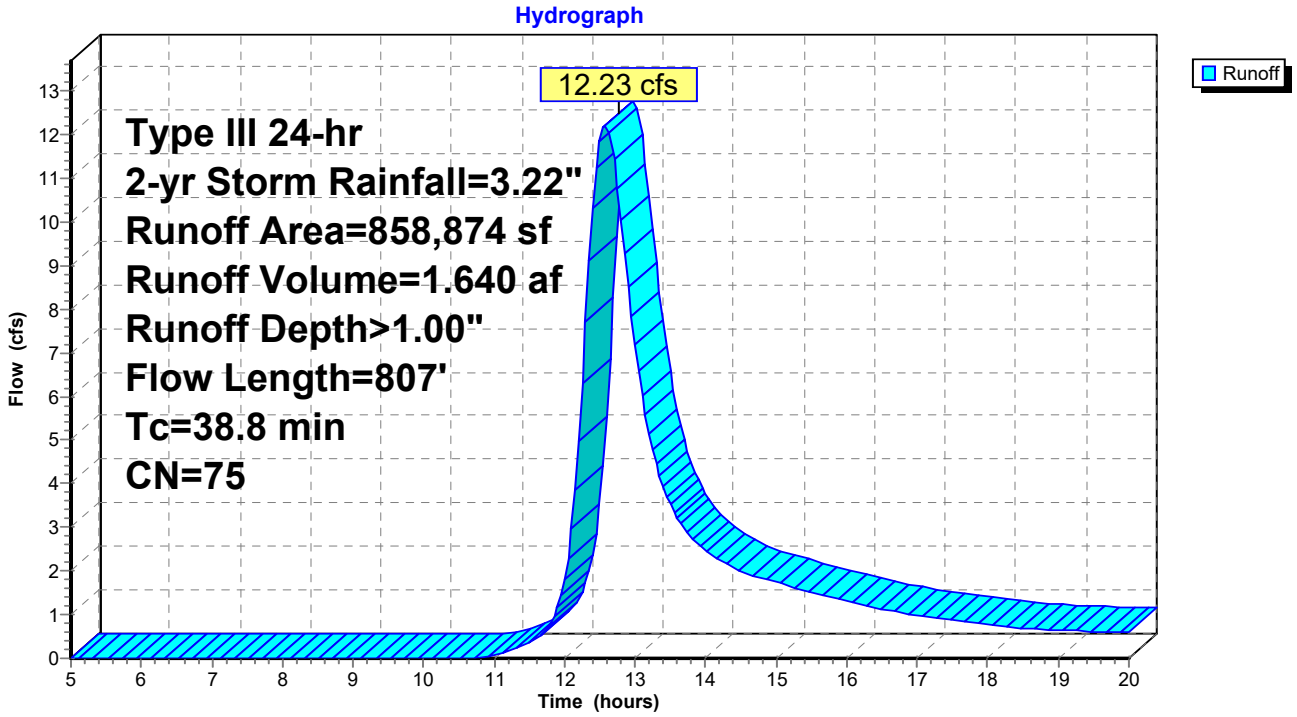
Runoff = 12.23 cfs @ 12.57 hrs, Volume= 1.640 af, Depth> 1.00"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

Area (sf)	CN	Description
82,076	39	Pasture/grassland/range, Good, HSG A
200,629	30	Woods, Good, HSG A
530,931	96	Gravel surface, HSG A
10,333	98	Paved parking, HSG A
34,905	98	Roofs, HSG A
858,874	75	Weighted Average
813,636		94.73% Pervious Area
45,238		5.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0050	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.22"
5.7	391	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
8.3	316	0.0160	0.63		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
38.8	807	Total			

Subcatchment SC-1 new: SC-1



Summary for Subcatchment SC-2 new: Road

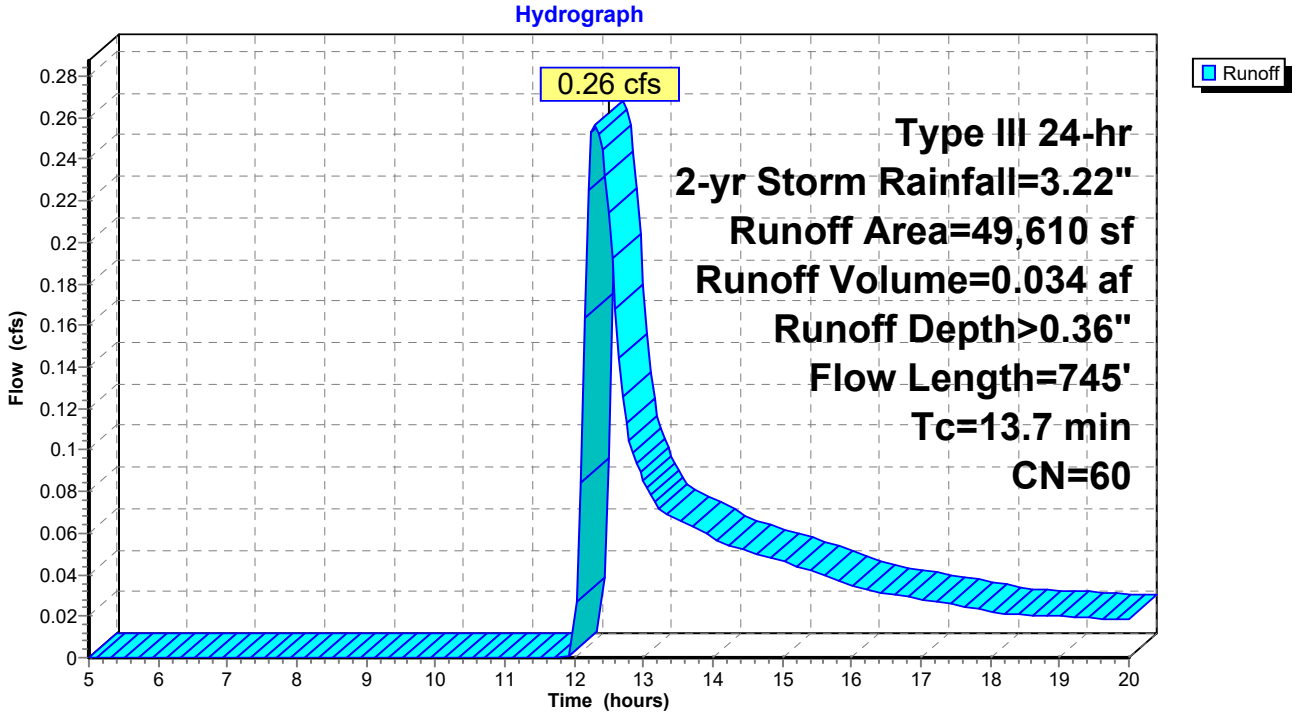
Runoff = 0.26 cfs @ 12.30 hrs, Volume= 0.034 af, Depth> 0.36"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

Area (sf)	CN	Description
14,423	98	Paved parking, HSG A
31,930	39	Pasture/grassland/range, Good, HSG A
3,257	98	Roofs, HSG A
49,610	60	Weighted Average
31,930		64.36% Pervious Area
17,680		35.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	100	0.0200	0.17		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.9	645	0.0290	2.74		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
13.7	745	Total			

Subcatchment SC-2 new: Road



Summary for Subcatchment SC-3 new: Southwest

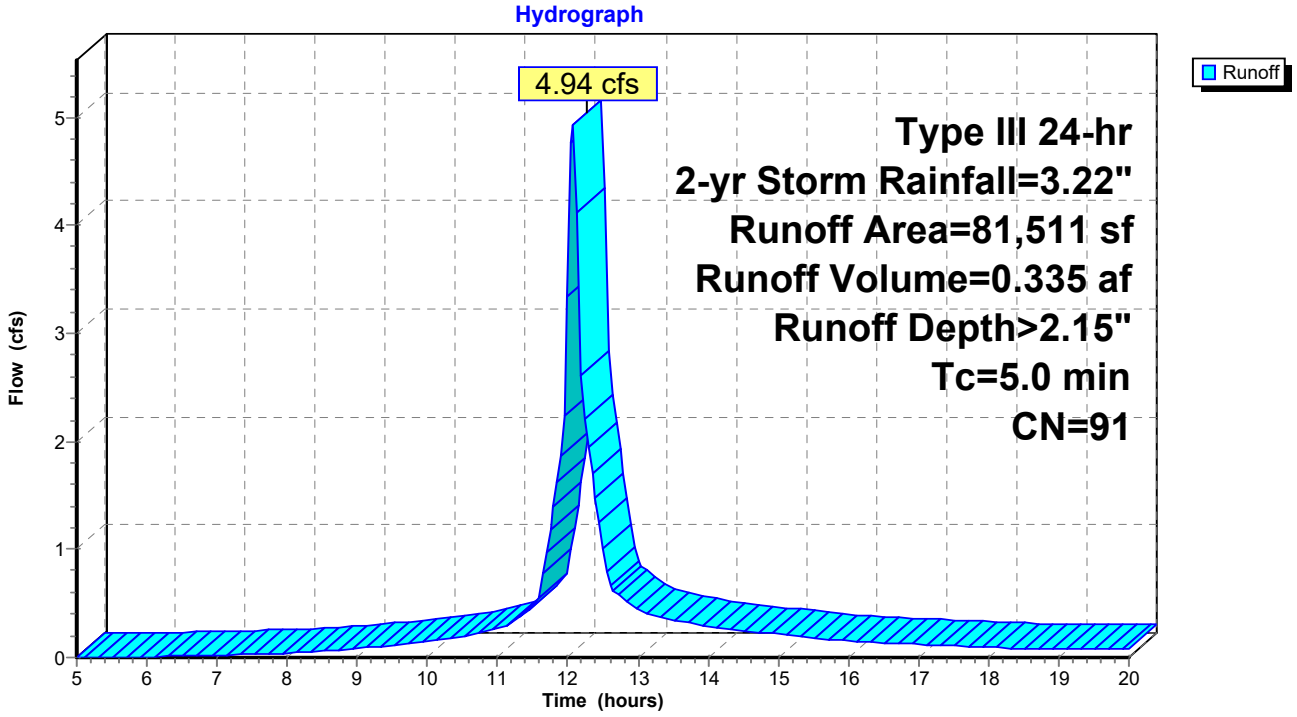
Runoff = 4.94 cfs @ 12.07 hrs, Volume= 0.335 af, Depth> 2.15"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
	35,485	98	Paved parking, HSG A
	7,056	39	Pasture/grassland/range, Good, HSG A
	6,191	80	Pasture/grassland/range, Good, HSG D
	19,590	98	Roofs, HSG A
*	13,189	96	Gravel
	81,511	91	Weighted Average
	26,436		32.43% Pervious Area
	55,075		67.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-3 new: Southwest

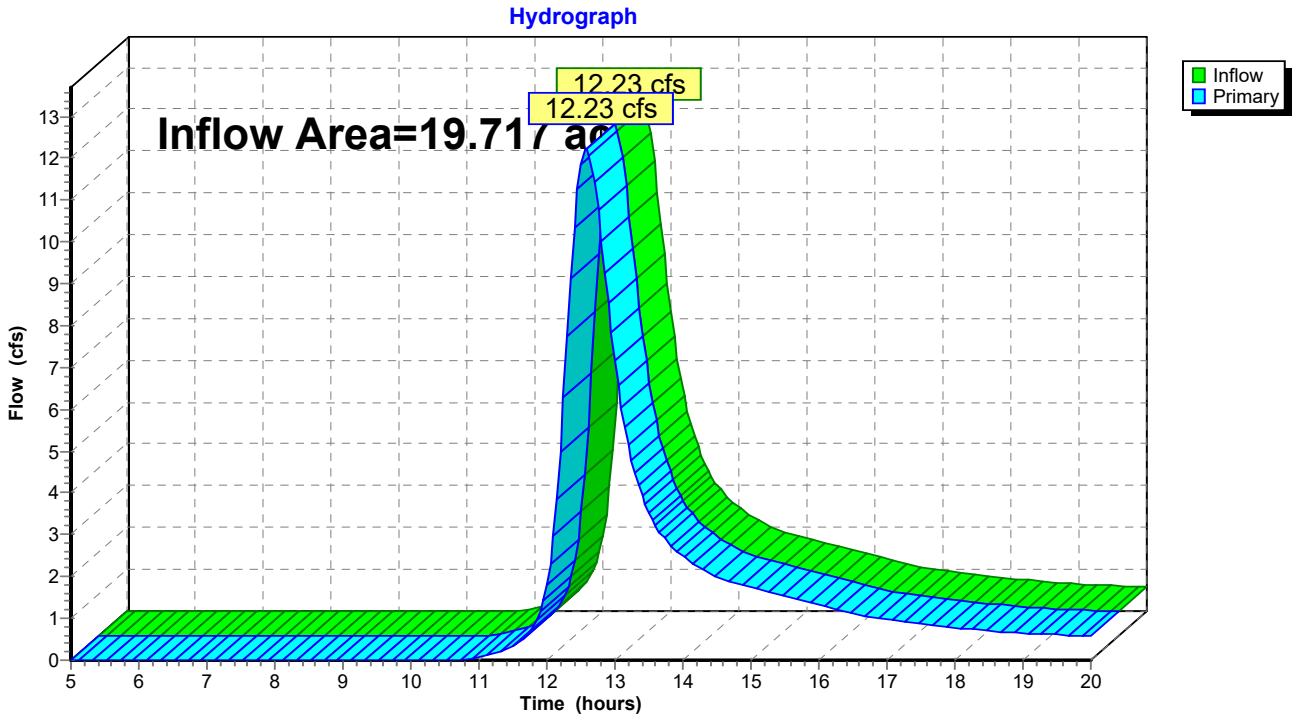


Summary for Link AP-1: AP-1

Inflow Area = 19.717 ac, 5.27% Impervious, Inflow Depth > 1.00" for 2-yr Storm event
Inflow = 12.23 cfs @ 12.57 hrs, Volume= 1.640 af
Primary = 12.23 cfs @ 12.57 hrs, Volume= 1.640 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-1: AP-1

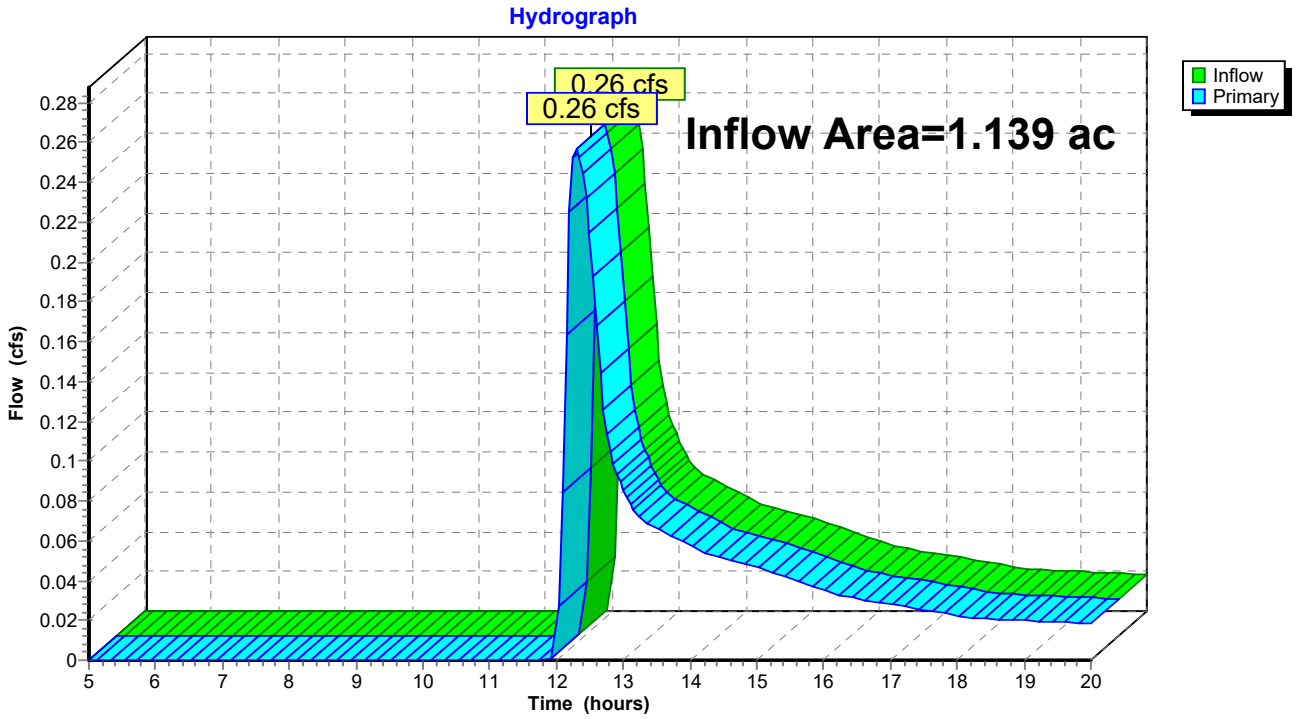


Summary for Link AP-2: AP-2

Inflow Area = 1.139 ac, 35.64% Impervious, Inflow Depth > 0.36" for 2-yr Storm event
Inflow = 0.26 cfs @ 12.30 hrs, Volume= 0.034 af
Primary = 0.26 cfs @ 12.30 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-2: AP-2

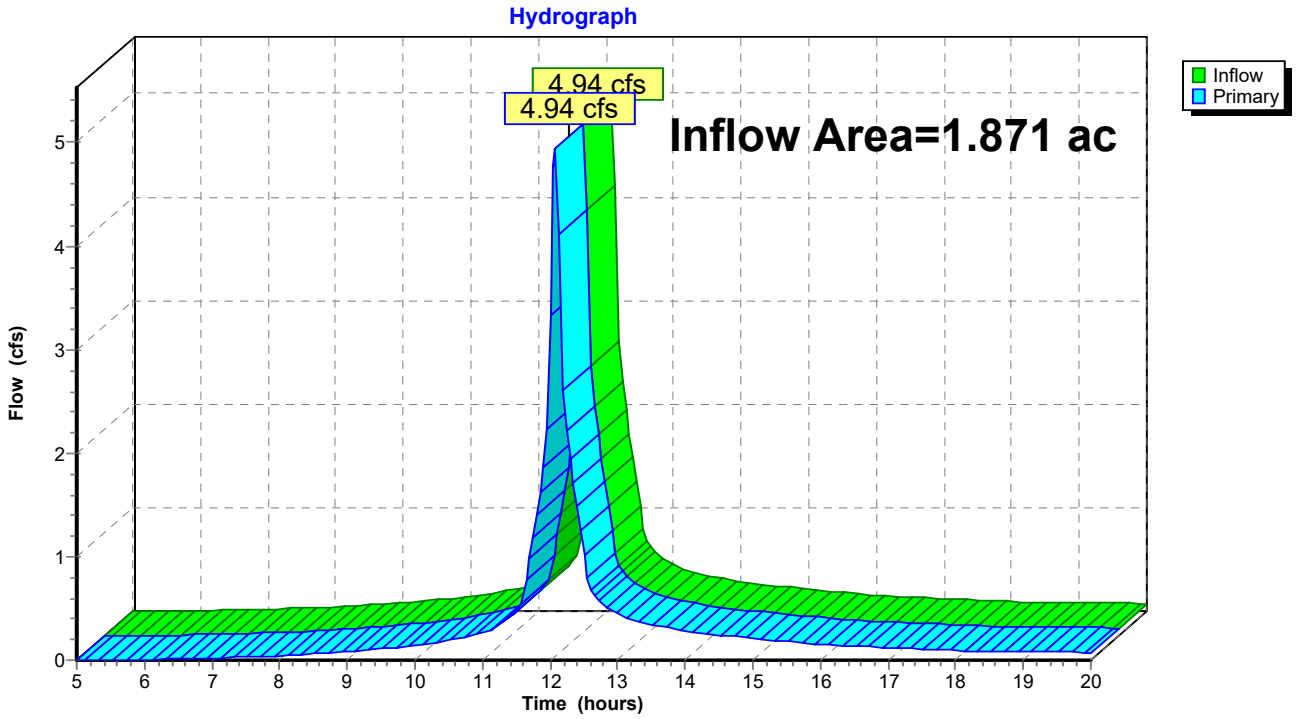


Summary for Link AP-3: AP-3

Inflow Area = 1.871 ac, 67.57% Impervious, Inflow Depth > 2.15" for 2-yr Storm event
Inflow = 4.94 cfs @ 12.07 hrs, Volume= 0.335 af
Primary = 4.94 cfs @ 12.07 hrs, Volume= 0.335 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-3: AP-3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentSC-1 new: SC-1 Runoff Area=858,874 sf 5.27% Impervious Runoff Depth>2.38"
Flow Length=807' Tc=38.8 min CN=75 Runoff=29.90 cfs 3.914 af

SubcatchmentSC-2 new: Road Runoff Area=49,610 sf 35.64% Impervious Runoff Depth>1.27"
Flow Length=745' Tc=13.7 min CN=60 Runoff=1.32 cfs 0.120 af

SubcatchmentSC-3 new: Southwest Runoff Area=81,511 sf 67.57% Impervious Runoff Depth>3.93"
Tc=5.0 min CN=91 Runoff=8.76 cfs 0.613 af

Link AP-1: AP-1 Inflow=29.90 cfs 3.914 af
Primary=29.90 cfs 3.914 af

Link AP-2: AP-2 Inflow=1.32 cfs 0.120 af
Primary=1.32 cfs 0.120 af

Link AP-3: AP-3 Inflow=8.76 cfs 0.613 af
Primary=8.76 cfs 0.613 af

Summary for Subcatchment SC-1 new: SC-1

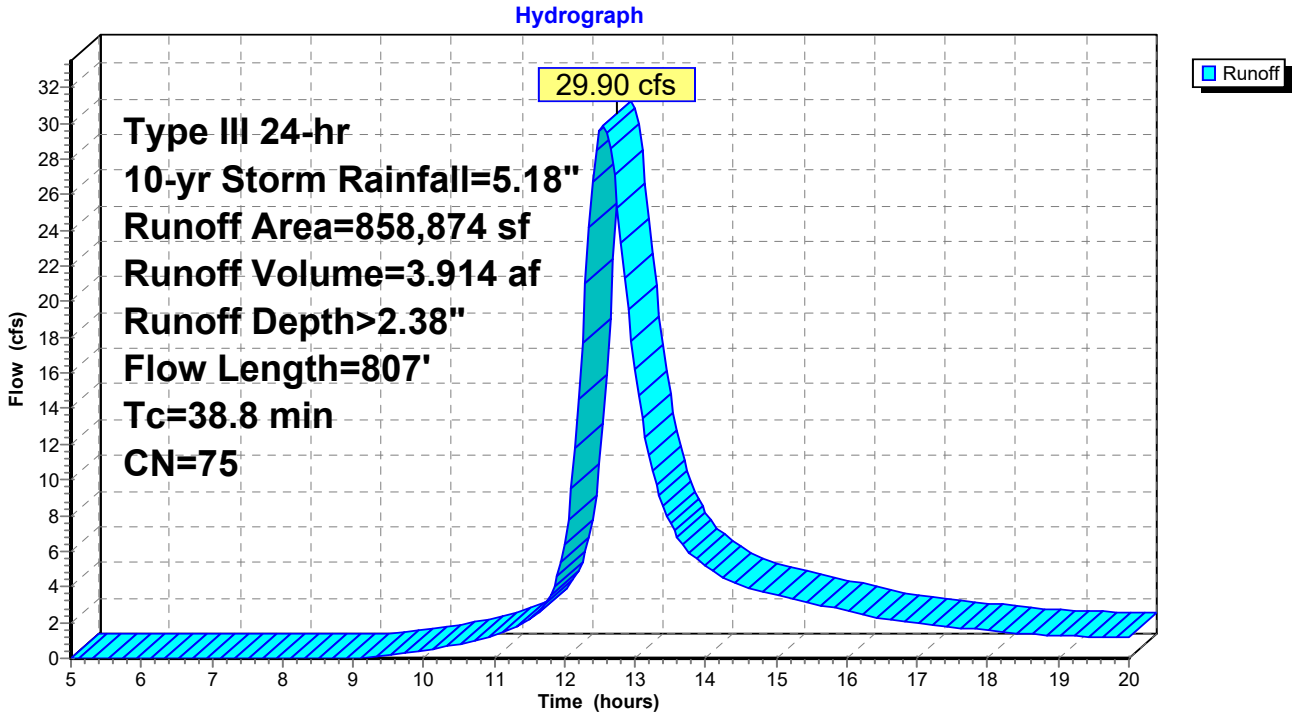
Runoff = 29.90 cfs @ 12.55 hrs, Volume= 3.914 af, Depth> 2.38"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

Area (sf)	CN	Description
82,076	39	Pasture/grassland/range, Good, HSG A
200,629	30	Woods, Good, HSG A
530,931	96	Gravel surface, HSG A
10,333	98	Paved parking, HSG A
34,905	98	Roofs, HSG A
858,874	75	Weighted Average
813,636		94.73% Pervious Area
45,238		5.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0050	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.22"
5.7	391	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
8.3	316	0.0160	0.63		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
38.8	807	Total			

Subcatchment SC-1 new: SC-1



Summary for Subcatchment SC-2 new: Road

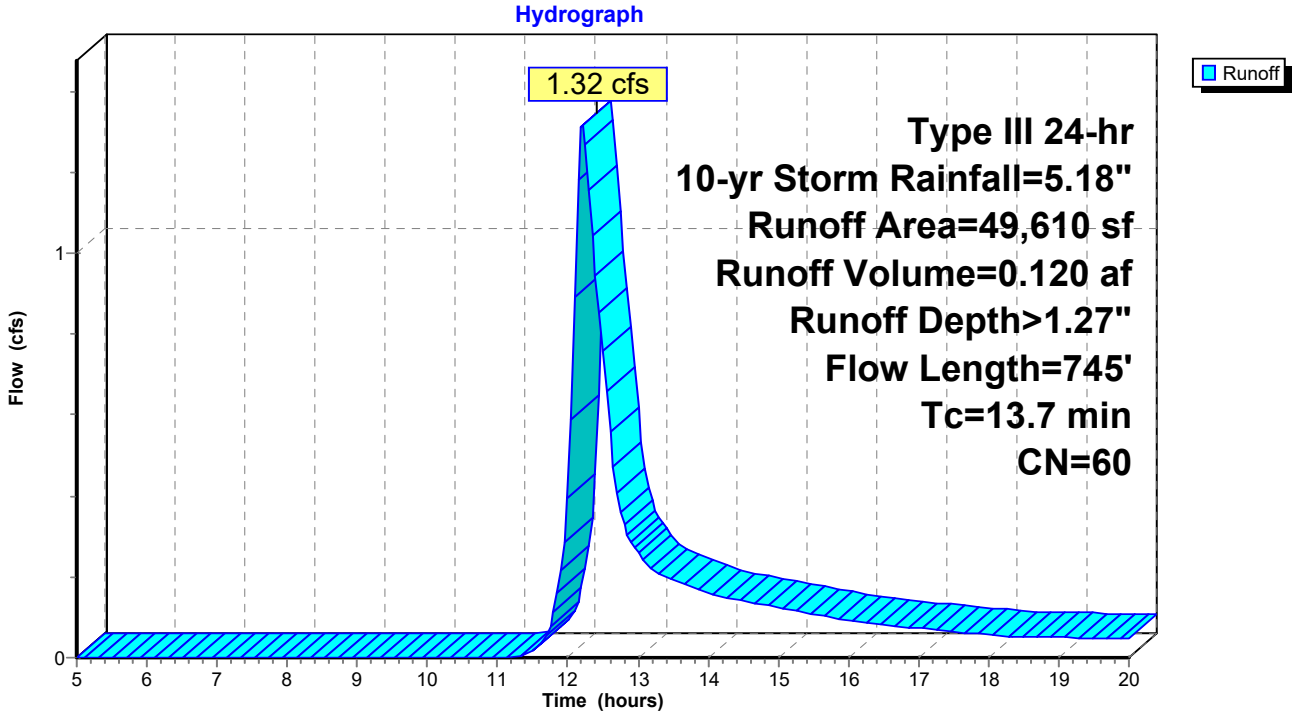
Runoff = 1.32 cfs @ 12.21 hrs, Volume= 0.120 af, Depth> 1.27"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

Area (sf)	CN	Description
14,423	98	Paved parking, HSG A
31,930	39	Pasture/grassland/range, Good, HSG A
3,257	98	Roofs, HSG A
49,610	60	Weighted Average
31,930		64.36% Pervious Area
17,680		35.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	100	0.0200	0.17		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.9	645	0.0290	2.74		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
13.7	745	Total			

Subcatchment SC-2 new: Road



Summary for Subcatchment SC-3 new: Southwest

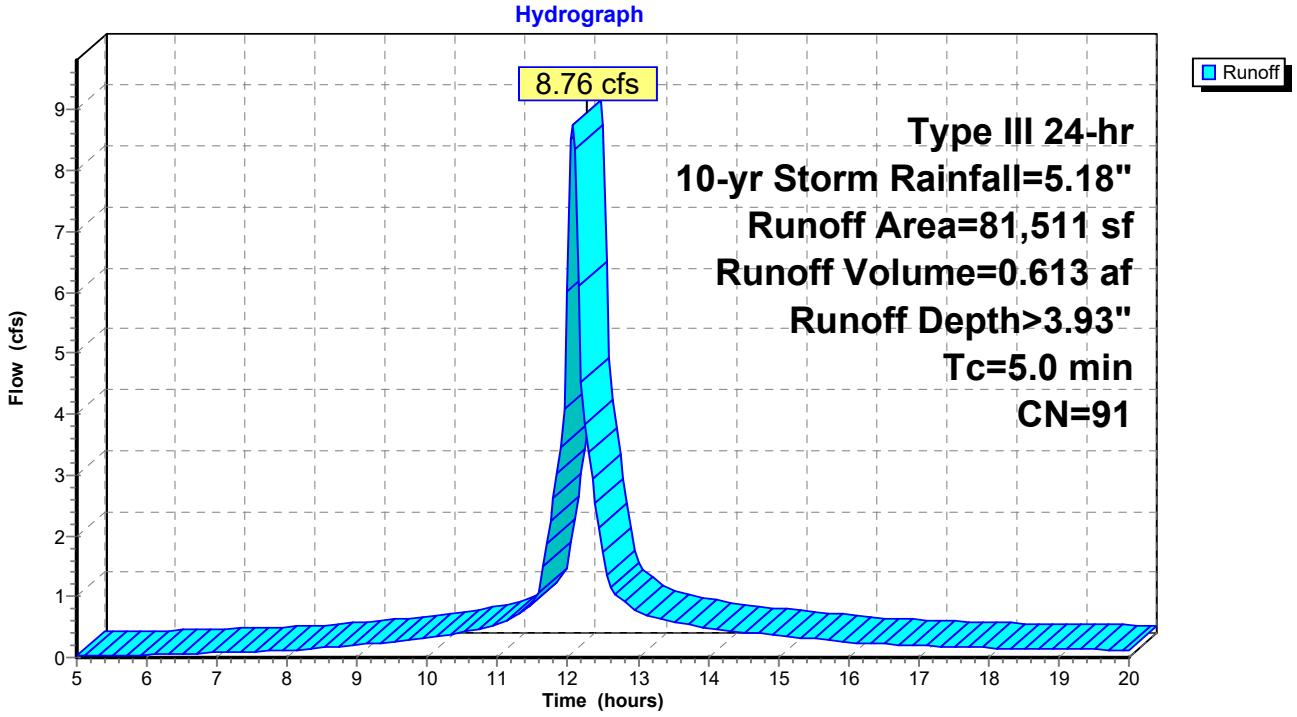
Runoff = 8.76 cfs @ 12.07 hrs, Volume= 0.613 af, Depth> 3.93"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
	35,485	98	Paved parking, HSG A
	7,056	39	Pasture/grassland/range, Good, HSG A
	6,191	80	Pasture/grassland/range, Good, HSG D
	19,590	98	Roofs, HSG A
*	13,189	96	Gravel
	81,511	91	Weighted Average
	26,436		32.43% Pervious Area
	55,075		67.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-3 new: Southwest

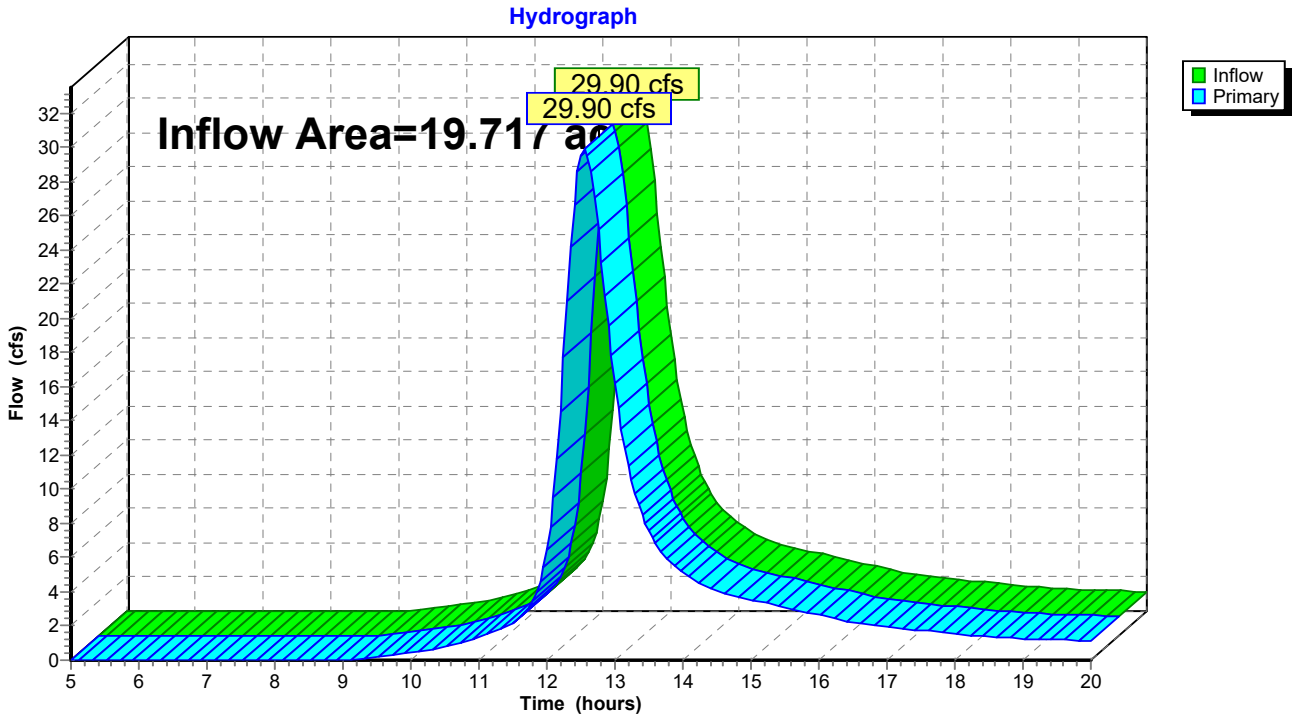


Summary for Link AP-1: AP-1

Inflow Area = 19.717 ac, 5.27% Impervious, Inflow Depth > 2.38" for 10-yr Storm event
Inflow = 29.90 cfs @ 12.55 hrs, Volume= 3.914 af
Primary = 29.90 cfs @ 12.55 hrs, Volume= 3.914 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-1: AP-1

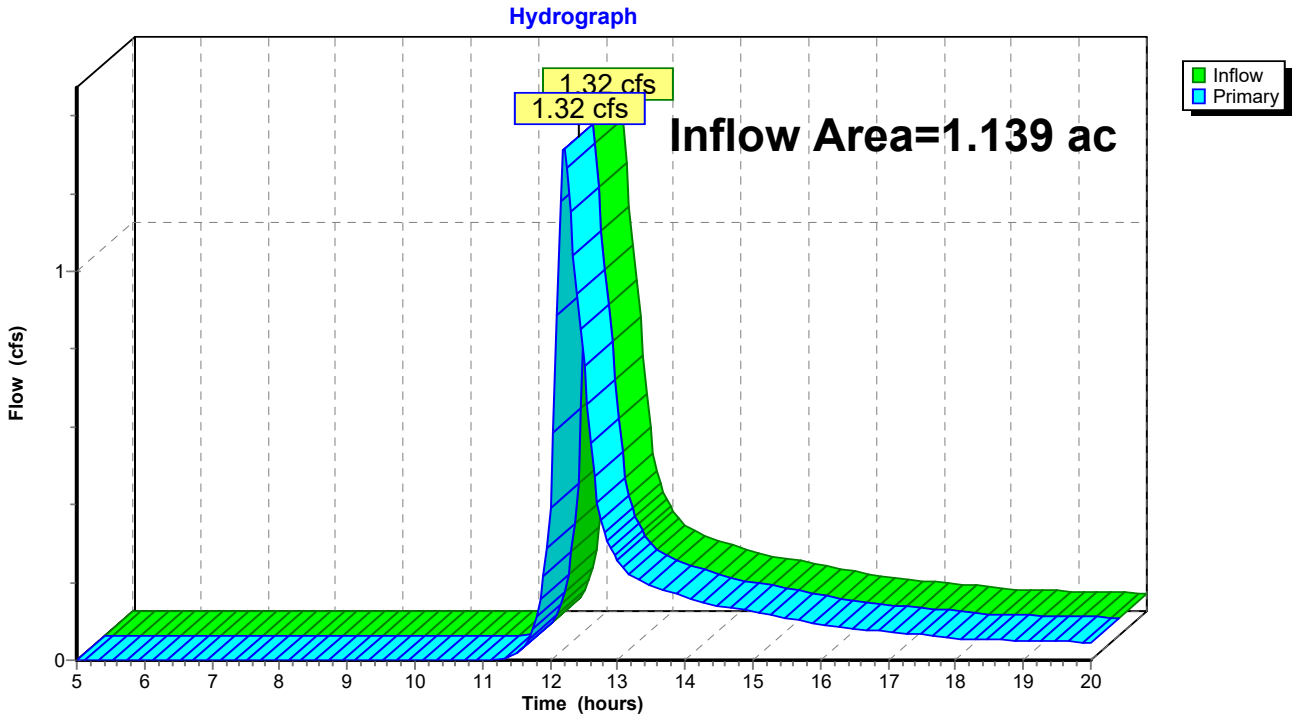


Summary for Link AP-2: AP-2

Inflow Area = 1.139 ac, 35.64% Impervious, Inflow Depth > 1.27" for 10-yr Storm event
Inflow = 1.32 cfs @ 12.21 hrs, Volume= 0.120 af
Primary = 1.32 cfs @ 12.21 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-2: AP-2

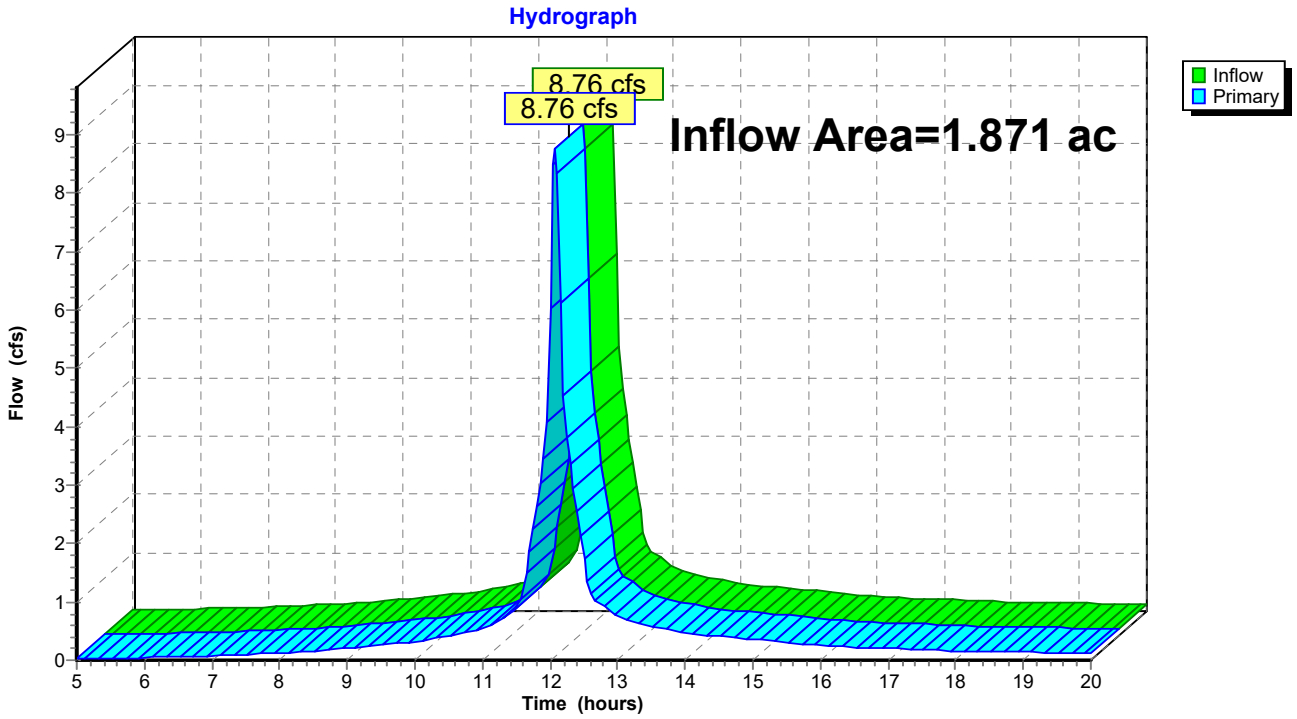


Summary for Link AP-3: AP-3

Inflow Area = 1.871 ac, 67.57% Impervious, Inflow Depth > 3.93" for 10-yr Storm event
Inflow = 8.76 cfs @ 12.07 hrs, Volume= 0.613 af
Primary = 8.76 cfs @ 12.07 hrs, Volume= 0.613 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-3: AP-3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentSC-1 new: SC-1 Runoff Area=858,874 sf 5.27% Impervious Runoff Depth>3.35"
Flow Length=807' Tc=38.8 min CN=75 Runoff=42.00 cfs 5.511 af

SubcatchmentSC-2 new: Road Runoff Area=49,610 sf 35.64% Impervious Runoff Depth>2.00"
Flow Length=745' Tc=13.7 min CN=60 Runoff=2.17 cfs 0.190 af

SubcatchmentSC-3 new: Southwest Runoff Area=81,511 sf 67.57% Impervious Runoff Depth>5.06"
Tc=5.0 min CN=91 Runoff=11.14 cfs 0.790 af

Link AP-1: AP-1 Inflow=42.00 cfs 5.511 af
Primary=42.00 cfs 5.511 af

Link AP-2: AP-2 Inflow=2.17 cfs 0.190 af
Primary=2.17 cfs 0.190 af

Link AP-3: AP-3 Inflow=11.14 cfs 0.790 af
Primary=11.14 cfs 0.790 af

Summary for Subcatchment SC-1 new: SC-1

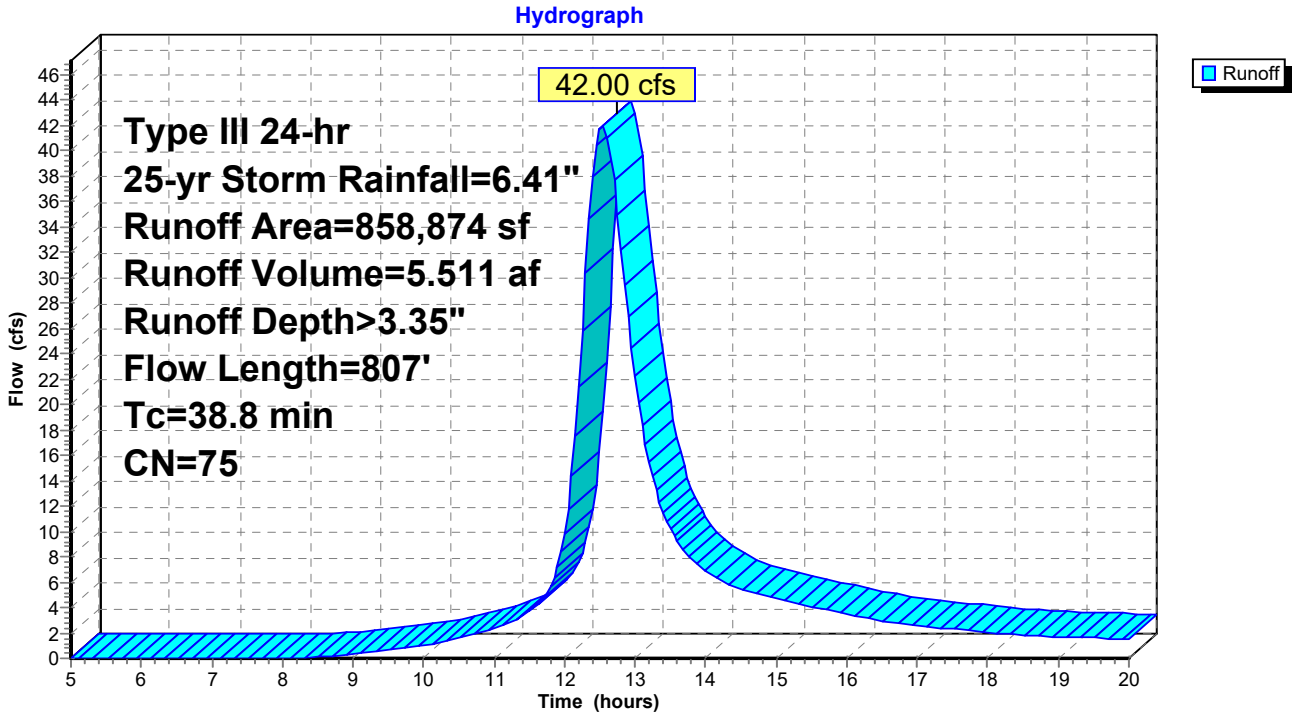
Runoff = 42.00 cfs @ 12.54 hrs, Volume= 5.511 af, Depth> 3.35"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

Area (sf)	CN	Description
82,076	39	Pasture/grassland/range, Good, HSG A
200,629	30	Woods, Good, HSG A
530,931	96	Gravel surface, HSG A
10,333	98	Paved parking, HSG A
34,905	98	Roofs, HSG A
858,874	75	Weighted Average
813,636		94.73% Pervious Area
45,238		5.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0050	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.22"
5.7	391	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
8.3	316	0.0160	0.63		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
38.8	807	Total			

Subcatchment SC-1 new: SC-1



Summary for Subcatchment SC-2 new: Road

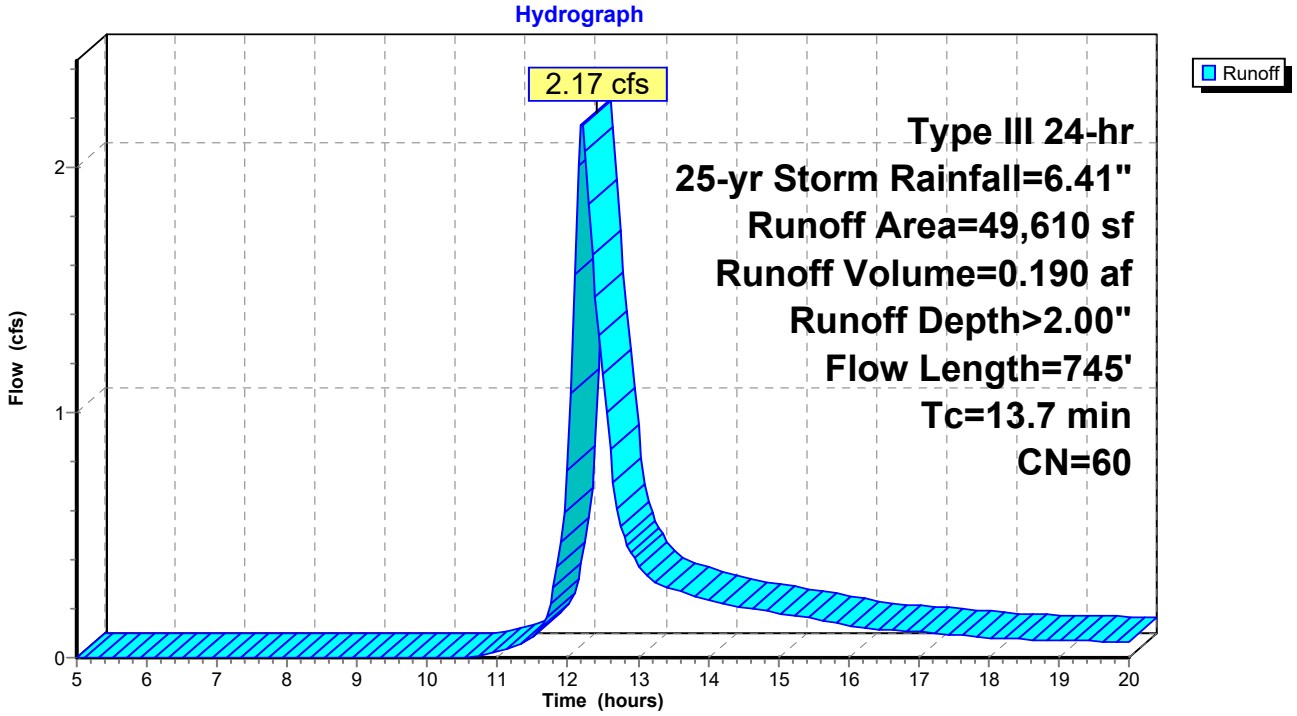
Runoff = 2.17 cfs @ 12.21 hrs, Volume= 0.190 af, Depth> 2.00"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

Area (sf)	CN	Description
14,423	98	Paved parking, HSG A
31,930	39	Pasture/grassland/range, Good, HSG A
3,257	98	Roofs, HSG A
49,610	60	Weighted Average
31,930		64.36% Pervious Area
17,680		35.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	100	0.0200	0.17		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.9	645	0.0290	2.74		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
13.7	745	Total			

Subcatchment SC-2 new: Road



Summary for Subcatchment SC-3 new: Southwest

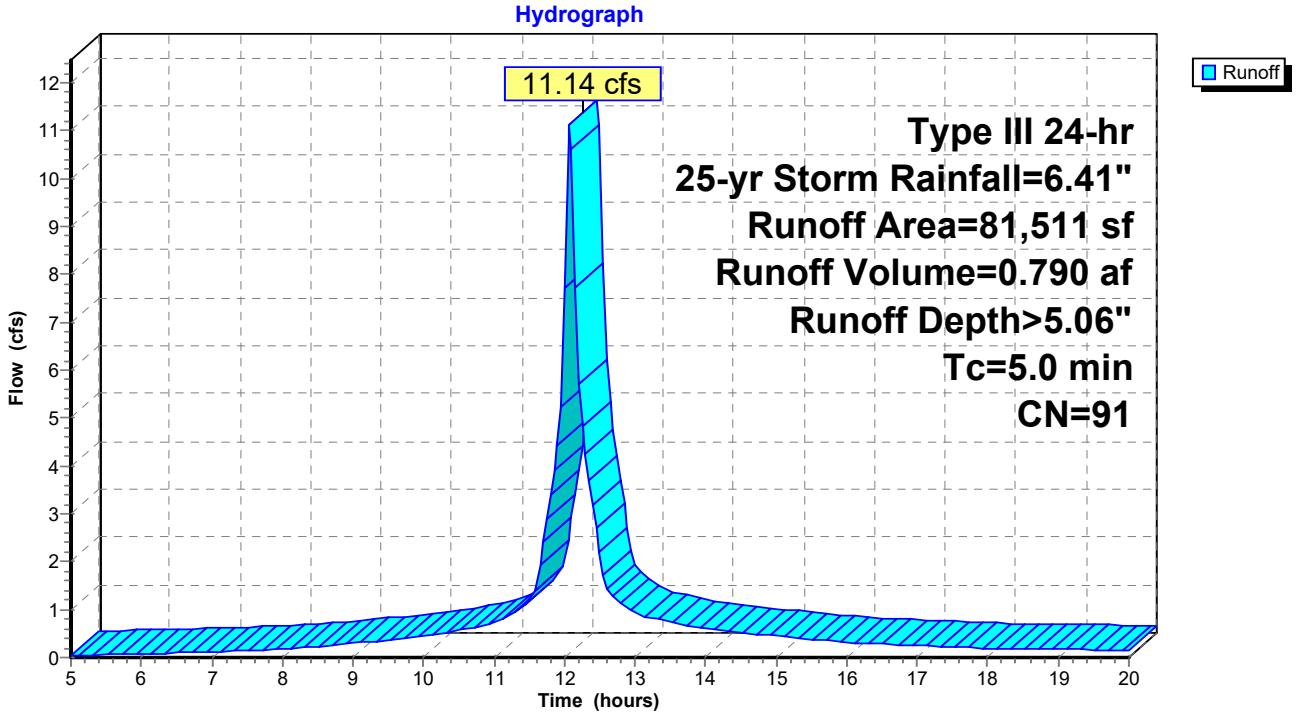
Runoff = 11.14 cfs @ 12.07 hrs, Volume= 0.790 af, Depth> 5.06"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
	35,485	98	Paved parking, HSG A
	7,056	39	Pasture/grassland/range, Good, HSG A
	6,191	80	Pasture/grassland/range, Good, HSG D
	19,590	98	Roofs, HSG A
*	13,189	96	Gravel
	81,511	91	Weighted Average
	26,436		32.43% Pervious Area
	55,075		67.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-3 new: Southwest

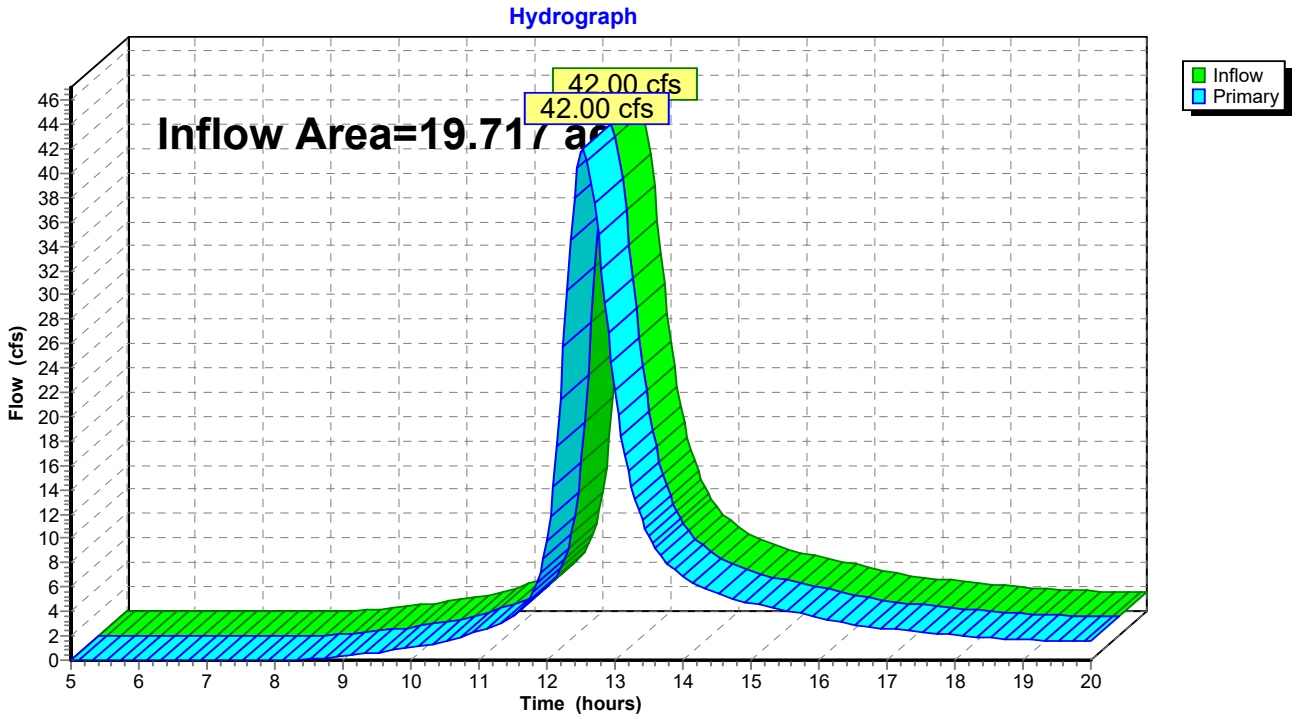


Summary for Link AP-1: AP-1

Inflow Area = 19.717 ac, 5.27% Impervious, Inflow Depth > 3.35" for 25-yr Storm event
Inflow = 42.00 cfs @ 12.54 hrs, Volume= 5.511 af
Primary = 42.00 cfs @ 12.54 hrs, Volume= 5.511 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-1: AP-1

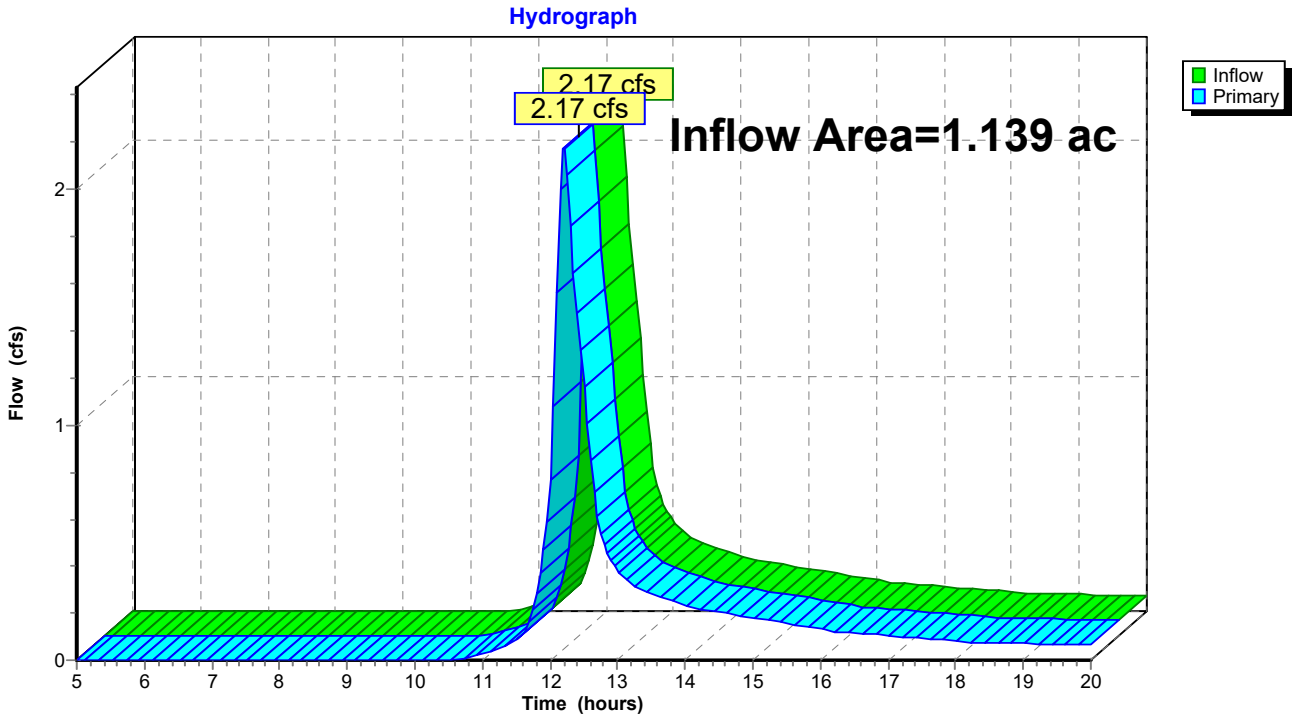


Summary for Link AP-2: AP-2

Inflow Area = 1.139 ac, 35.64% Impervious, Inflow Depth > 2.00" for 25-yr Storm event
Inflow = 2.17 cfs @ 12.21 hrs, Volume= 0.190 af
Primary = 2.17 cfs @ 12.21 hrs, Volume= 0.190 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-2: AP-2

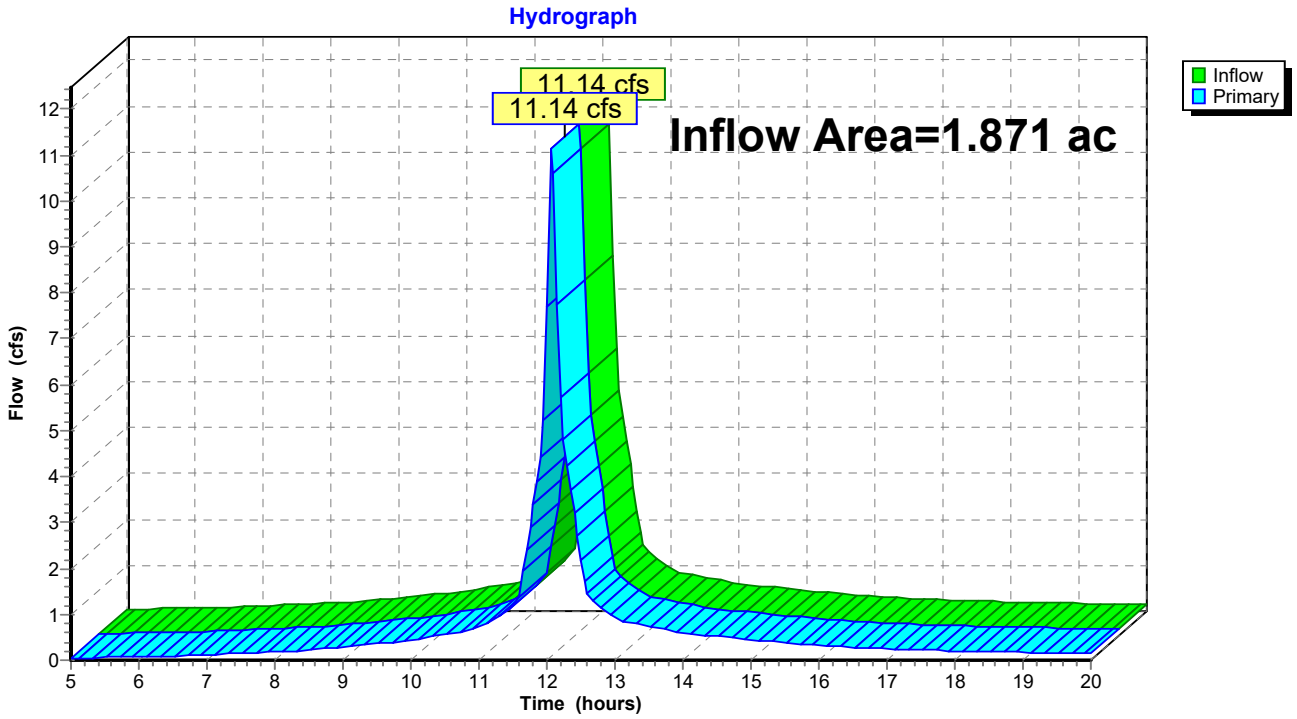


Summary for Link AP-3: AP-3

Inflow Area = 1.871 ac, 67.57% Impervious, Inflow Depth > 5.06" for 25-yr Storm event
Inflow = 11.14 cfs @ 12.07 hrs, Volume= 0.790 af
Primary = 11.14 cfs @ 12.07 hrs, Volume= 0.790 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-3: AP-3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentSC-1 new: SC-1 Runoff Area=858,874 sf 5.27% Impervious Runoff Depth>4.94"
Flow Length=807' Tc=38.8 min CN=75 Runoff=61.32 cfs 8.118 af

SubcatchmentSC-2 new: Road Runoff Area=49,610 sf 35.64% Impervious Runoff Depth>3.28"
Flow Length=745' Tc=13.7 min CN=60 Runoff=3.65 cfs 0.312 af

SubcatchmentSC-3 new: Southwest Runoff Area=81,511 sf 67.57% Impervious Runoff Depth>6.82"
Tc=5.0 min CN=91 Runoff=14.77 cfs 1.063 af

Link AP-1: AP-1 Inflow=61.32 cfs 8.118 af
Primary=61.32 cfs 8.118 af

Link AP-2: AP-2 Inflow=3.65 cfs 0.312 af
Primary=3.65 cfs 0.312 af

Link AP-3: AP-3 Inflow=14.77 cfs 1.063 af
Primary=14.77 cfs 1.063 af

Summary for Subcatchment SC-1 new: SC-1

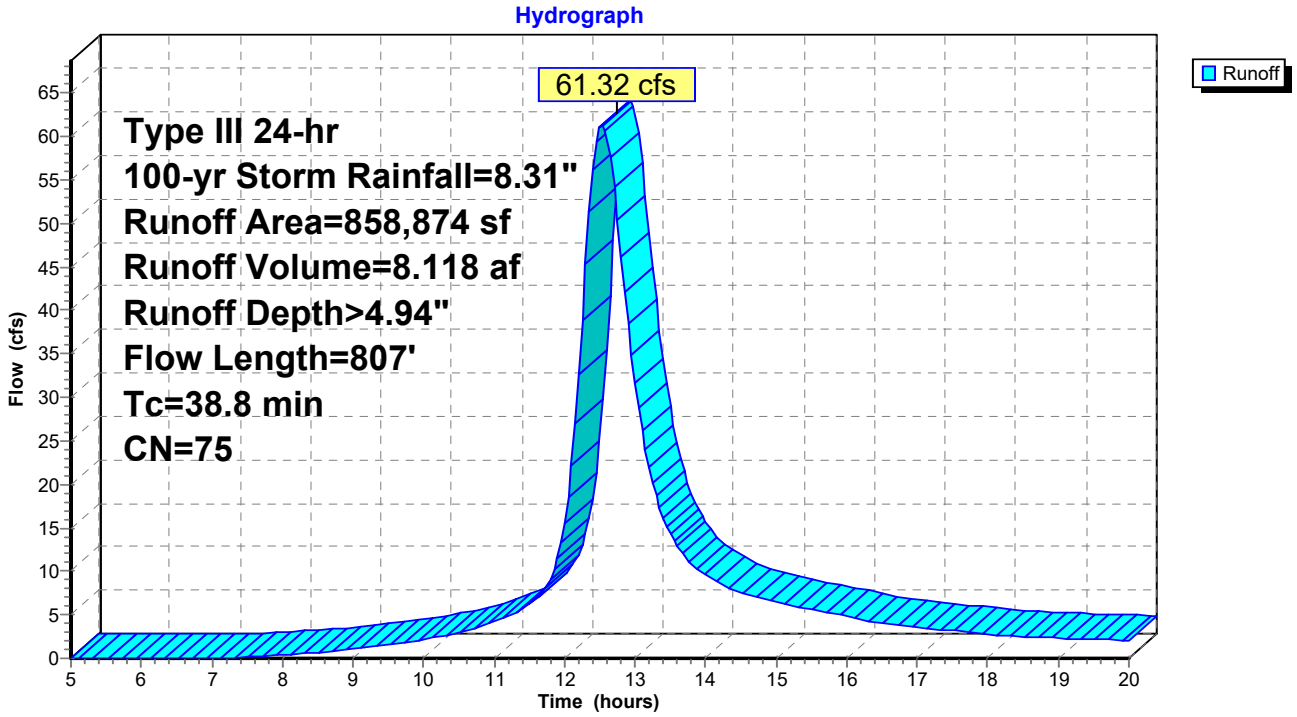
Runoff = 61.32 cfs @ 12.53 hrs, Volume= 8.118 af, Depth> 4.94"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

Area (sf)	CN	Description
82,076	39	Pasture/grassland/range, Good, HSG A
200,629	30	Woods, Good, HSG A
530,931	96	Gravel surface, HSG A
10,333	98	Paved parking, HSG A
34,905	98	Roofs, HSG A
858,874	75	Weighted Average
813,636		94.73% Pervious Area
45,238		5.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0050	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.22"
5.7	391	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
8.3	316	0.0160	0.63		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
38.8	807	Total			

Subcatchment SC-1 new: SC-1



Summary for Subcatchment SC-2 new: Road

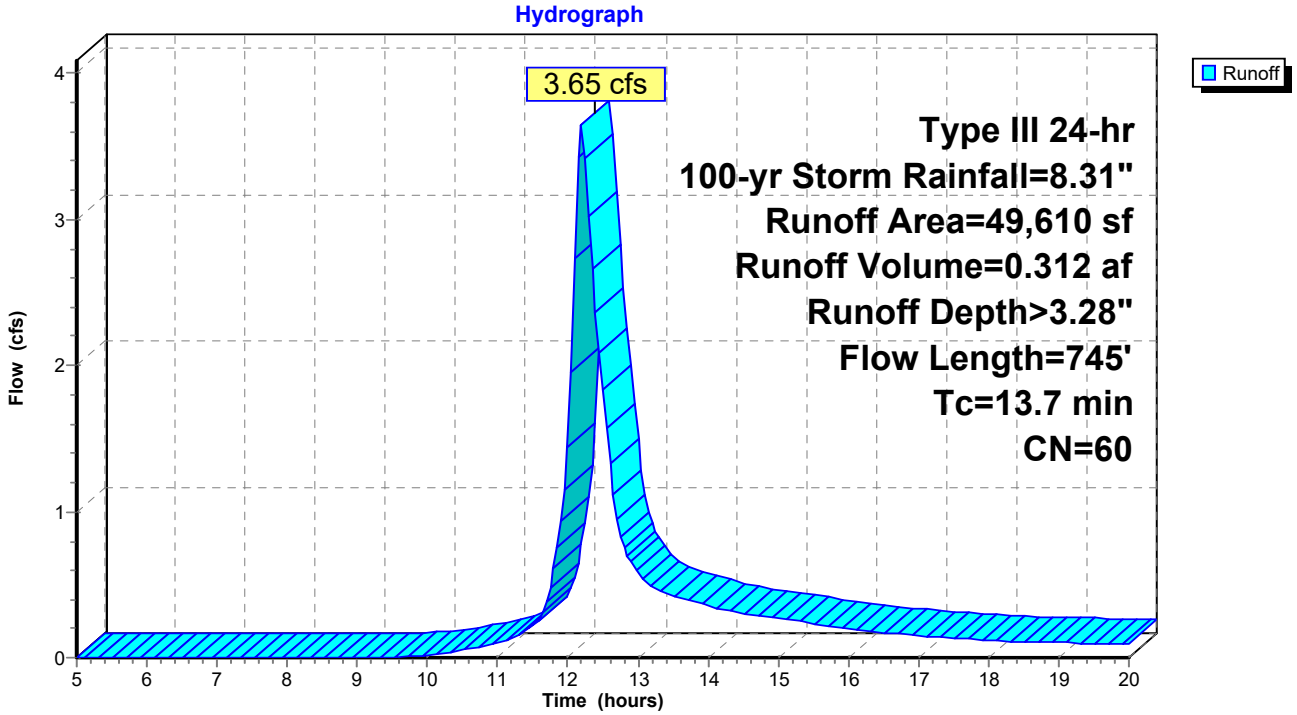
Runoff = 3.65 cfs @ 12.20 hrs, Volume= 0.312 af, Depth> 3.28"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

Area (sf)	CN	Description
14,423	98	Paved parking, HSG A
31,930	39	Pasture/grassland/range, Good, HSG A
3,257	98	Roofs, HSG A
49,610	60	Weighted Average
31,930		64.36% Pervious Area
17,680		35.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	100	0.0200	0.17		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.9	645	0.0290	2.74		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
13.7	745	Total			

Subcatchment SC-2 new: Road



Summary for Subcatchment SC-3 new: Southwest

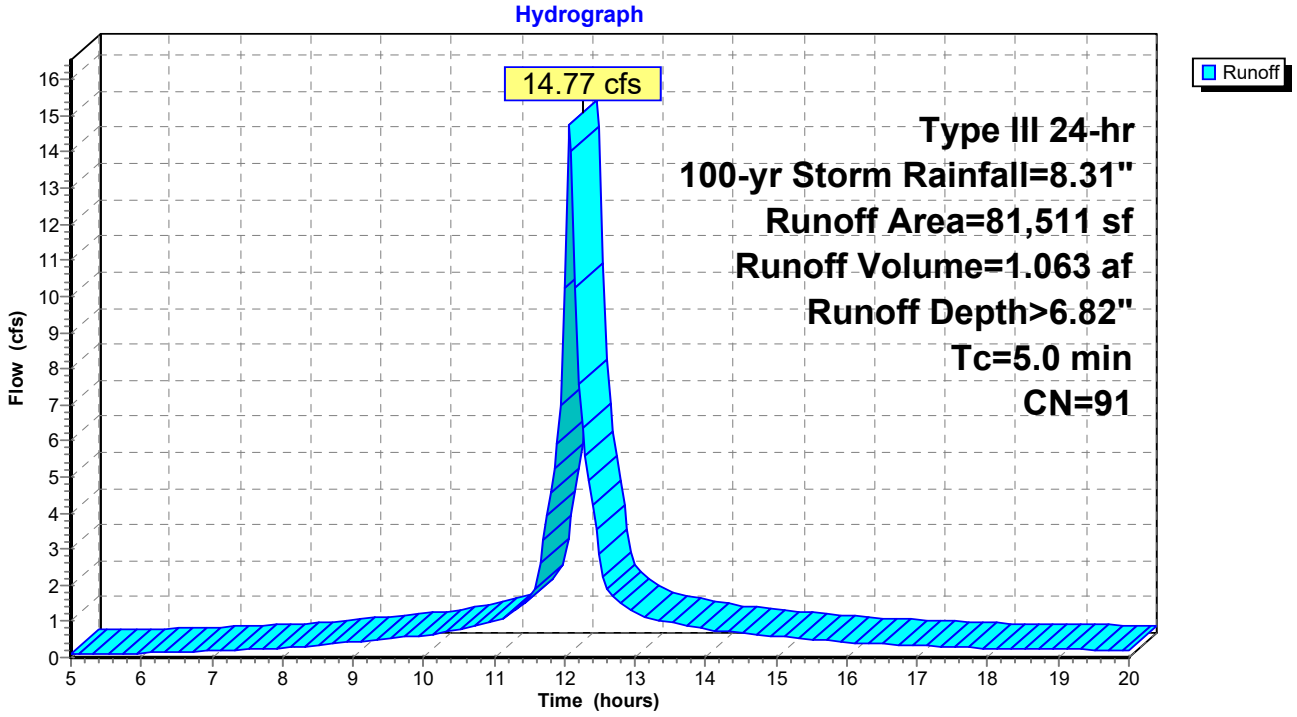
Runoff = 14.77 cfs @ 12.07 hrs, Volume= 1.063 af, Depth> 6.82"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
	35,485	98	Paved parking, HSG A
	7,056	39	Pasture/grassland/range, Good, HSG A
	6,191	80	Pasture/grassland/range, Good, HSG D
	19,590	98	Roofs, HSG A
*	13,189	96	Gravel
	81,511	91	Weighted Average
	26,436		32.43% Pervious Area
	55,075		67.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-3 new: Southwest

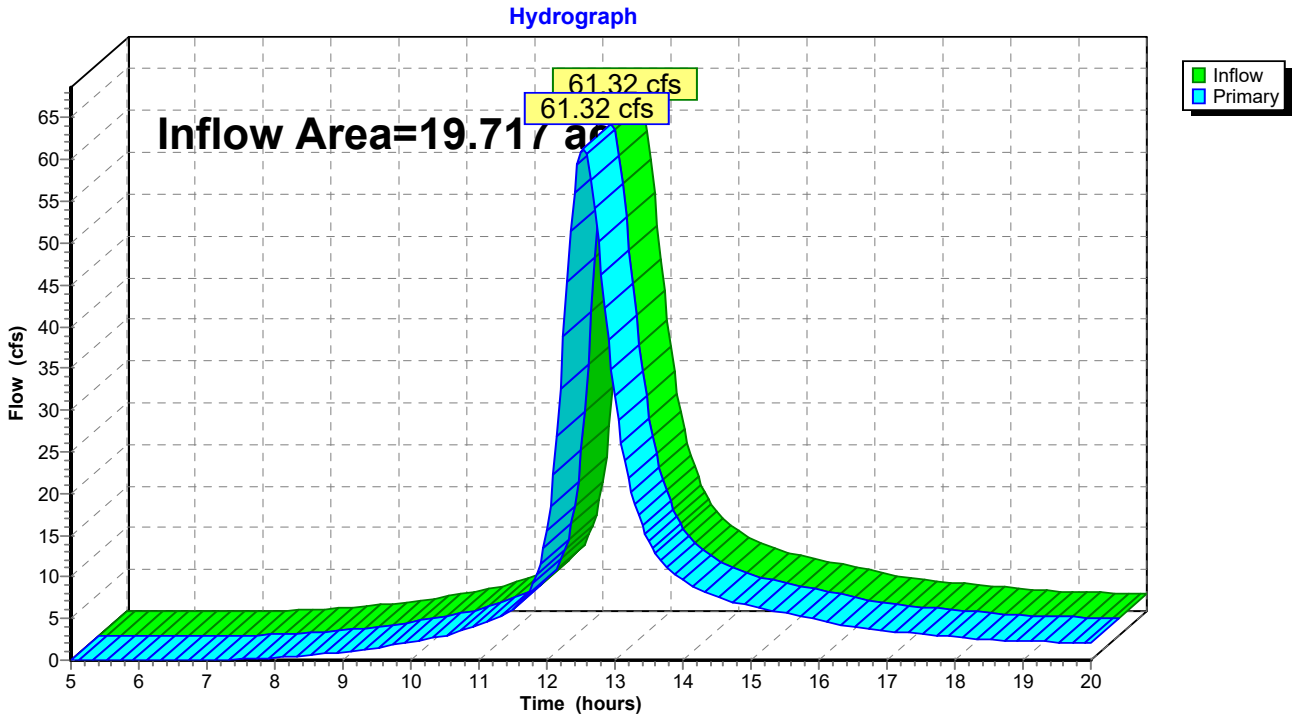


Summary for Link AP-1: AP-1

Inflow Area = 19.717 ac, 5.27% Impervious, Inflow Depth > 4.94" for 100-yr Storm event
Inflow = 61.32 cfs @ 12.53 hrs, Volume= 8.118 af
Primary = 61.32 cfs @ 12.53 hrs, Volume= 8.118 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-1: AP-1

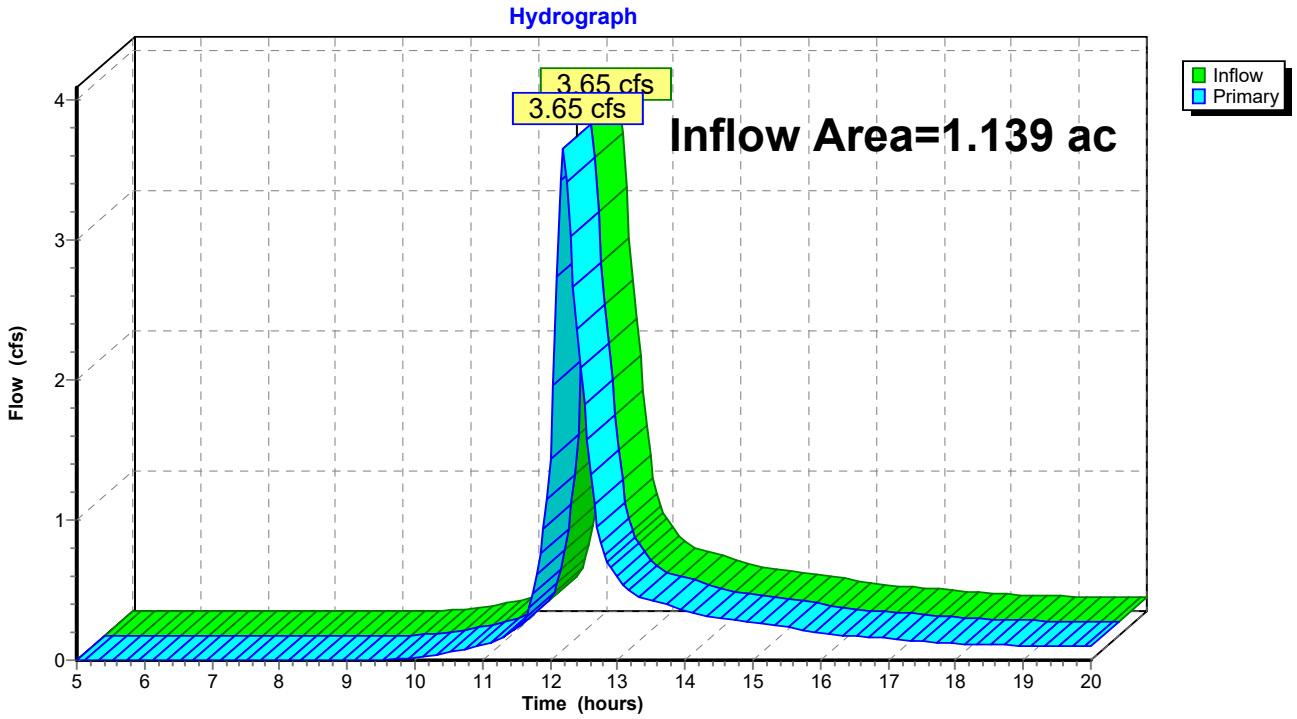


Summary for Link AP-2: AP-2

Inflow Area = 1.139 ac, 35.64% Impervious, Inflow Depth > 3.28" for 100-yr Storm event
Inflow = 3.65 cfs @ 12.20 hrs, Volume= 0.312 af
Primary = 3.65 cfs @ 12.20 hrs, Volume= 0.312 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link AP-2: AP-2

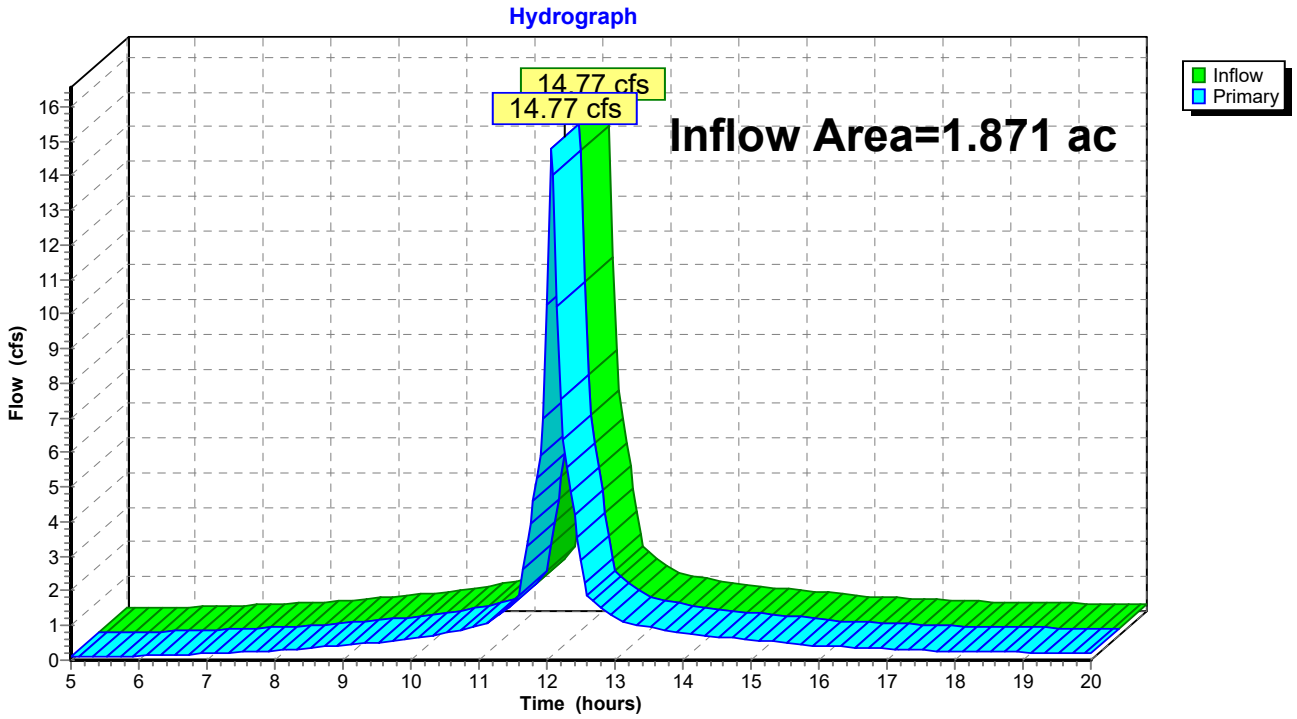


Summary for Link AP-3: AP-3

Inflow Area = 1.871 ac, 67.57% Impervious, Inflow Depth > 6.82" for 100-yr Storm event
Inflow = 14.77 cfs @ 12.07 hrs, Volume= 1.063 af
Primary = 14.77 cfs @ 12.07 hrs, Volume= 1.063 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

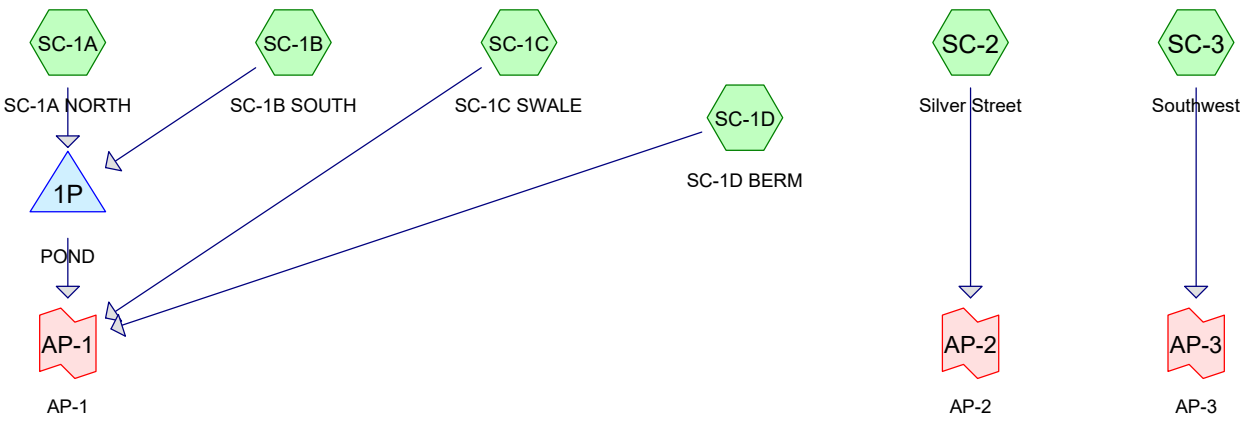
Link AP-3: AP-3



ATTACHMENT D

POST-DEVELOPMENT HYDROCAD CALCULATIONS

SME
SEVEE & MAHER
ENGINEERS



Subcat Reach Pond Link

Routing Diagram for Post-Conditions - TMH
Prepared by Sevee & Maher Engineers, Printed 12/23/2025
HydroCAD® 10.20-7a s/n 01260 © 2025 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr Storm	Type III 24-hr		Default	24.00	1	3.22	2
2	10-yr Storm	Type III 24-hr		Default	24.00	1	5.18	2
3	25-yr Storm	Type III 24-hr		Default	24.00	1	6.41	2
4	100-yr Storm	Type III 24-hr		Default	24.00	1	8.31	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.451	96	Gravel (SC-1A, SC-1B, SC-1C, SC-1D, SC-3)
7.696	39	Pasture/grassland/range, Good, HSG A (SC-1A, SC-1B, SC-1C, SC-1D, SC-2, SC-3)
0.510	98	Paved parking, HSG A (SC-1A, SC-1C, SC-2)
0.463	98	Roofs, HSG A (SC-1B, SC-1C, SC-2)
4.606	30	Woods, Good, HSG A (SC-1C)
22.726	**63**	**TOTAL AREA**

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	1P	179.50	179.20	20.0	0.0150	0.012	0.0	15.0	0.0	
2	1P	180.00	179.80	20.0	0.0100	0.012	0.0	12.0	0.0	
3	1P	180.25	180.05	20.0	0.0100	0.012	0.0	12.0	0.0	

Time span=1.00-48.00 hrs, dt=0.01 hrs, 4701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1A: SC-1A NORTH Runoff Area=108,252 sf 3.51% Impervious Runoff Depth=1.77"
Flow Length=779' Tc=22.4 min CN=85 Runoff=3.33 cfs 0.368 af

Subcatchment SC-1B: SC-1B SOUTH Runoff Area=192,960 sf 4.55% Impervious Runoff Depth=2.10"
Flow Length=901' Tc=23.4 min CN=89 Runoff=6.85 cfs 0.775 af

Subcatchment SC-1C: SC-1C SWALE Runoff Area=569,133 sf 1.87% Impervious Runoff Depth=0.11"
Flow Length=896' Tc=30.9 min CN=49 Runoff=0.20 cfs 0.122 af

Subcatchment SC-1D: SC-1D BERM Runoff Area=27,040 sf 0.00% Impervious Runoff Depth=0.06"
Tc=5.0 min CN=46 Runoff=0.00 cfs 0.003 af

Subcatchment SC-2: Silver Street Runoff Area=40,523 sf 47.20% Impervious Runoff Depth=0.70"
Flow Length=745' Tc=22.2 min CN=67 Runoff=0.41 cfs 0.054 af

Subcatchment SC-3: Southwest Runoff Area=52,035 sf 0.00% Impervious Runoff Depth=1.85"
Tc=5.0 min CN=86 Runoff=2.69 cfs 0.184 af

Pond 1P: POND Peak Elev=181.05' Storage=8,847 cf Inflow=10.18 cfs 1.143 af
Outflow=8.87 cfs 1.075 af

Pond 2P: Treatment Volume Peak Elev=0.00' Storage=0 cf

Link AP-1: AP-1 Inflow=8.88 cfs 1.200 af
Primary=8.88 cfs 1.200 af

Link AP-2: AP-2 Inflow=0.41 cfs 0.054 af
Primary=0.41 cfs 0.054 af

Link AP-3: AP-3 Inflow=2.69 cfs 0.184 af
Primary=2.69 cfs 0.184 af

Total Runoff Area = 22.726 ac Runoff Volume = 1.506 af Average Runoff Depth = 0.80"
95.72% Pervious = 21.753 ac 4.28% Impervious = 0.973 ac

Summary for Subcatchment SC-1A: SC-1A NORTH

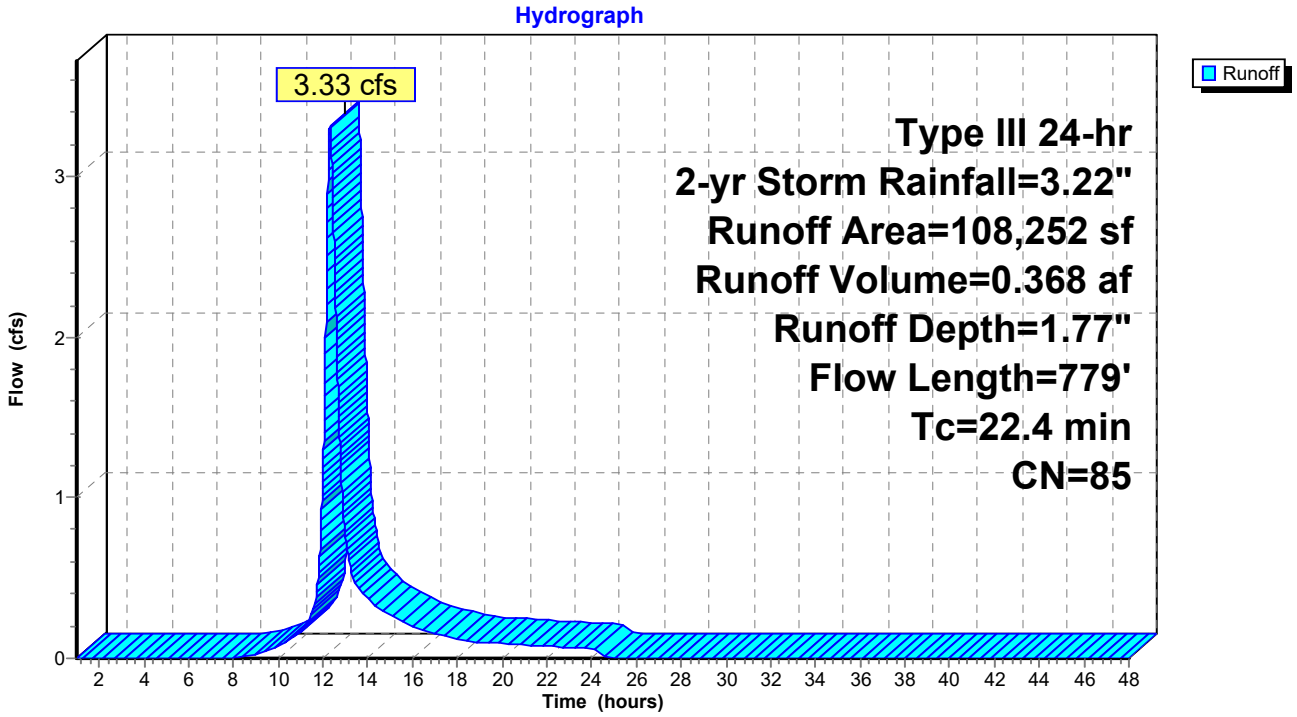
Runoff = 3.33 cfs @ 12.32 hrs, Volume= 0.368 af, Depth= 1.77"
Routed to Pond 1P : POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
*	84,355	96	Gravel
	20,100	39	Pasture/grassland/range, Good, HSG A
	3,797	98	Paved parking, HSG A
	108,252	85	Weighted Average
	104,455		96.49% Pervious Area
	3,797		3.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.7	157	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.6	385	0.0120	1.76		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
2.2	137	0.0220	1.04		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
22.4	779	Total			

Subcatchment SC-1A: SC-1A NORTH



Summary for Subcatchment SC-1B: SC-1B SOUTH

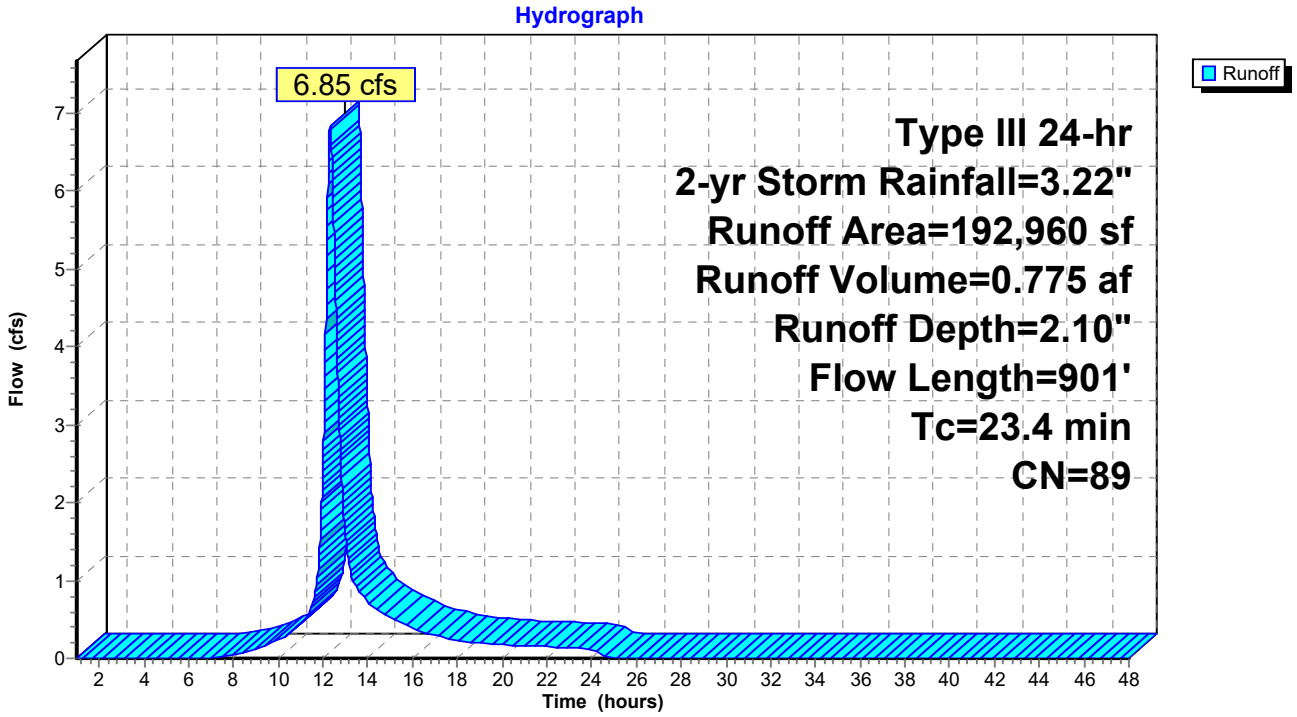
Runoff = 6.85 cfs @ 12.32 hrs, Volume= 0.775 af, Depth= 2.10"
Routed to Pond 1P : POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
*	160,517	96	Gravel
	23,663	39	Pasture/grassland/range, Good, HSG A
	8,780	98	Roofs, HSG A
	192,960	89	Weighted Average
	184,180		95.45% Pervious Area
	8,780		4.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
0.8	88	0.0090	1.93		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
1.3	61	0.0120	0.77		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
4.4	450	0.0110	1.69		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
4.0	202	0.0148	0.85		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
23.4	901	Total			

Subcatchment SC-1B: SC-1B SOUTH



Summary for Subcatchment SC-1C: SC-1C SWALE

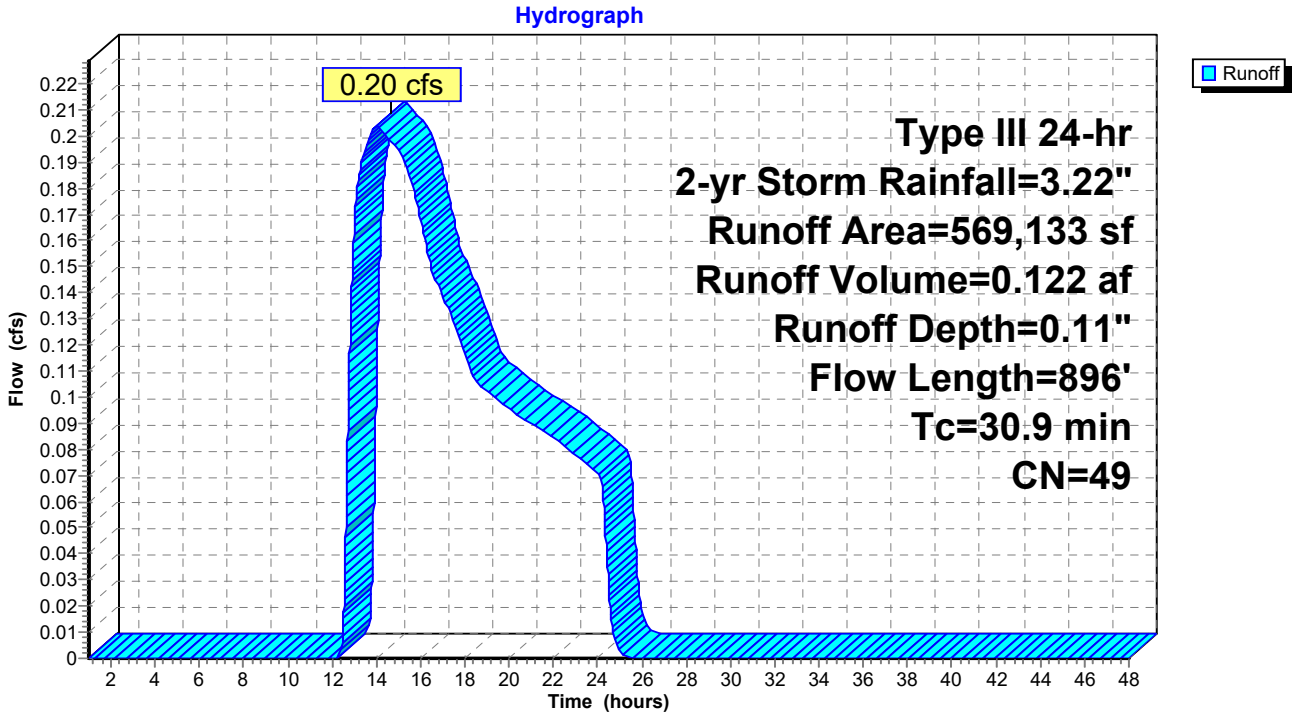
Runoff = 0.20 cfs @ 14.04 hrs, Volume= 0.122 af, Depth= 0.11"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
	237,073	39	Pasture/grassland/range, Good, HSG A
	200,629	30	Woods, Good, HSG A
	2,585	98	Paved parking, HSG A
*	120,760	96	Gravel
	8,086	98	Roofs, HSG A
	569,133	49	Weighted Average
	558,462		98.13% Pervious Area
	10,671		1.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0050	0.10		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
6.9	474	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
3.2	122	0.0080	0.63		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
3.8	200	0.0300	0.87		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
30.9	896	Total			

Subcatchment SC-1C: SC-1C SWALE



Summary for Subcatchment SC-1D: SC-1D BERM

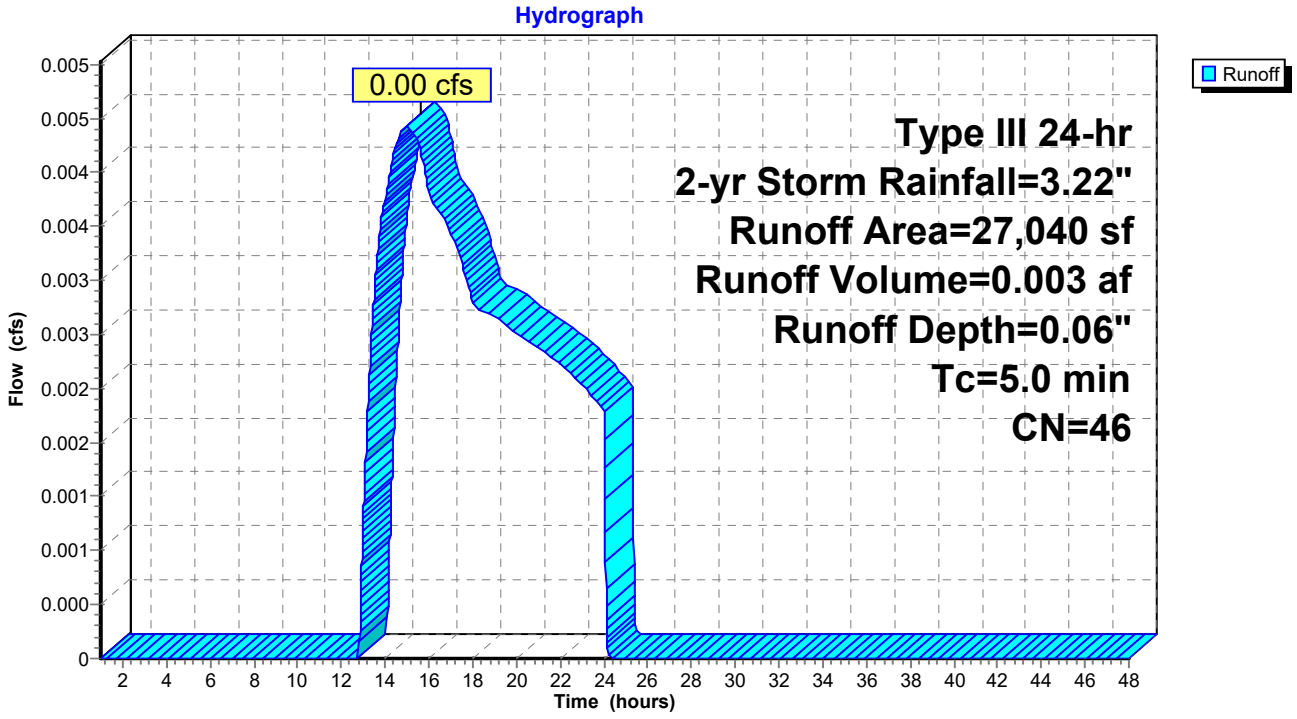
Runoff = 0.00 cfs @ 14.99 hrs, Volume= 0.003 af, Depth= 0.06"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
*	3,240	96	Gravel
	23,800	39	Pasture/grassland/range, Good, HSG A
	27,040	46	Weighted Average
	27,040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-1D: SC-1D BERM



Summary for Subcatchment SC-2: Silver Street

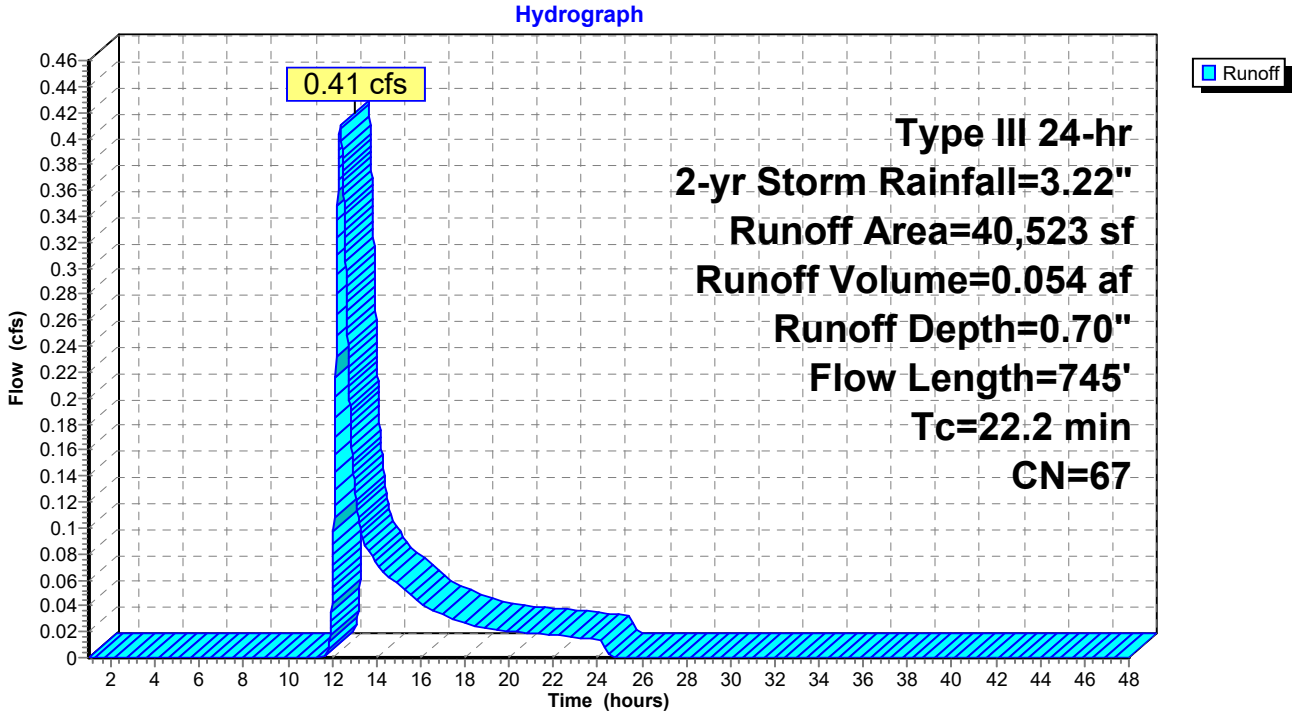
Runoff = 0.41 cfs @ 12.36 hrs, Volume= 0.054 af, Depth= 0.70"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

Area (sf)	CN	Description
15,815	98	Paved parking, HSG A
21,395	39	Pasture/grassland/range, Good, HSG A
3,313	98	Roofs, HSG A
40,523	67	Weighted Average
21,395		52.80% Pervious Area
19,128		47.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	100	0.0200	0.17		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
12.4	645	0.0029	0.87		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
22.2	745	Total			

Subcatchment SC-2: Silver Street



Summary for Subcatchment SC-3: Southwest

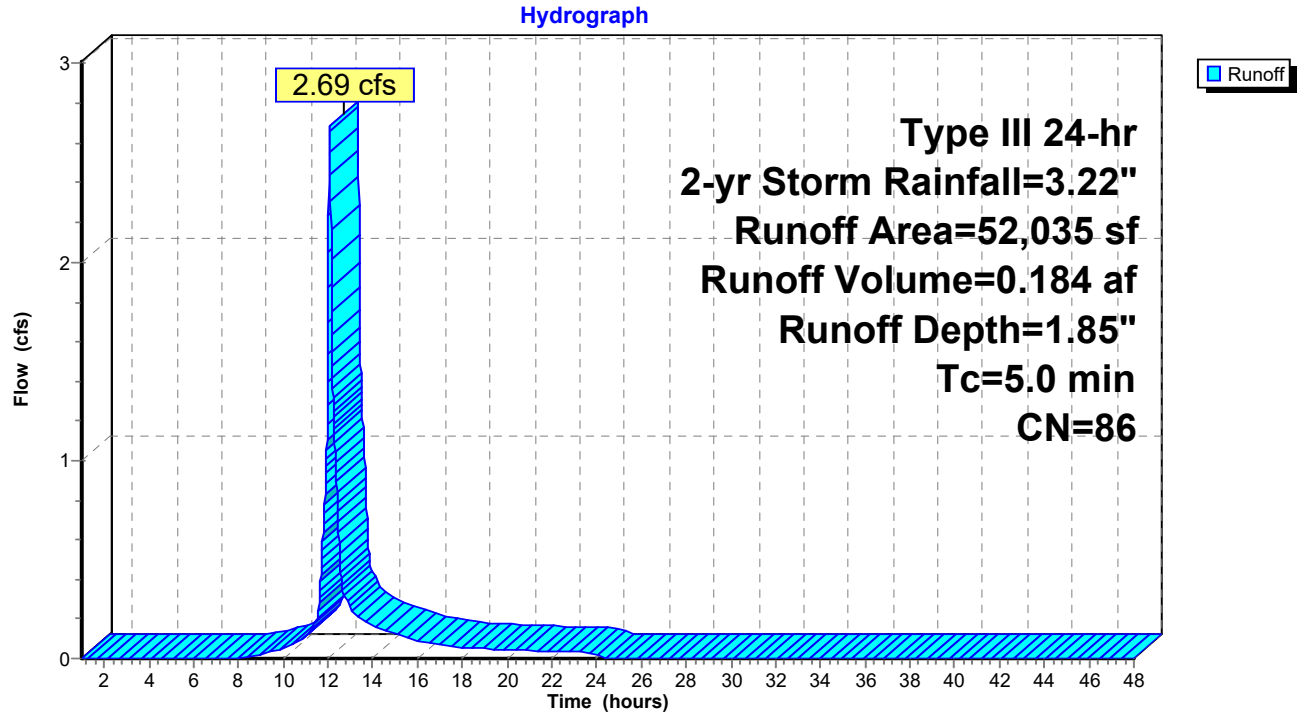
Runoff = 2.69 cfs @ 12.07 hrs, Volume= 0.184 af, Depth= 1.85"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Storm Rainfall=3.22"

	Area (sf)	CN	Description
*	42,810	96	Gravel
	9,225	39	Pasture/grassland/range, Good, HSG A
	52,035	86	Weighted Average
	52,035		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-3: Southwest



Summary for Pond 1P: POND

Inflow Area = 6.915 ac, 4.18% Impervious, Inflow Depth = 1.98" for 2-yr Storm event
Inflow = 10.18 cfs @ 12.32 hrs, Volume= 1.143 af
Outflow = 8.87 cfs @ 12.44 hrs, Volume= 1.075 af, Atten= 13%, Lag= 7.5 min
Primary = 8.87 cfs @ 12.44 hrs, Volume= 1.075 af
Routed to Link AP-1 : AP-1

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 181.05' @ 12.44 hrs Surf.Area= 4,851 sf Storage= 8,847 cf

Plug-Flow detention time= 71.5 min calculated for 1.075 af (94% of inflow)
Center-of-Mass det. time= 39.7 min (871.2 - 831.5)

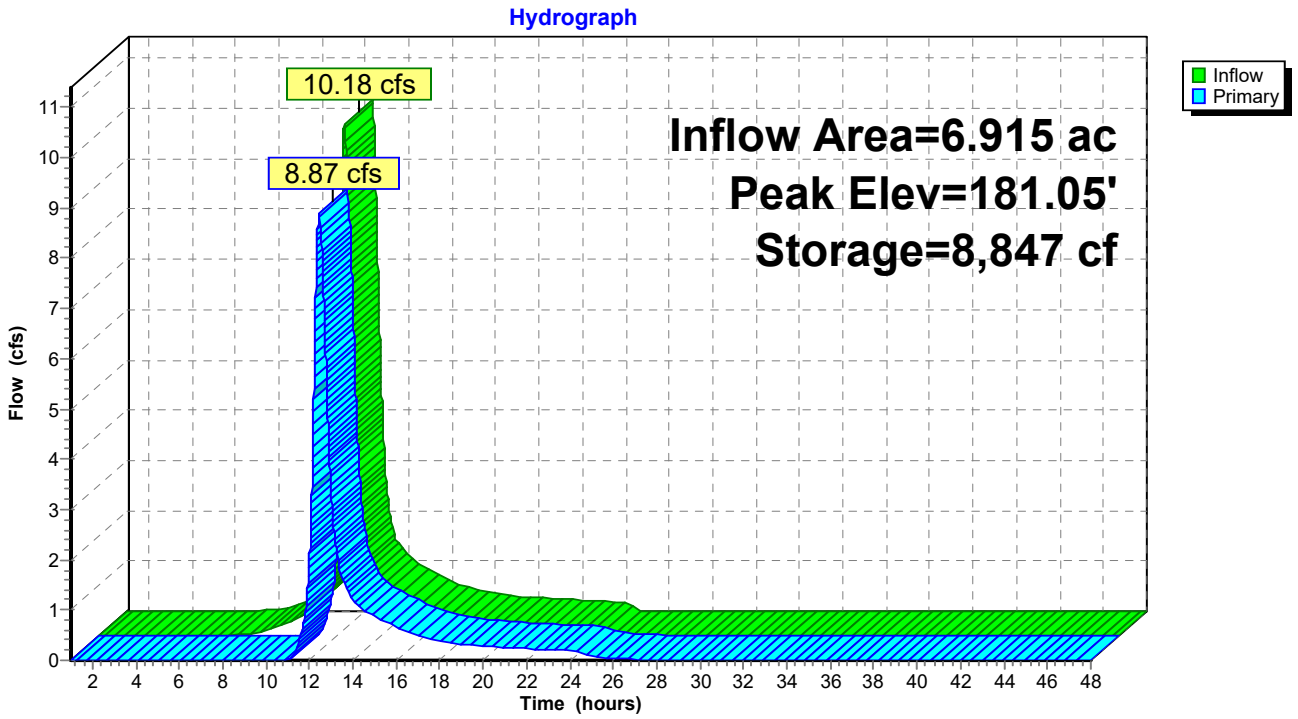
Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	17,805 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.00	1,129	0	0	1,129
179.00	2,262	1,663	1,663	2,271
180.00	3,473	2,846	4,509	3,497
181.00	4,769	4,104	8,613	4,812
182.00	6,591	5,655	14,268	6,654
182.50	7,565	3,536	17,805	7,639

Device	Routing	Invert	Outlet Devices
#1	Primary	181.50'	**6.0' long x 80.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Primary	179.50'	**15.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 179.50' / 179.20' S= 0.0150 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#3	Primary	180.00'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 180.00' / 179.80' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	180.25'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 180.25' / 180.05' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=8.87 cfs @ 12.44 hrs HW=181.05' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Inlet Controls 4.48 cfs @ 3.65 fps)
- **3=Culvert** (Barrel Controls 2.61 cfs @ 3.94 fps)
- **4=Culvert** (Barrel Controls 1.78 cfs @ 3.62 fps)

Pond 1P: POND


Hydrograph
10.18 cfs
8.87 cfs
Inflow Area=6.915 ac
Peak Elev=181.05'
Storage=8,847 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Summary for Pond 2P: Treatment Volume

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	2,943 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

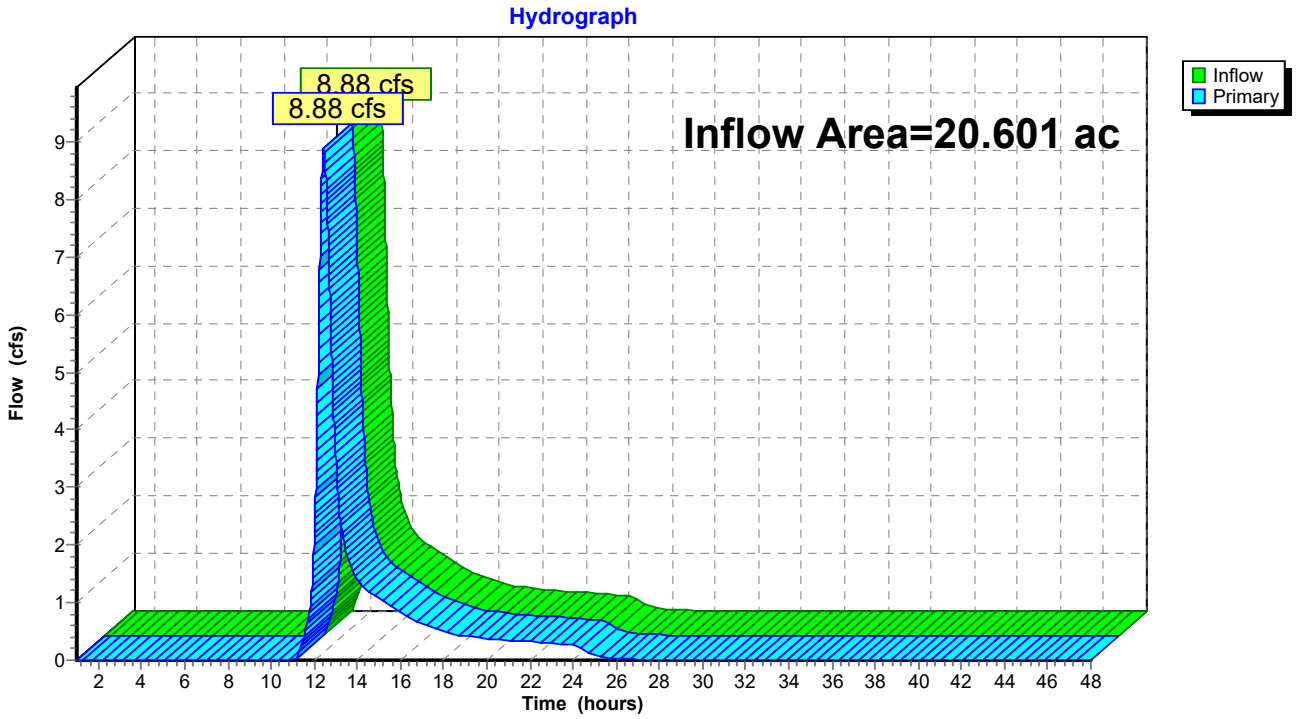
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.00	1,129	0	0	1,129
179.00	2,262	1,663	1,663	2,271
179.33	2,658	811	2,474	2,671
179.50	2,858	469	2,943	2,874

Summary for Link AP-1: AP-1

Inflow Area = 20.601 ac, 2.59% Impervious, Inflow Depth = 0.70" for 2-yr Storm event
Inflow = 8.88 cfs @ 12.44 hrs, Volume= 1.200 af
Primary = 8.88 cfs @ 12.44 hrs, Volume= 1.200 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

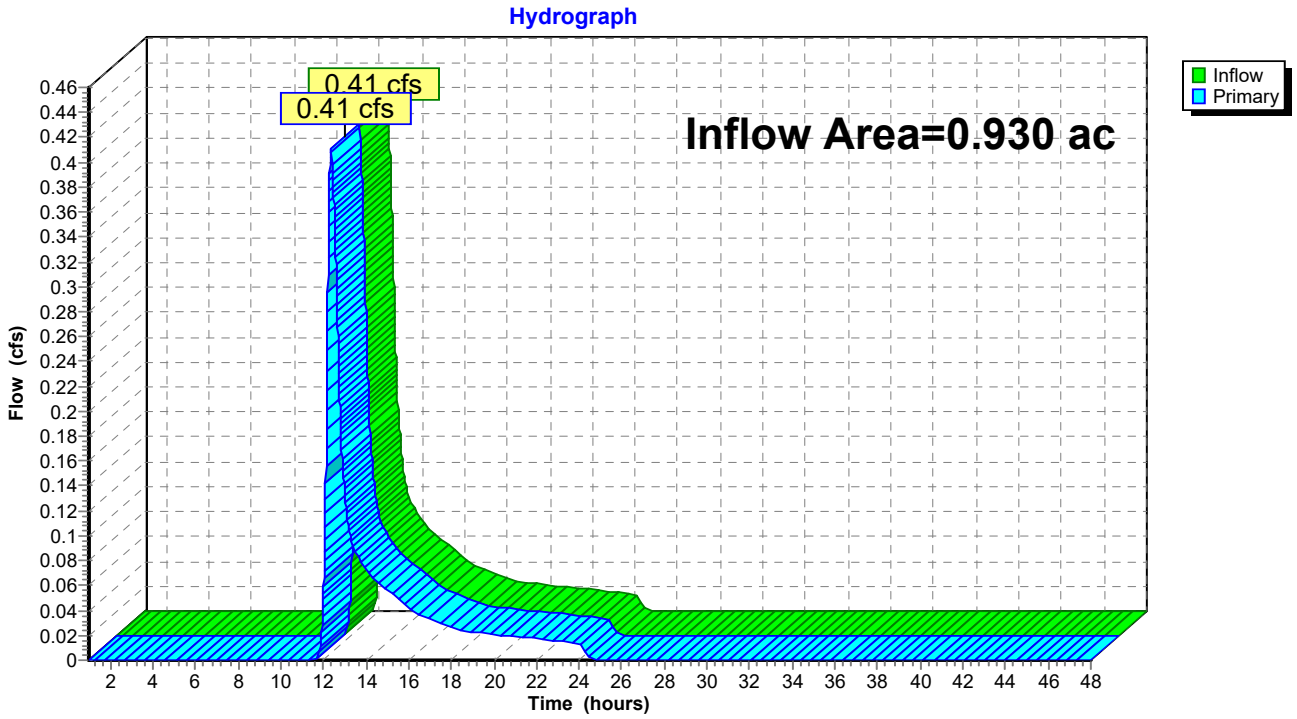


Summary for Link AP-2: AP-2

Inflow Area = 0.930 ac, 47.20% Impervious, Inflow Depth = 0.70" for 2-yr Storm event
Inflow = 0.41 cfs @ 12.36 hrs, Volume= 0.054 af
Primary = 0.41 cfs @ 12.36 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2

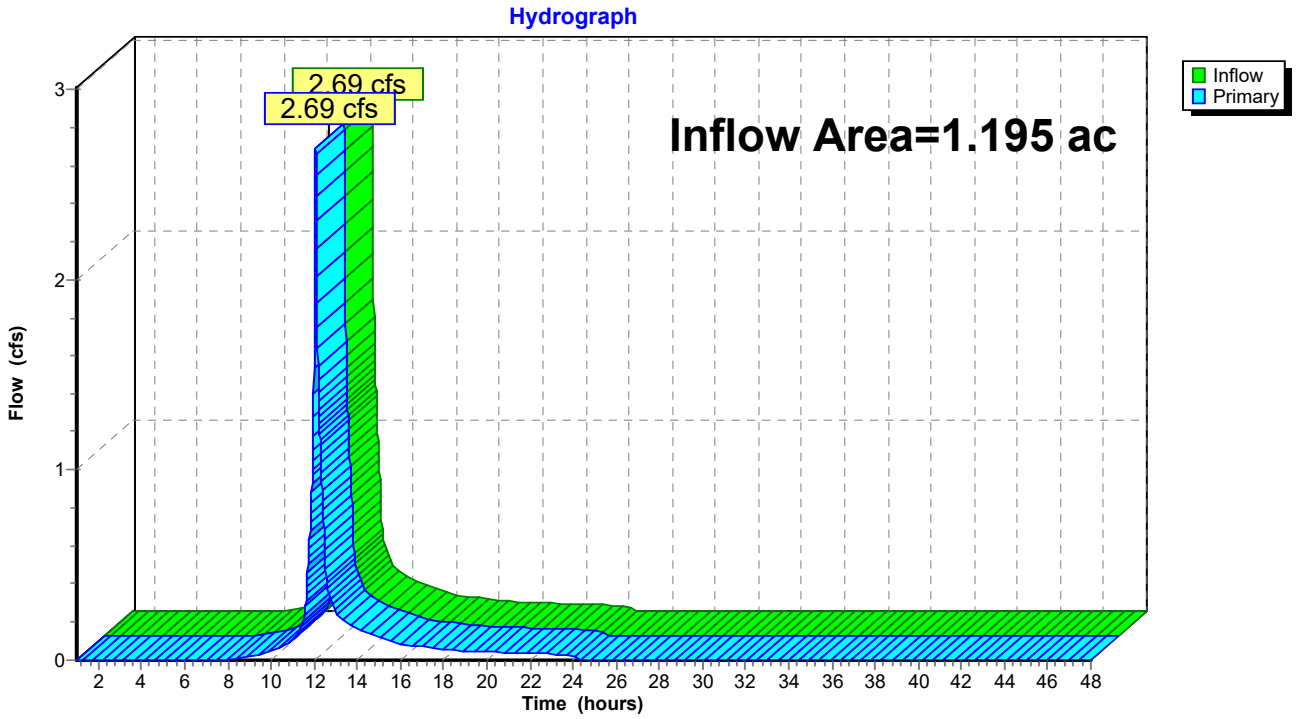


Summary for Link AP-3: AP-3

Inflow Area = 1.195 ac, 0.00% Impervious, Inflow Depth = 1.85" for 2-yr Storm event
Inflow = 2.69 cfs @ 12.07 hrs, Volume= 0.184 af
Primary = 2.69 cfs @ 12.07 hrs, Volume= 0.184 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-3: AP-3



Time span=1.00-48.00 hrs, dt=0.01 hrs, 4701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1A: SC-1A NORTH Runoff Area=108,252 sf 3.51% Impervious Runoff Depth=3.53"
Flow Length=779' Tc=22.4 min CN=85 Runoff=6.57 cfs 0.732 af

Subcatchment SC-1B: SC-1B SOUTH Runoff Area=192,960 sf 4.55% Impervious Runoff Depth=3.94"
Flow Length=901' Tc=23.4 min CN=89 Runoff=12.62 cfs 1.456 af

Subcatchment SC-1C: SC-1C SWALE Runoff Area=569,133 sf 1.87% Impervious Runoff Depth=0.71"
Flow Length=896' Tc=30.9 min CN=49 Runoff=4.11 cfs 0.774 af

Subcatchment SC-1D: SC-1D BERM Runoff Area=27,040 sf 0.00% Impervious Runoff Depth=0.55"
Tc=5.0 min CN=46 Runoff=0.19 cfs 0.028 af

Subcatchment SC-2: Silver Street Runoff Area=40,523 sf 47.20% Impervious Runoff Depth=1.93"
Flow Length=745' Tc=22.2 min CN=67 Runoff=1.31 cfs 0.150 af

Subcatchment SC-3: Southwest Runoff Area=52,035 sf 0.00% Impervious Runoff Depth=3.64"
Tc=5.0 min CN=86 Runoff=5.19 cfs 0.362 af

Pond 1P: POND Peak Elev=181.81' Storage=13,066 cf Inflow=19.18 cfs 2.188 af
Outflow=17.07 cfs 2.121 af

Pond 2P: Treatment Volume Peak Elev=0.00' Storage=0 cf

Link AP-1: AP-1 Inflow=20.73 cfs 2.923 af
Primary=20.73 cfs 2.923 af

Link AP-2: AP-2 Inflow=1.31 cfs 0.150 af
Primary=1.31 cfs 0.150 af

Link AP-3: AP-3 Inflow=5.19 cfs 0.362 af
Primary=5.19 cfs 0.362 af

Total Runoff Area = 22.726 ac Runoff Volume = 3.502 af Average Runoff Depth = 1.85"
95.72% Pervious = 21.753 ac 4.28% Impervious = 0.973 ac

Summary for Subcatchment SC-1A: SC-1A NORTH

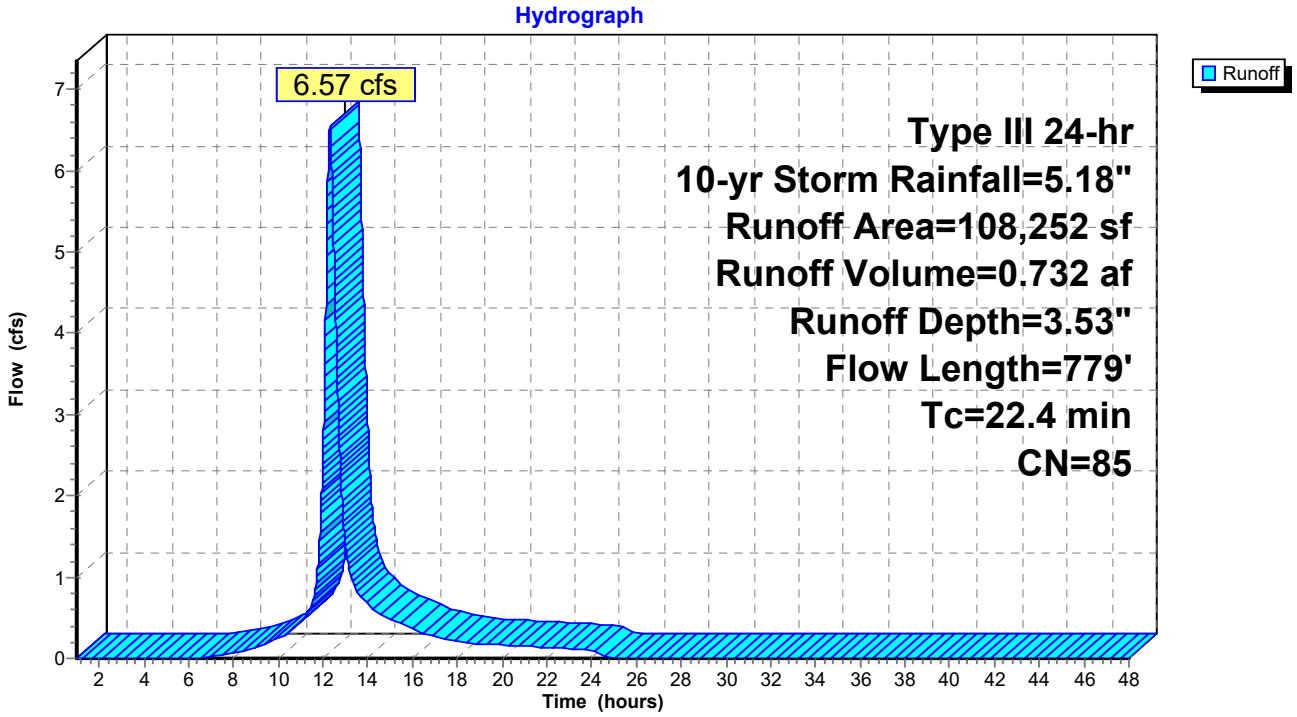
Runoff = 6.57 cfs @ 12.30 hrs, Volume= 0.732 af, Depth= 3.53"
Routed to Pond 1P : POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
*	84,355	96	Gravel
	20,100	39	Pasture/grassland/range, Good, HSG A
	3,797	98	Paved parking, HSG A
	108,252	85	Weighted Average
	104,455		96.49% Pervious Area
	3,797		3.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.7	157	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.6	385	0.0120	1.76		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
2.2	137	0.0220	1.04		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
22.4	779	Total			

Subcatchment SC-1A: SC-1A NORTH



Summary for Subcatchment SC-1B: SC-1B SOUTH

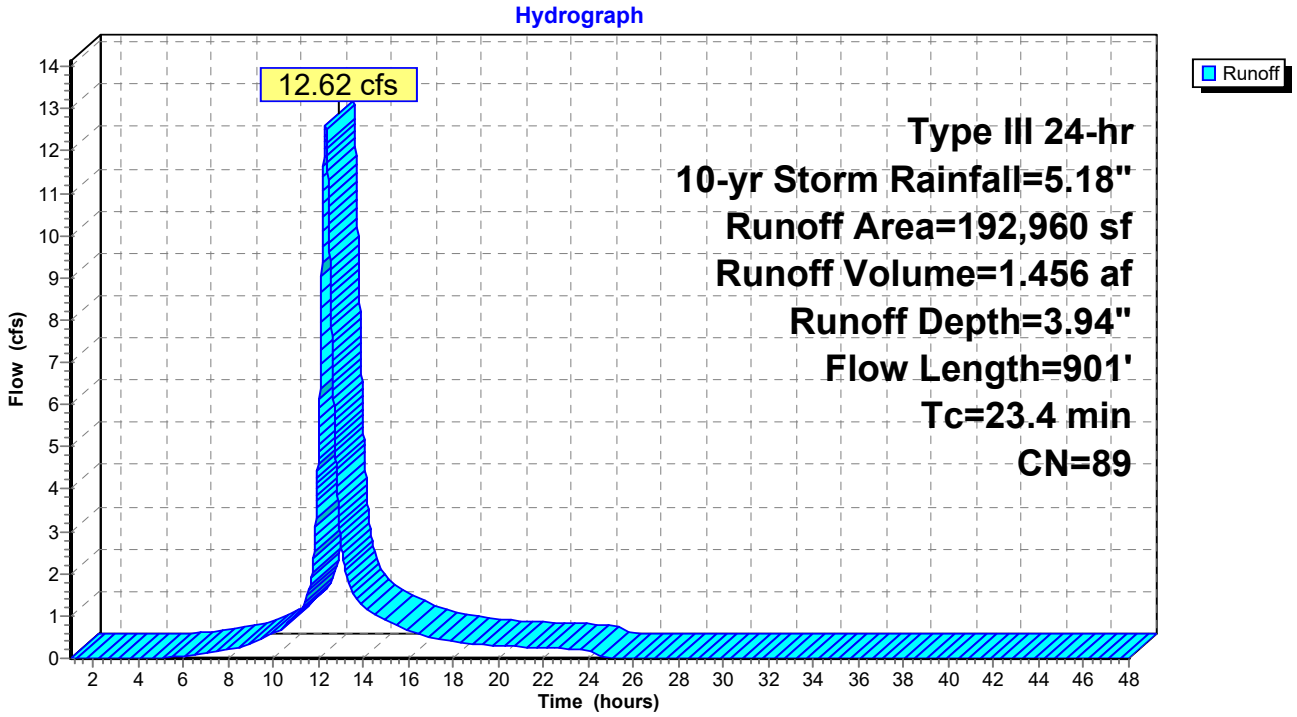
Runoff = 12.62 cfs @ 12.30 hrs, Volume= 1.456 af, Depth= 3.94"
Routed to Pond 1P : POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
*	160,517	96	Gravel
	23,663	39	Pasture/grassland/range, Good, HSG A
	8,780	98	Roofs, HSG A
	192,960	89	Weighted Average
	184,180		95.45% Pervious Area
	8,780		4.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
0.8	88	0.0090	1.93		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
1.3	61	0.0120	0.77		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
4.4	450	0.0110	1.69		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
4.0	202	0.0148	0.85		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
23.4	901	Total			

Subcatchment SC-1B: SC-1B SOUTH



Summary for Subcatchment SC-1C: SC-1C SWALE

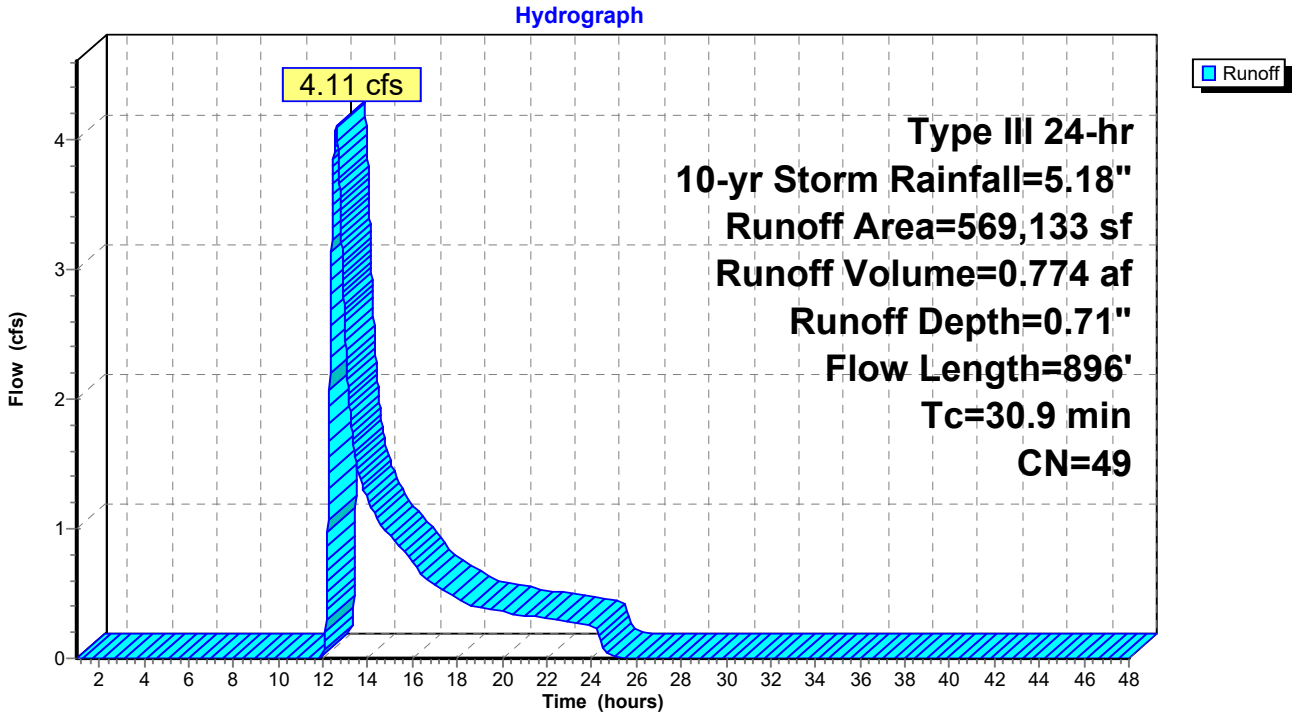
Runoff = 4.11 cfs @ 12.57 hrs, Volume= 0.774 af, Depth= 0.71"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
	237,073	39	Pasture/grassland/range, Good, HSG A
	200,629	30	Woods, Good, HSG A
	2,585	98	Paved parking, HSG A
*	120,760	96	Gravel
	8,086	98	Roofs, HSG A
	569,133	49	Weighted Average
	558,462		98.13% Pervious Area
	10,671		1.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0050	0.10		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
6.9	474	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
3.2	122	0.0080	0.63		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
3.8	200	0.0300	0.87		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
30.9	896	Total			

Subcatchment SC-1C: SC-1C SWALE



Summary for Subcatchment SC-1D: SC-1D BERM

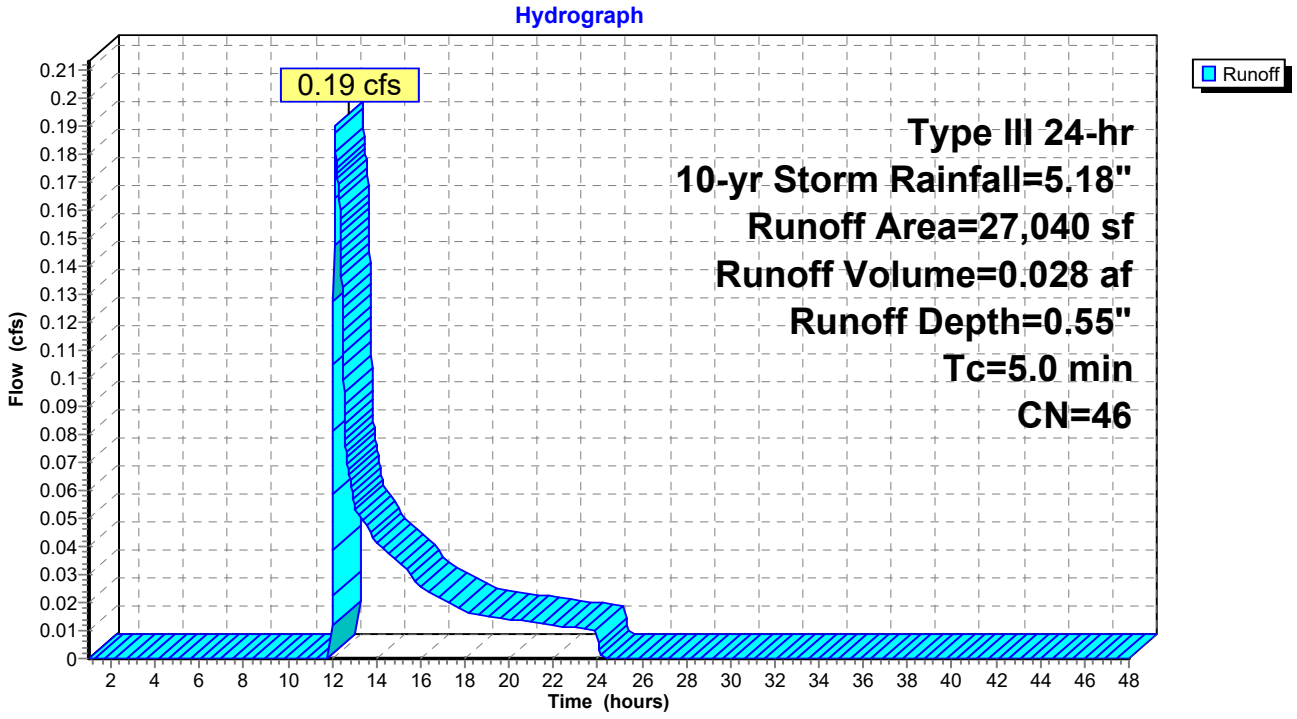
Runoff = 0.19 cfs @ 12.13 hrs, Volume= 0.028 af, Depth= 0.55"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
*	3,240	96	Gravel
	23,800	39	Pasture/grassland/range, Good, HSG A
	27,040	46	Weighted Average
	27,040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-1D: SC-1D BERM



Summary for Subcatchment SC-2: Silver Street

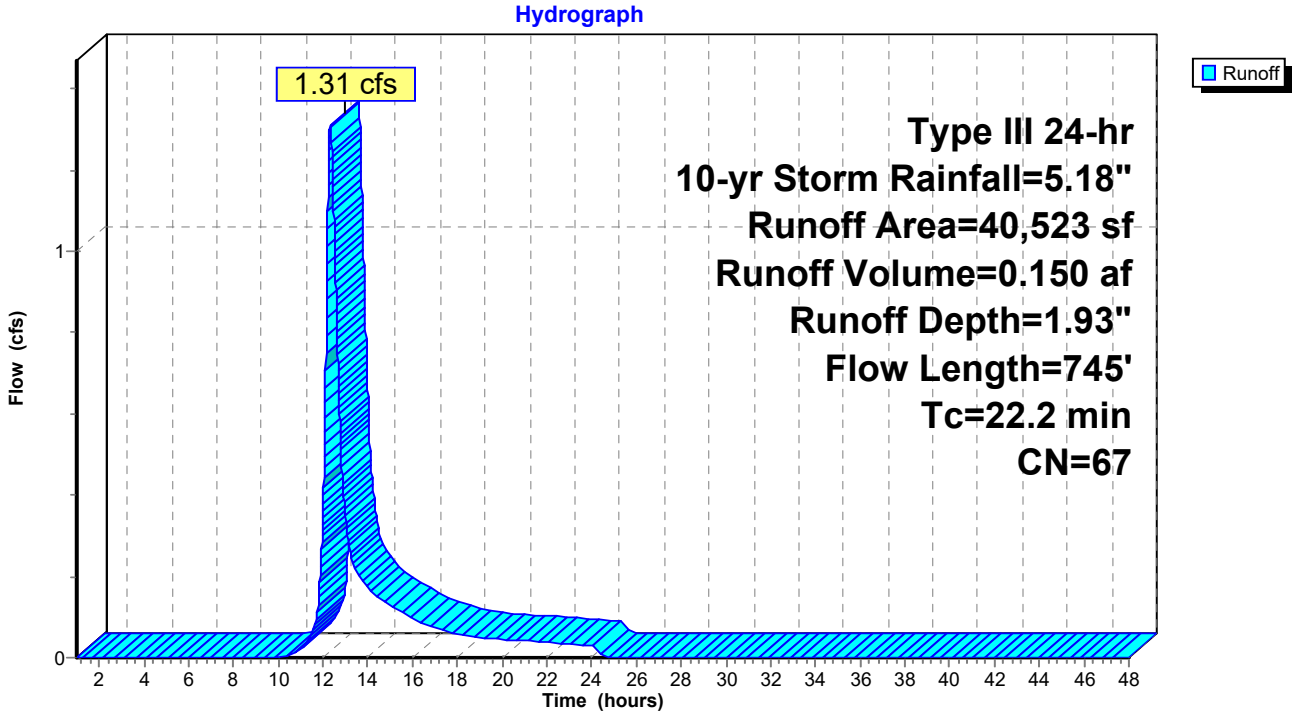
Runoff = 1.31 cfs @ 12.32 hrs, Volume= 0.150 af, Depth= 1.93"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

Area (sf)	CN	Description
15,815	98	Paved parking, HSG A
21,395	39	Pasture/grassland/range, Good, HSG A
3,313	98	Roofs, HSG A
40,523	67	Weighted Average
21,395		52.80% Pervious Area
19,128		47.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	100	0.0200	0.17		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
12.4	645	0.0029	0.87		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
22.2	745	Total			

Subcatchment SC-2: Silver Street



Summary for Subcatchment SC-3: Southwest

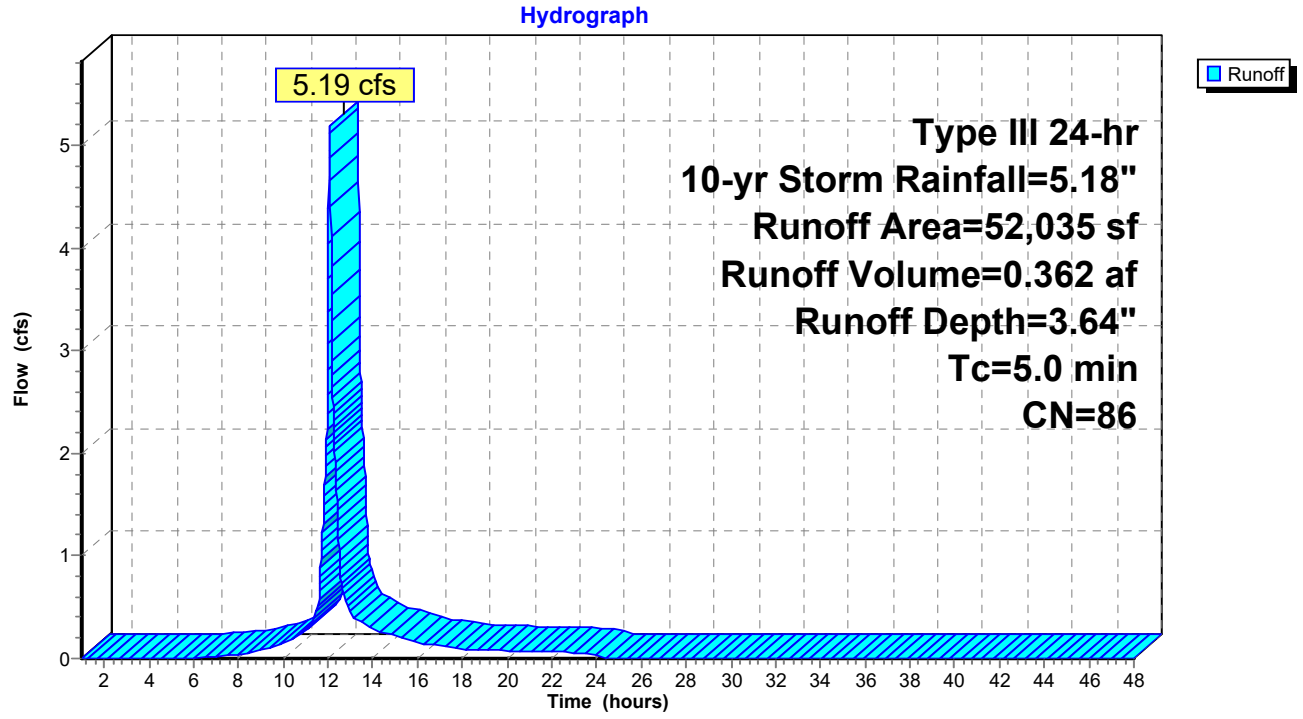
Runoff = 5.19 cfs @ 12.07 hrs, Volume= 0.362 af, Depth= 3.64"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Storm Rainfall=5.18"

	Area (sf)	CN	Description
*	42,810	96	Gravel
	9,225	39	Pasture/grassland/range, Good, HSG A
	52,035	86	Weighted Average
	52,035		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-3: Southwest



Summary for Pond 1P: POND

Inflow Area = 6.915 ac, 4.18% Impervious, Inflow Depth = 3.80" for 10-yr Storm event
Inflow = 19.18 cfs @ 12.30 hrs, Volume= 2.188 af
Outflow = 17.07 cfs @ 12.42 hrs, Volume= 2.121 af, Atten= 11%, Lag= 7.0 min
Primary = 17.07 cfs @ 12.42 hrs, Volume= 2.121 af
Routed to Link AP-1 : AP-1

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 181.81' @ 12.42 hrs Surf.Area= 6,227 sf Storage= 13,066 cf

Plug-Flow detention time= 48.3 min calculated for 2.120 af (97% of inflow)
Center-of-Mass det. time= 30.4 min (843.7 - 813.3)

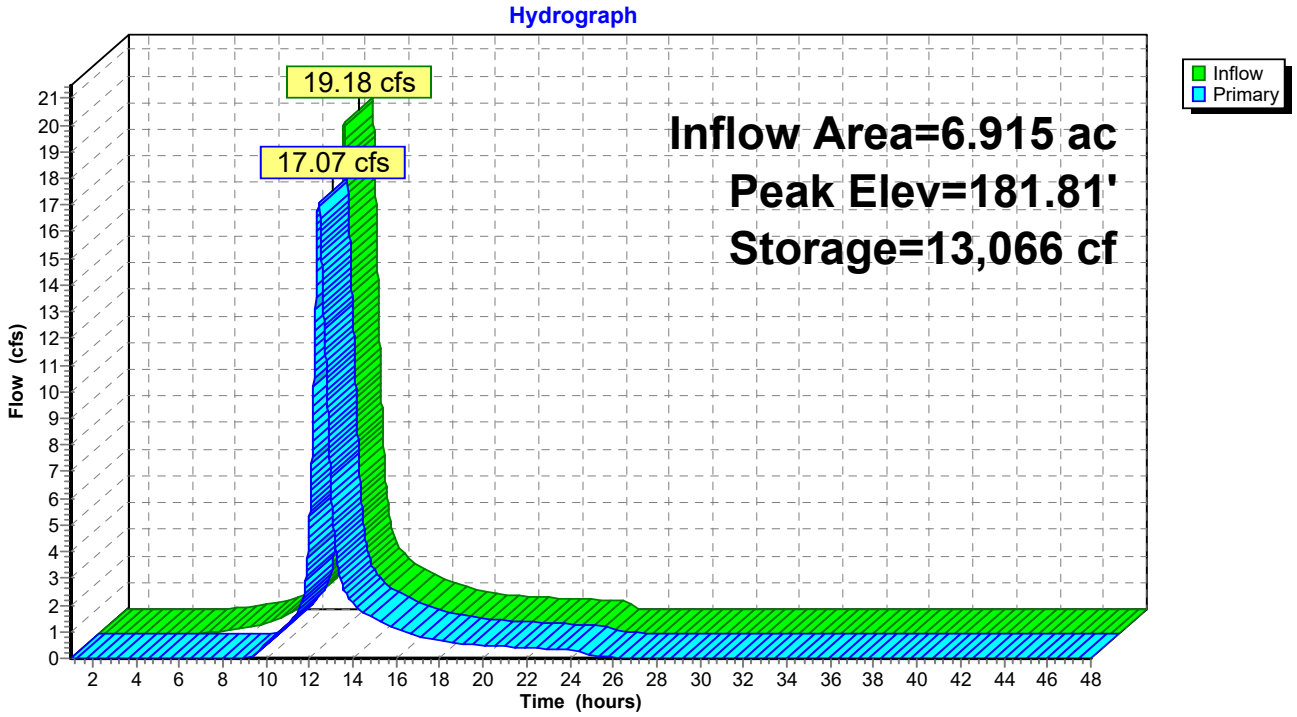
Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	17,805 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.00	1,129	0	0	1,129
179.00	2,262	1,663	1,663	2,271
180.00	3,473	2,846	4,509	3,497
181.00	4,769	4,104	8,613	4,812
182.00	6,591	5,655	14,268	6,654
182.50	7,565	3,536	17,805	7,639

Device	Routing	Invert	Outlet Devices
#1	Primary	181.50'	**6.0' long x 80.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Primary	179.50'	**15.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 179.50' / 179.20' S= 0.0150 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#3	Primary	180.00'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 180.00' / 179.80' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	180.25'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 180.25' / 180.05' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=17.07 cfs @ 12.42 hrs HW=181.81' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 2.82 cfs @ 1.50 fps)
- **2=Culvert** (Inlet Controls 6.06 cfs @ 4.94 fps)
- **3=Culvert** (Inlet Controls 4.33 cfs @ 5.52 fps)
- **4=Culvert** (Barrel Controls 3.86 cfs @ 4.91 fps)

Pond 1P: POND


Hydrograph
19.18 cfs
17.07 cfs
Inflow Area=6.915 ac
Peak Elev=181.81'
Storage=13,066 cf
Inflow
Primary
Flow (cfs)
Time (hours)

Summary for Pond 2P: Treatment Volume

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	2,943 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

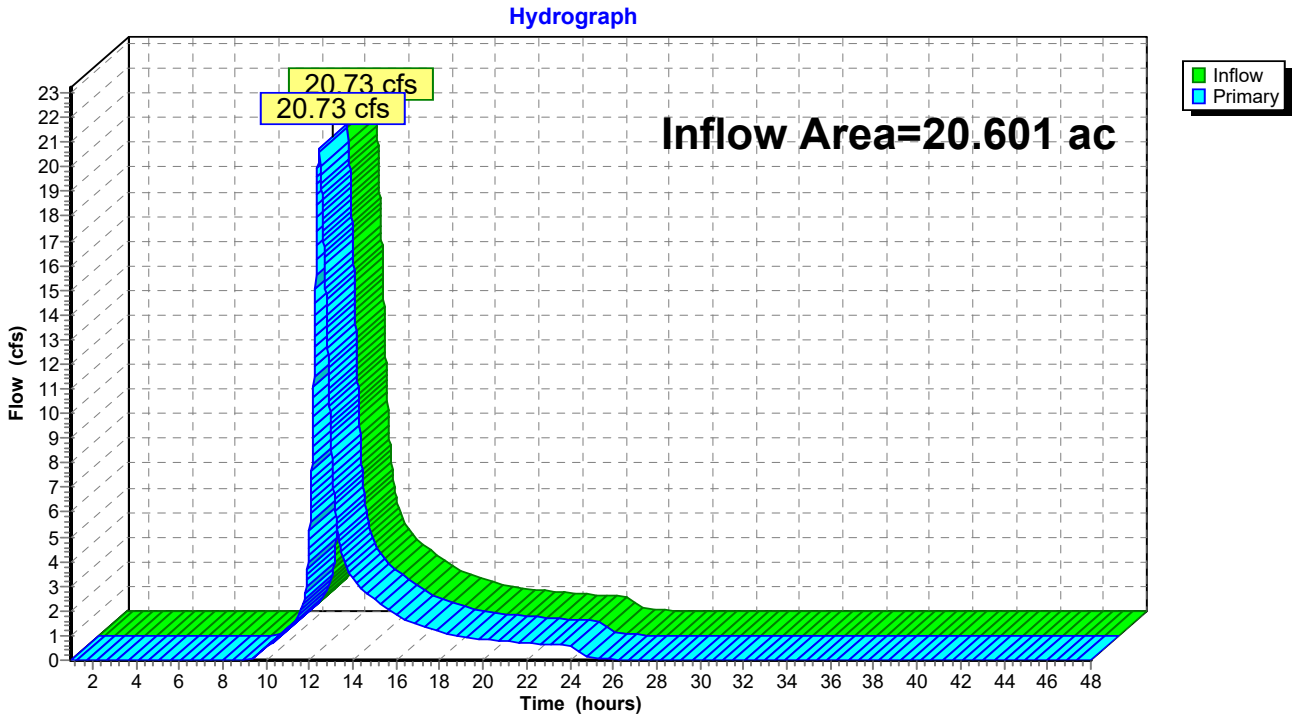
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.00	1,129	0	0	1,129
179.00	2,262	1,663	1,663	2,271
179.33	2,658	811	2,474	2,671
179.50	2,858	469	2,943	2,874

Summary for Link AP-1: AP-1

Inflow Area = 20.601 ac, 2.59% Impervious, Inflow Depth = 1.70" for 10-yr Storm event
Inflow = 20.73 cfs @ 12.44 hrs, Volume= 2.923 af
Primary = 20.73 cfs @ 12.44 hrs, Volume= 2.923 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

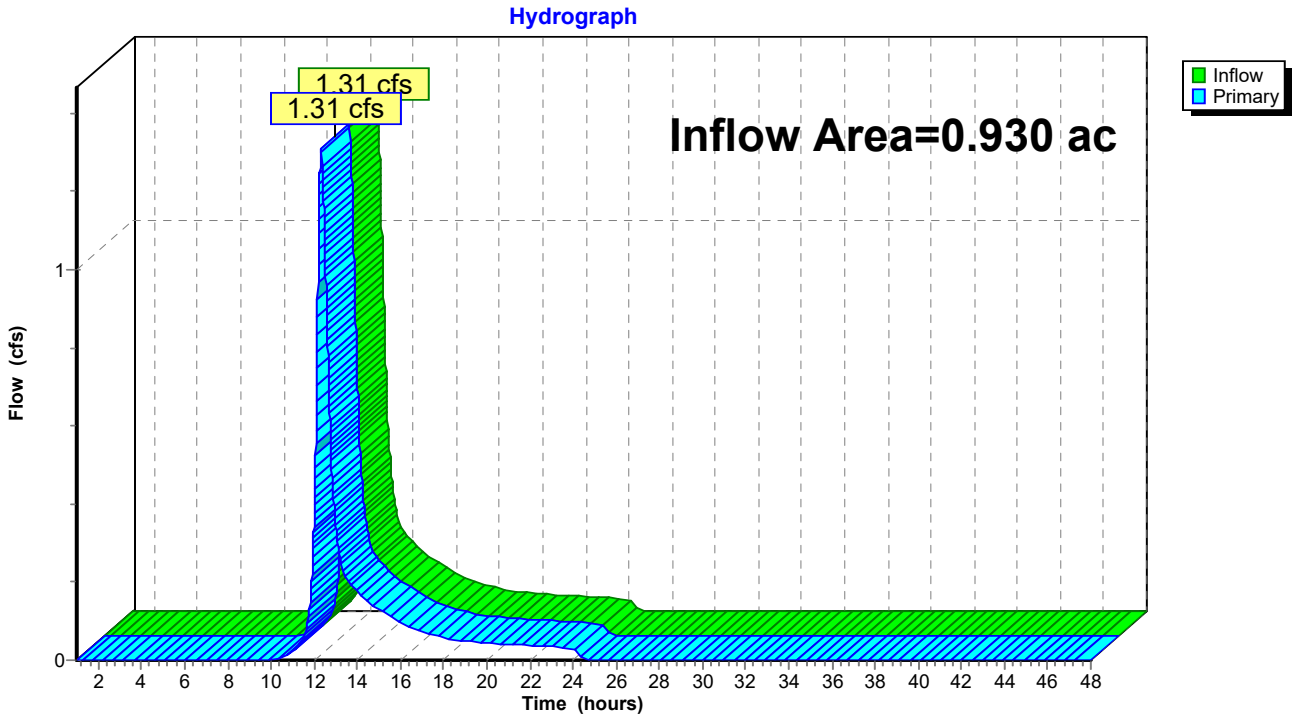


Summary for Link AP-2: AP-2

Inflow Area = 0.930 ac, 47.20% Impervious, Inflow Depth = 1.93" for 10-yr Storm event
Inflow = 1.31 cfs @ 12.32 hrs, Volume= 0.150 af
Primary = 1.31 cfs @ 12.32 hrs, Volume= 0.150 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2

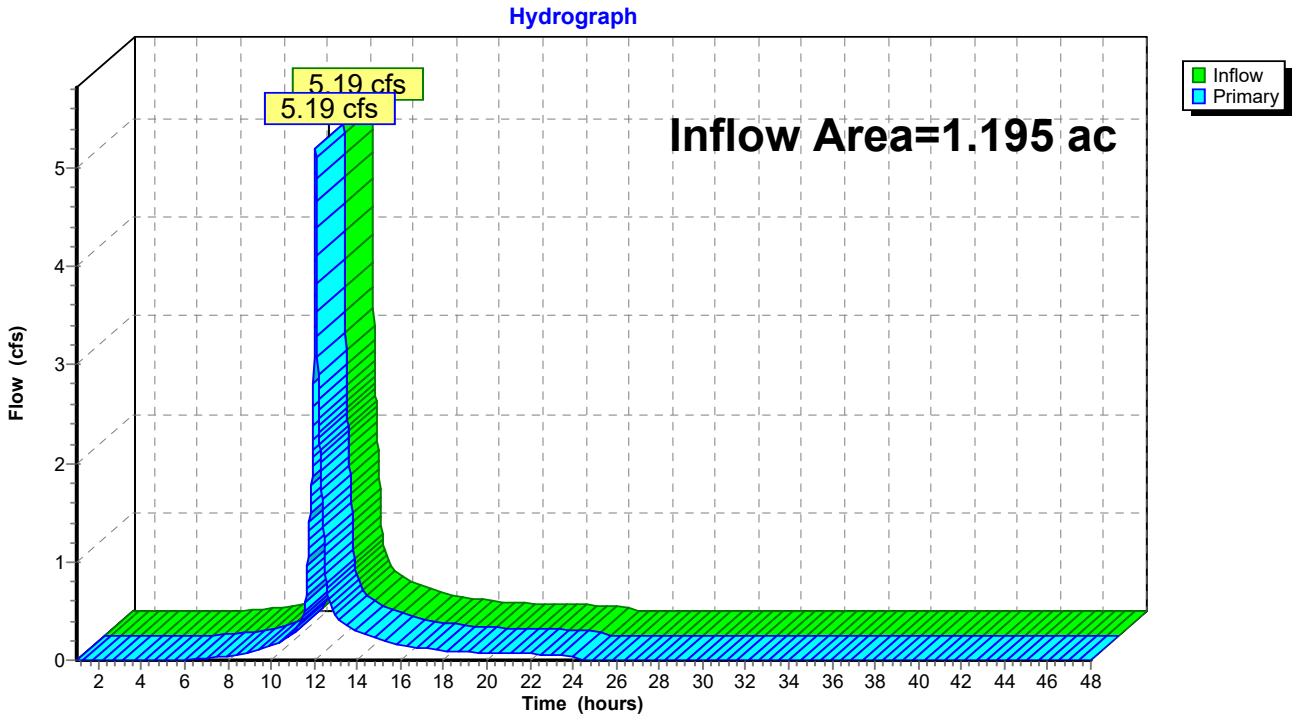


Summary for Link AP-3: AP-3

Inflow Area = 1.195 ac, 0.00% Impervious, Inflow Depth = 3.64" for 10-yr Storm event
Inflow = 5.19 cfs @ 12.07 hrs, Volume= 0.362 af
Primary = 5.19 cfs @ 12.07 hrs, Volume= 0.362 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-3: AP-3



Time span=1.00-48.00 hrs, dt=0.01 hrs, 4701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1A: SC-1A NORTH Runoff Area=108,252 sf 3.51% Impervious Runoff Depth=4.69"
Flow Length=779' Tc=22.4 min CN=85 Runoff=8.63 cfs 0.971 af

Subcatchment SC-1B: SC-1B SOUTH Runoff Area=192,960 sf 4.55% Impervious Runoff Depth=5.13"
Flow Length=901' Tc=23.4 min CN=89 Runoff=16.23 cfs 1.895 af

Subcatchment SC-1C: SC-1C SWALE Runoff Area=569,133 sf 1.87% Impervious Runoff Depth=1.27"
Flow Length=896' Tc=30.9 min CN=49 Runoff=8.86 cfs 1.384 af

Subcatchment SC-1D: SC-1D BERM Runoff Area=27,040 sf 0.00% Impervious Runoff Depth=1.04"
Tc=5.0 min CN=46 Runoff=0.56 cfs 0.054 af

Subcatchment SC-2: Silver Street Runoff Area=40,523 sf 47.20% Impervious Runoff Depth=2.84"
Flow Length=745' Tc=22.2 min CN=67 Runoff=1.98 cfs 0.220 af

Subcatchment SC-3: Southwest Runoff Area=52,035 sf 0.00% Impervious Runoff Depth=4.80"
Tc=5.0 min CN=86 Runoff=6.78 cfs 0.478 af

Pond 1P: POND Peak Elev=182.08' Storage=14,833 cf Inflow=24.86 cfs 2.866 af
Outflow=22.90 cfs 2.799 af

Pond 2P: Treatment Volume Peak Elev=0.00' Storage=0 cf

Link AP-1: AP-1 Inflow=31.34 cfs 4.237 af
Primary=31.34 cfs 4.237 af

Link AP-2: AP-2 Inflow=1.98 cfs 0.220 af
Primary=1.98 cfs 0.220 af

Link AP-3: AP-3 Inflow=6.78 cfs 0.478 af
Primary=6.78 cfs 0.478 af

Total Runoff Area = 22.726 ac Runoff Volume = 5.003 af Average Runoff Depth = 2.64"
95.72% Pervious = 21.753 ac 4.28% Impervious = 0.973 ac

Summary for Subcatchment SC-1A: SC-1A NORTH

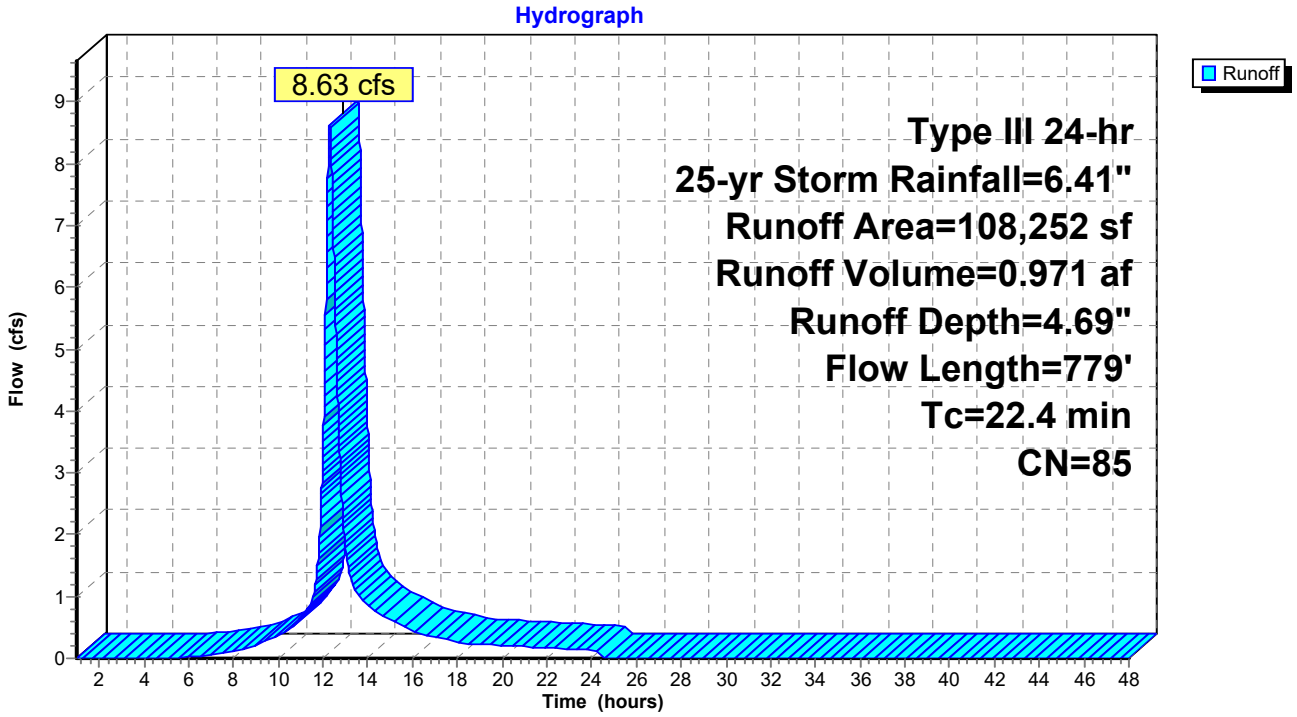
Runoff = 8.63 cfs @ 12.30 hrs, Volume= 0.971 af, Depth= 4.69"
Routed to Pond 1P : POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
*	84,355	96	Gravel
	20,100	39	Pasture/grassland/range, Good, HSG A
	3,797	98	Paved parking, HSG A
	108,252	85	Weighted Average
	104,455		96.49% Pervious Area
	3,797		3.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.7	157	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.6	385	0.0120	1.76		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
2.2	137	0.0220	1.04		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
22.4	779	Total			

Subcatchment SC-1A: SC-1A NORTH



Summary for Subcatchment SC-1B: SC-1B SOUTH

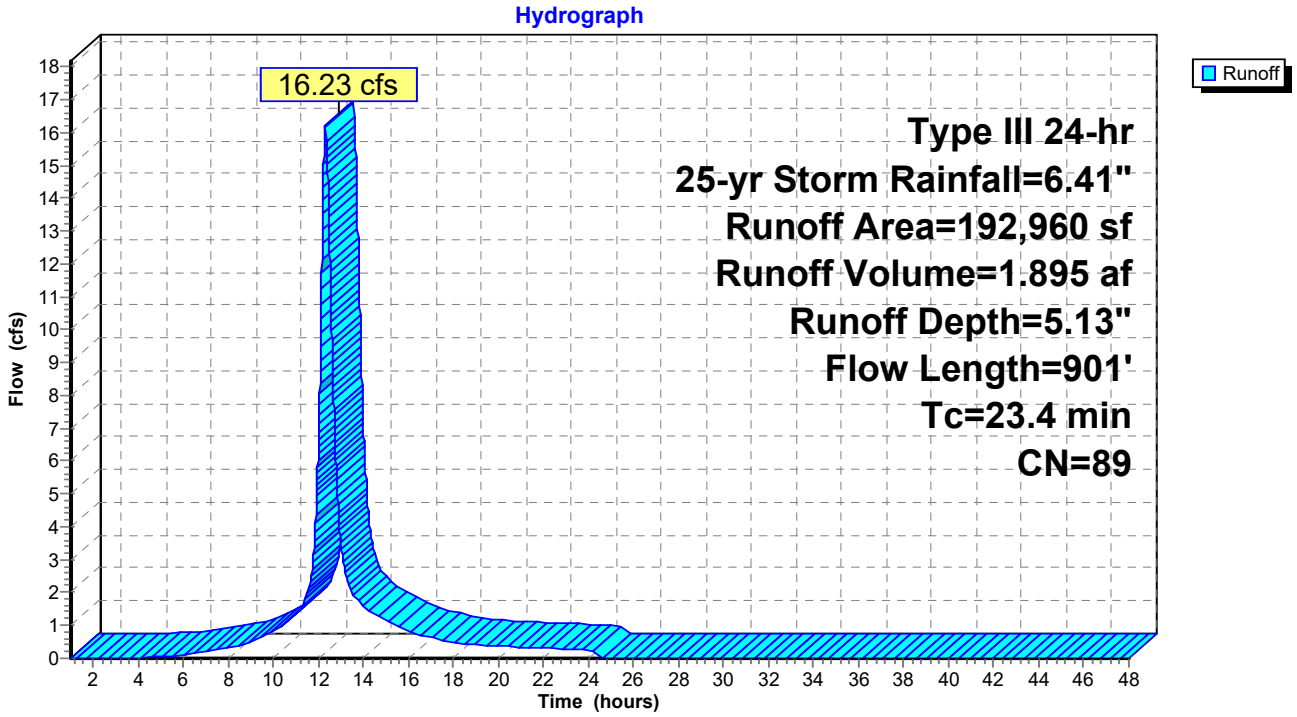
Runoff = 16.23 cfs @ 12.30 hrs, Volume= 1.895 af, Depth= 5.13"
Routed to Pond 1P : POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
*	160,517	96	Gravel
	23,663	39	Pasture/grassland/range, Good, HSG A
	8,780	98	Roofs, HSG A
	192,960	89	Weighted Average
	184,180		95.45% Pervious Area
	8,780		4.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
0.8	88	0.0090	1.93		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
1.3	61	0.0120	0.77		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
4.4	450	0.0110	1.69		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
4.0	202	0.0148	0.85		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
23.4	901	Total			

Subcatchment SC-1B: SC-1B SOUTH



Summary for Subcatchment SC-1C: SC-1C SWALE

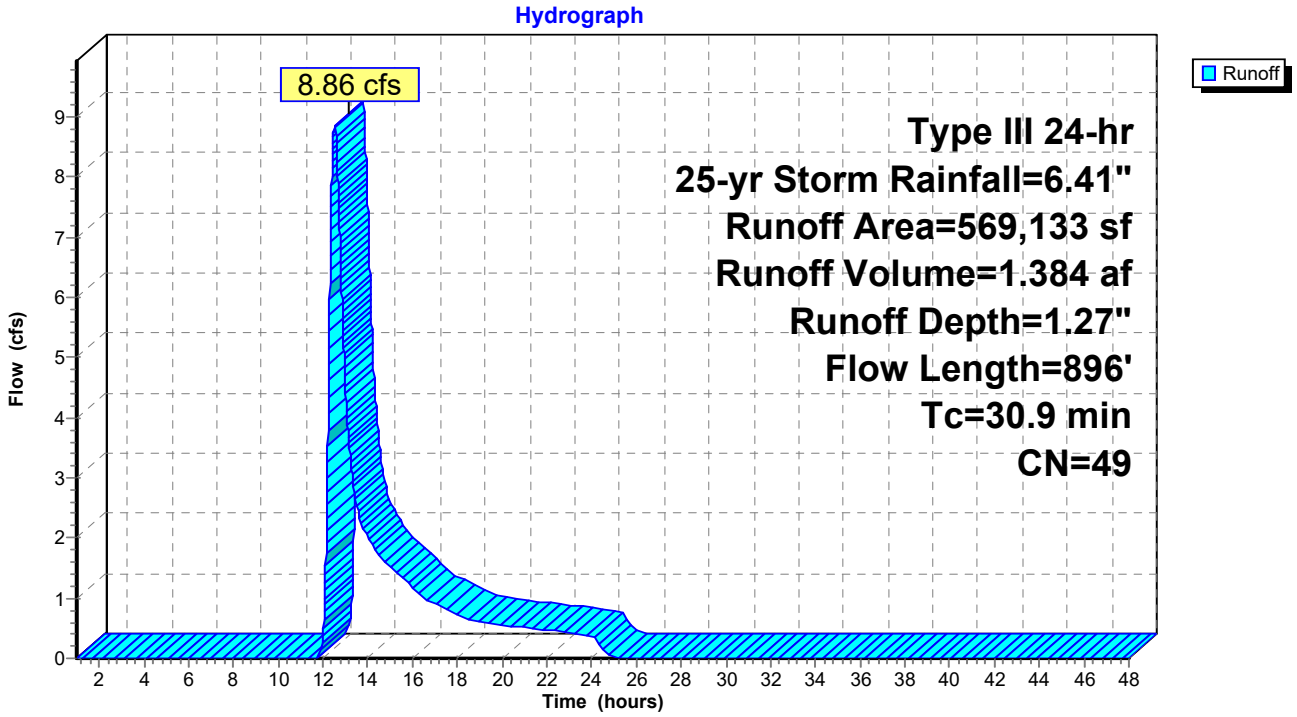
Runoff = 8.86 cfs @ 12.53 hrs, Volume= 1.384 af, Depth= 1.27"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
	237,073	39	Pasture/grassland/range, Good, HSG A
	200,629	30	Woods, Good, HSG A
	2,585	98	Paved parking, HSG A
*	120,760	96	Gravel
	8,086	98	Roofs, HSG A
	569,133	49	Weighted Average
	558,462		98.13% Pervious Area
	10,671		1.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0050	0.10		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
6.9	474	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
3.2	122	0.0080	0.63		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
3.8	200	0.0300	0.87		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
30.9	896	Total			

Subcatchment SC-1C: SC-1C SWALE



Summary for Subcatchment SC-1D: SC-1D BERM

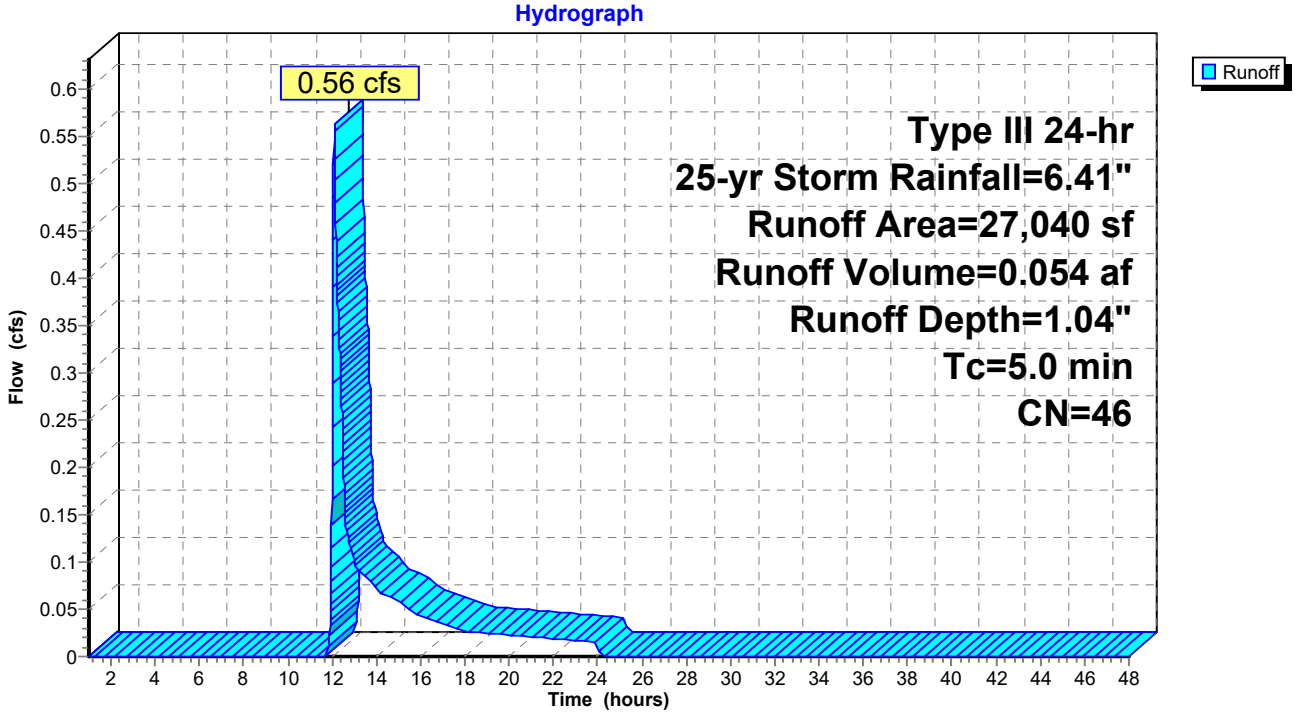
Runoff = 0.56 cfs @ 12.10 hrs, Volume= 0.054 af, Depth= 1.04"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
*	3,240	96	Gravel
	23,800	39	Pasture/grassland/range, Good, HSG A
	27,040	46	Weighted Average
	27,040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-1D: SC-1D BERM



Summary for Subcatchment SC-2: Silver Street

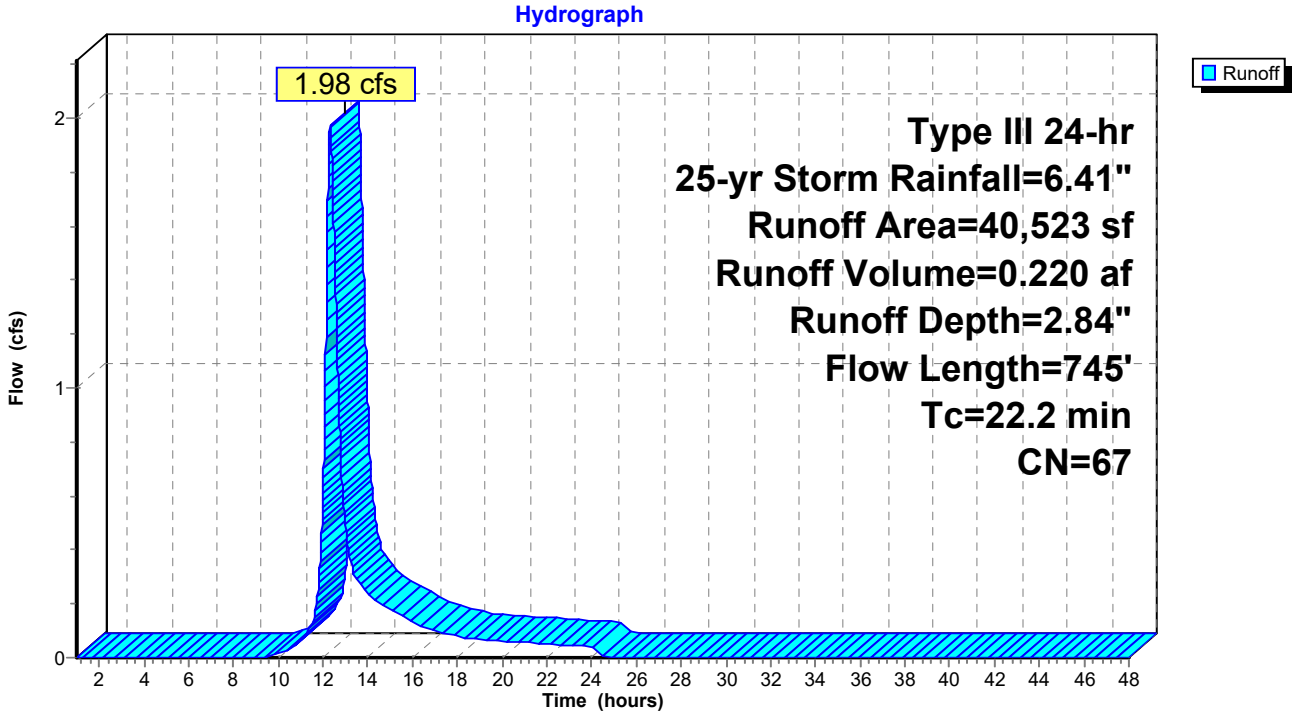
Runoff = 1.98 cfs @ 12.31 hrs, Volume= 0.220 af, Depth= 2.84"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

Area (sf)	CN	Description
15,815	98	Paved parking, HSG A
21,395	39	Pasture/grassland/range, Good, HSG A
3,313	98	Roofs, HSG A
40,523	67	Weighted Average
21,395		52.80% Pervious Area
19,128		47.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	100	0.0200	0.17		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
12.4	645	0.0029	0.87		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
22.2	745	Total			

Subcatchment SC-2: Silver Street



Summary for Subcatchment SC-3: Southwest

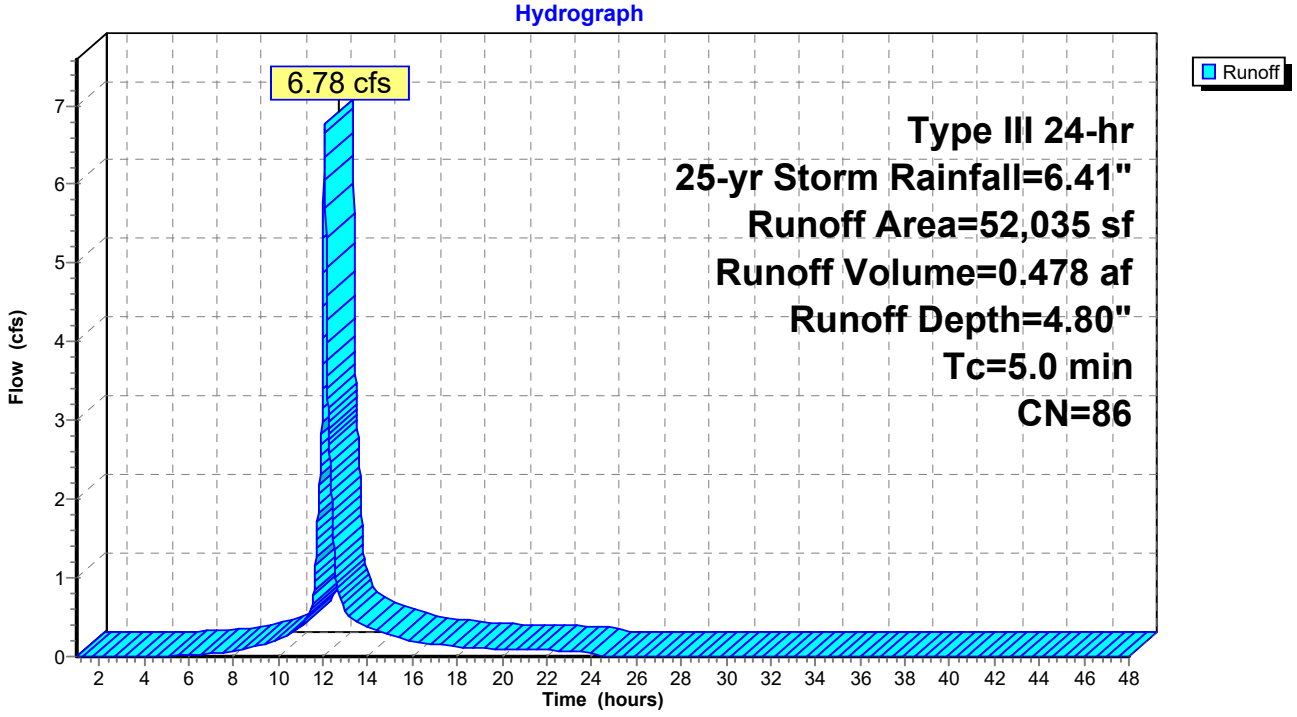
Runoff = 6.78 cfs @ 12.07 hrs, Volume= 0.478 af, Depth= 4.80"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Storm Rainfall=6.41"

	Area (sf)	CN	Description
*	42,810	96	Gravel
	9,225	39	Pasture/grassland/range, Good, HSG A
	52,035	86	Weighted Average
	52,035		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-3: Southwest



Summary for Pond 1P: POND

Inflow Area = 6.915 ac, 4.18% Impervious, Inflow Depth = 4.97" for 25-yr Storm event
Inflow = 24.86 cfs @ 12.30 hrs, Volume= 2.866 af
Outflow = 22.90 cfs @ 12.40 hrs, Volume= 2.799 af, Atten= 8%, Lag= 5.7 min
Primary = 22.90 cfs @ 12.40 hrs, Volume= 2.799 af
Routed to Link AP-1 : AP-1

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.08' @ 12.40 hrs Surf.Area= 6,751 sf Storage= 14,833 cf

Plug-Flow detention time= 41.4 min calculated for 2.799 af (98% of inflow)
Center-of-Mass det. time= 27.1 min (833.1 - 806.0)

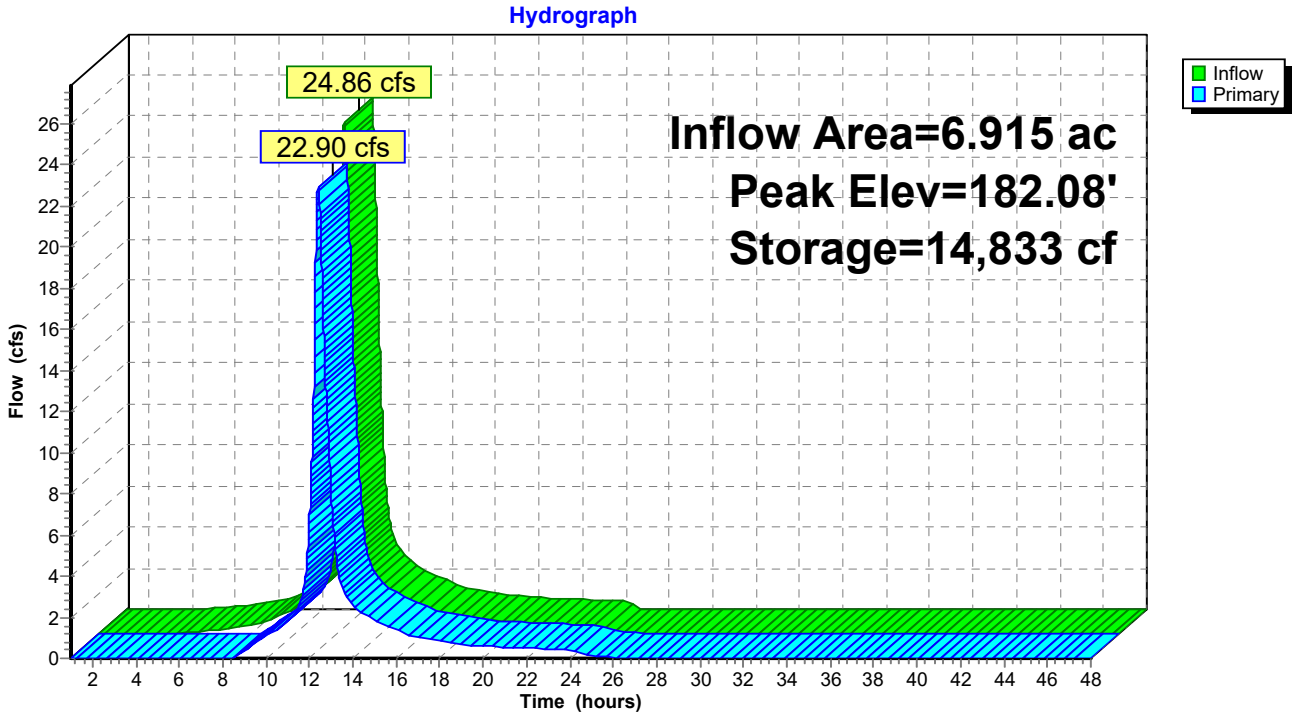
Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	17,805 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.00	1,129	0	0	1,129
179.00	2,262	1,663	1,663	2,271
180.00	3,473	2,846	4,509	3,497
181.00	4,769	4,104	8,613	4,812
182.00	6,591	5,655	14,268	6,654
182.50	7,565	3,536	17,805	7,639

Device	Routing	Invert	Outlet Devices
#1	Primary	181.50'	**6.0' long x 80.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Primary	179.50'	**15.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 179.50' / 179.20' S= 0.0150 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#3	Primary	180.00'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 180.00' / 179.80' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	180.25'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 180.25' / 180.05' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=22.90 cfs @ 12.40 hrs HW=182.08' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 7.24 cfs @ 2.06 fps)
- **2=Culvert** (Inlet Controls 6.53 cfs @ 5.32 fps)
- **3=Culvert** (Inlet Controls 4.76 cfs @ 6.06 fps)
- **4=Culvert** (Inlet Controls 4.37 cfs @ 5.56 fps)

Pond 1P: POND


Hydrograph
24.86 cfs
22.90 cfs
Inflow Area=6.915 ac
Peak Elev=182.08'
Storage=14,833 cf
Inflow
Primary
Flow (cfs)
Time (hours)

Summary for Pond 2P: Treatment Volume

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	2,943 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

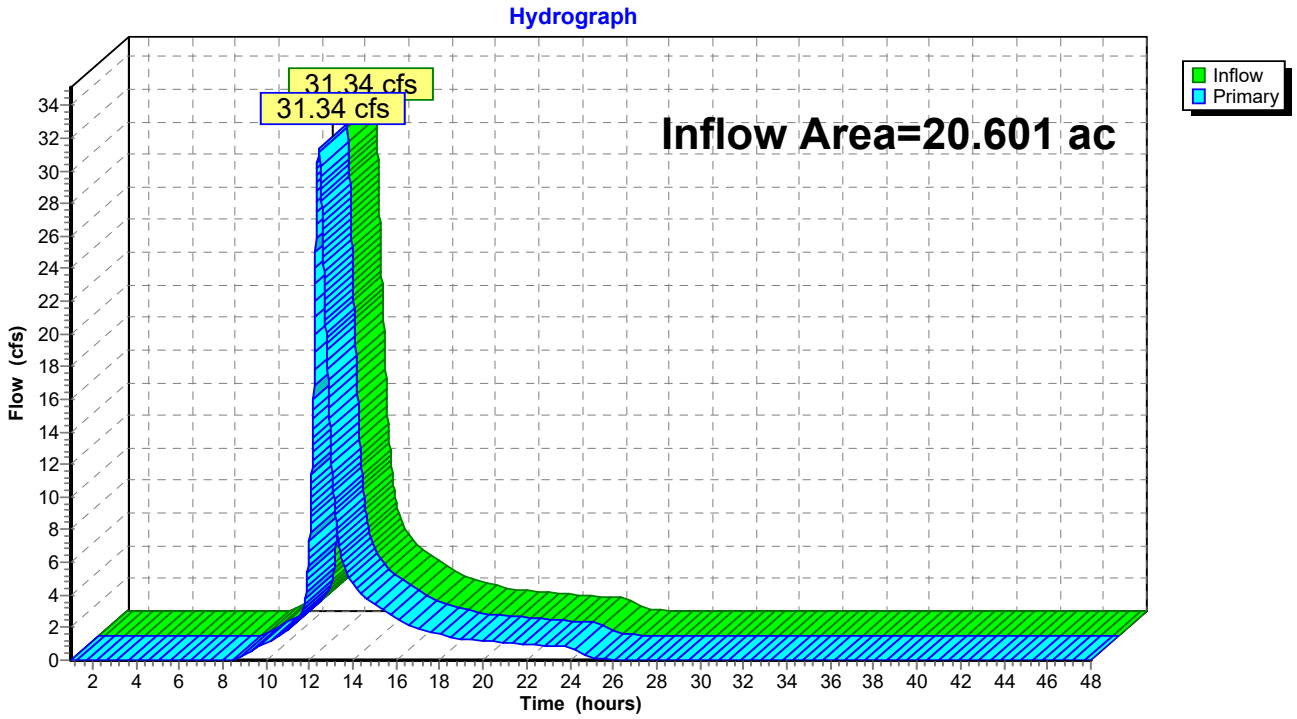
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.00	1,129	0	0	1,129
179.00	2,262	1,663	1,663	2,271
179.33	2,658	811	2,474	2,671
179.50	2,858	469	2,943	2,874

Summary for Link AP-1: AP-1

Inflow Area = 20.601 ac, 2.59% Impervious, Inflow Depth = 2.47" for 25-yr Storm event
Inflow = 31.34 cfs @ 12.42 hrs, Volume= 4.237 af
Primary = 31.34 cfs @ 12.42 hrs, Volume= 4.237 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

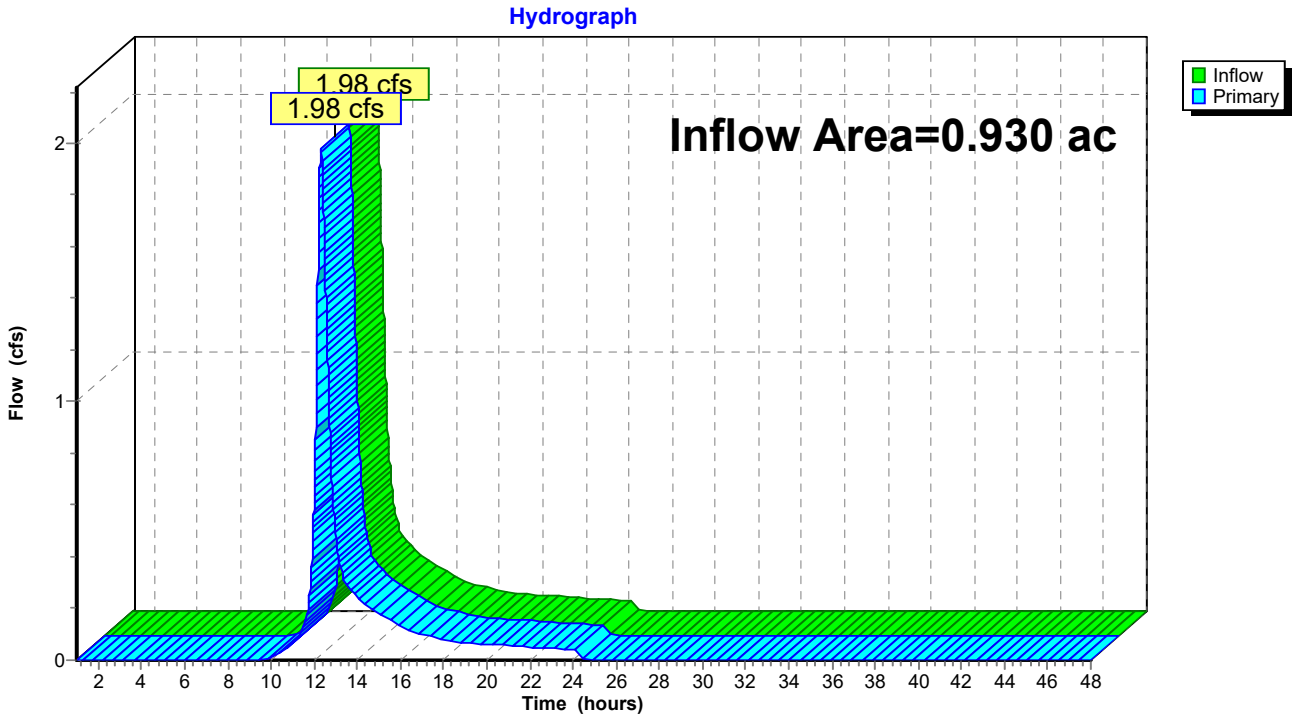


Summary for Link AP-2: AP-2

Inflow Area = 0.930 ac, 47.20% Impervious, Inflow Depth = 2.84" for 25-yr Storm event
Inflow = 1.98 cfs @ 12.31 hrs, Volume= 0.220 af
Primary = 1.98 cfs @ 12.31 hrs, Volume= 0.220 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2

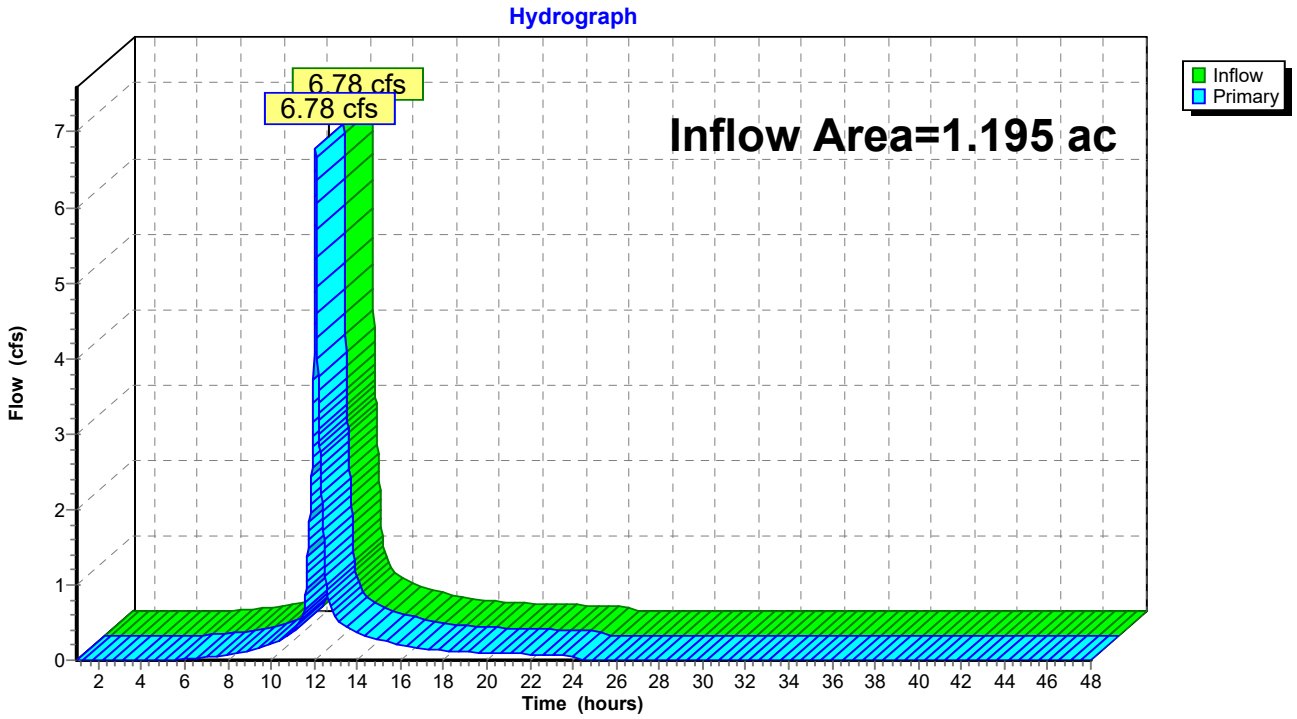


Summary for Link AP-3: AP-3

Inflow Area = 1.195 ac, 0.00% Impervious, Inflow Depth = 4.80" for 25-yr Storm event
Inflow = 6.78 cfs @ 12.07 hrs, Volume= 0.478 af
Primary = 6.78 cfs @ 12.07 hrs, Volume= 0.478 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-3: AP-3



Time span=1.00-48.00 hrs, dt=0.01 hrs, 4701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1A: SC-1A NORTH Runoff Area=108,252 sf 3.51% Impervious Runoff Depth=6.51"
Flow Length=779' Tc=22.4 min CN=85 Runoff=11.81 cfs 1.349 af

Subcatchment SC-1B: SC-1B SOUTH Runoff Area=192,960 sf 4.55% Impervious Runoff Depth=6.99"
Flow Length=901' Tc=23.4 min CN=89 Runoff=21.75 cfs 2.581 af

Subcatchment SC-1C: SC-1C SWALE Runoff Area=569,133 sf 1.87% Impervious Runoff Depth=2.33"
Flow Length=896' Tc=30.9 min CN=49 Runoff=18.22 cfs 2.539 af

Subcatchment SC-1D: SC-1D BERM Runoff Area=27,040 sf 0.00% Impervious Runoff Depth=2.01"
Tc=5.0 min CN=46 Runoff=1.33 cfs 0.104 af

Subcatchment SC-2: Silver Street Runoff Area=40,523 sf 47.20% Impervious Runoff Depth=4.38"
Flow Length=745' Tc=22.2 min CN=67 Runoff=3.08 cfs 0.340 af

Subcatchment SC-3: Southwest Runoff Area=52,035 sf 0.00% Impervious Runoff Depth=6.63"
Tc=5.0 min CN=86 Runoff=9.21 cfs 0.660 af

Pond 1P: POND Peak Elev=182.43' Storage=17,294 cf Inflow=33.57 cfs 3.929 af
Outflow=31.46 cfs 3.862 af

Pond 2P: Treatment Volume Peak Elev=0.00' Storage=0 cf

Link AP-1: AP-1 Inflow=49.43 cfs 6.505 af
Primary=49.43 cfs 6.505 af

Link AP-2: AP-2 Inflow=3.08 cfs 0.340 af
Primary=3.08 cfs 0.340 af

Link AP-3: AP-3 Inflow=9.21 cfs 0.660 af
Primary=9.21 cfs 0.660 af

Total Runoff Area = 22.726 ac Runoff Volume = 7.572 af Average Runoff Depth = 4.00"
95.72% Pervious = 21.753 ac 4.28% Impervious = 0.973 ac

Summary for Subcatchment SC-1A: SC-1A NORTH

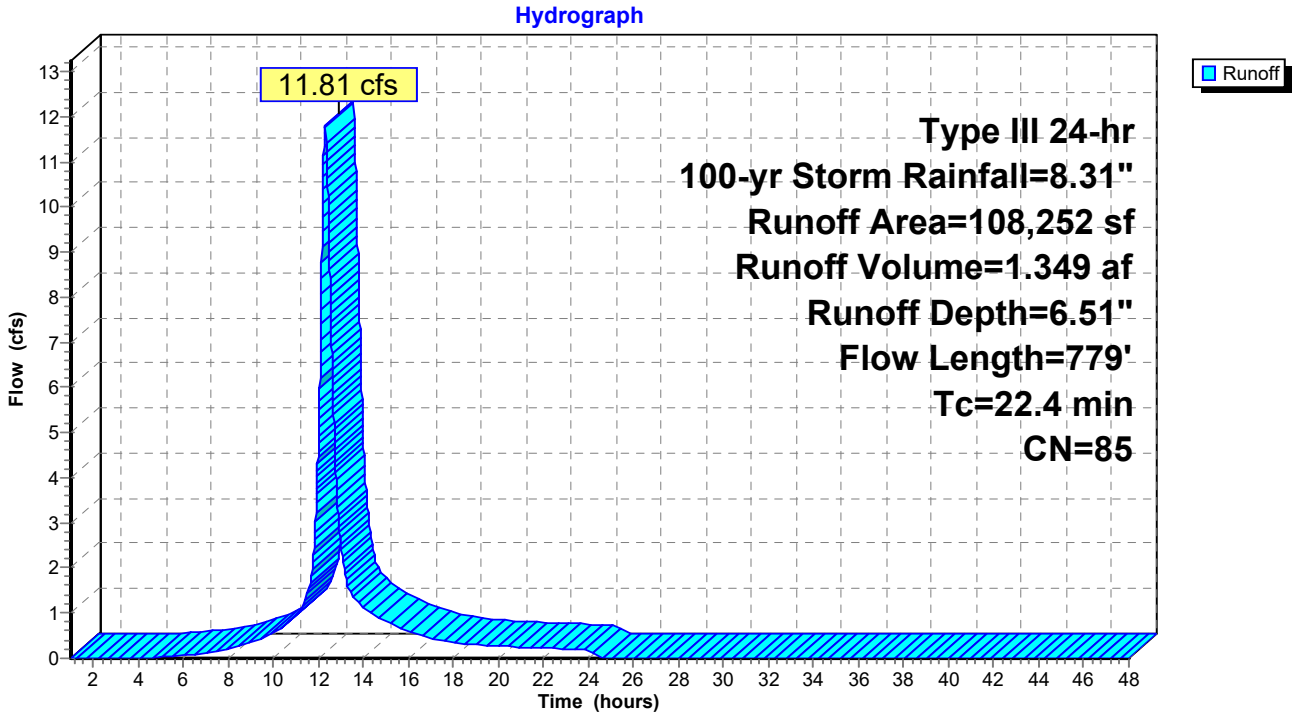
Runoff = 11.81 cfs @ 12.30 hrs, Volume= 1.349 af, Depth= 6.51"
Routed to Pond 1P : POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
*	84,355	96	Gravel
	20,100	39	Pasture/grassland/range, Good, HSG A
	3,797	98	Paved parking, HSG A
	108,252	85	Weighted Average
	104,455		96.49% Pervious Area
	3,797		3.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
3.7	157	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.6	385	0.0120	1.76		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
2.2	137	0.0220	1.04		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
22.4	779	Total			

Subcatchment SC-1A: SC-1A NORTH



Summary for Subcatchment SC-1B: SC-1B SOUTH

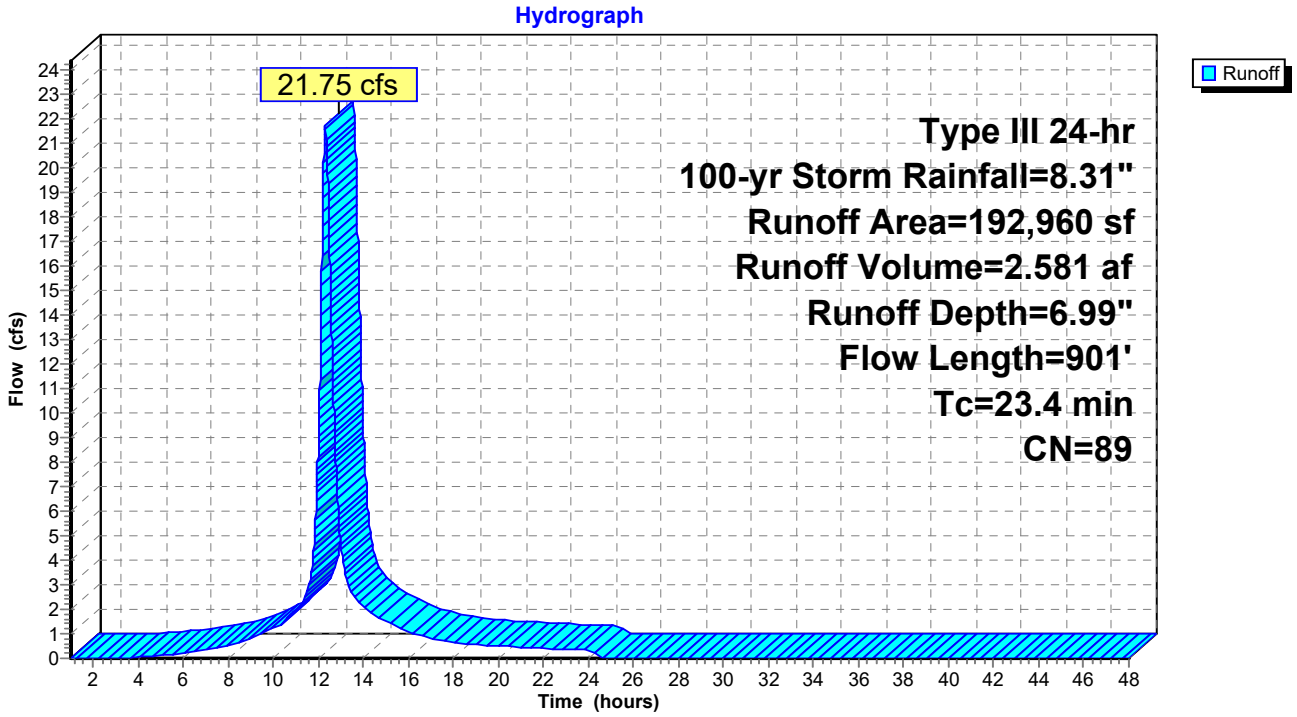
Runoff = 21.75 cfs @ 12.30 hrs, Volume= 2.581 af, Depth= 6.99"
Routed to Pond 1P : POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
*	160,517	96	Gravel
	23,663	39	Pasture/grassland/range, Good, HSG A
	8,780	98	Roofs, HSG A
	192,960	89	Weighted Average
	184,180		95.45% Pervious Area
	8,780		4.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
0.8	88	0.0090	1.93		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
1.3	61	0.0120	0.77		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
4.4	450	0.0110	1.69		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
4.0	202	0.0148	0.85		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
23.4	901	Total			

Subcatchment SC-1B: SC-1B SOUTH



Summary for Subcatchment SC-1C: SC-1C SWALE

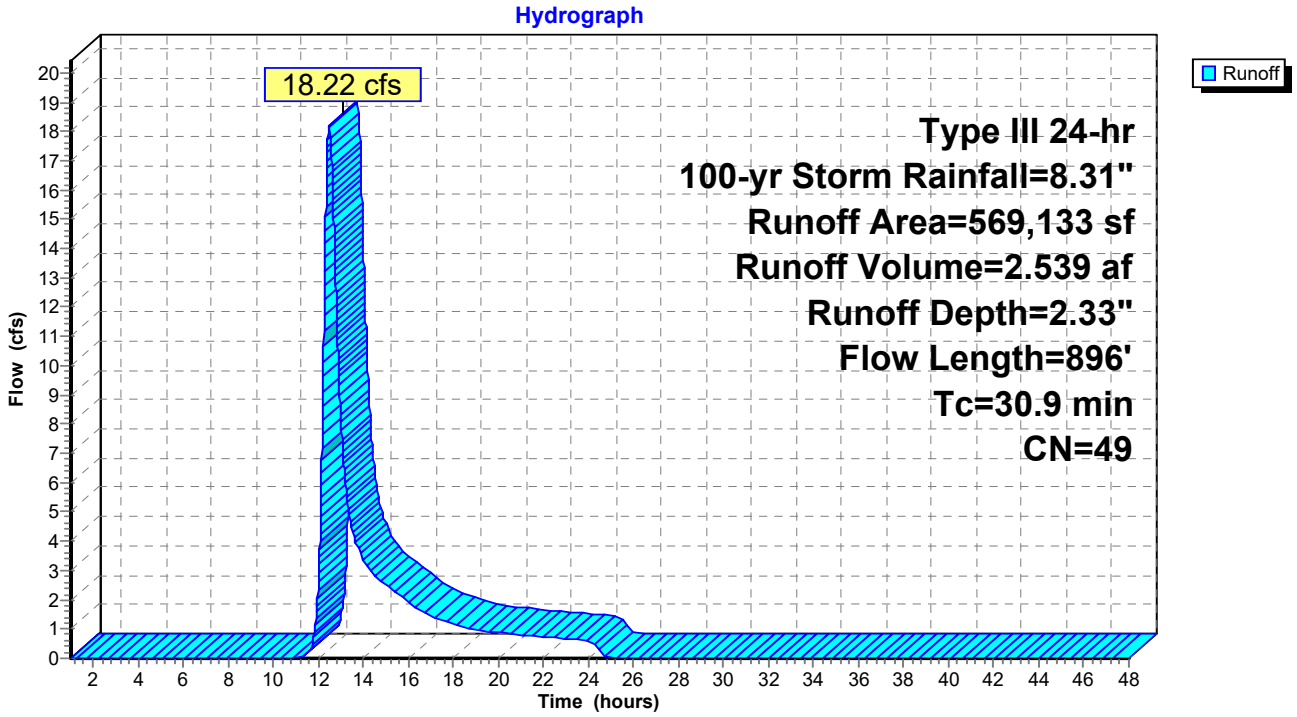
Runoff = 18.22 cfs @ 12.47 hrs, Volume= 2.539 af, Depth= 2.33"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
	237,073	39	Pasture/grassland/range, Good, HSG A
	200,629	30	Woods, Good, HSG A
	2,585	98	Paved parking, HSG A
*	120,760	96	Gravel
	8,086	98	Roofs, HSG A
	569,133	49	Weighted Average
	558,462		98.13% Pervious Area
	10,671		1.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0050	0.10		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
6.9	474	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
3.2	122	0.0080	0.63		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
3.8	200	0.0300	0.87		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
30.9	896	Total			

Subcatchment SC-1C: SC-1C SWALE



Summary for Subcatchment SC-1D: SC-1D BERM

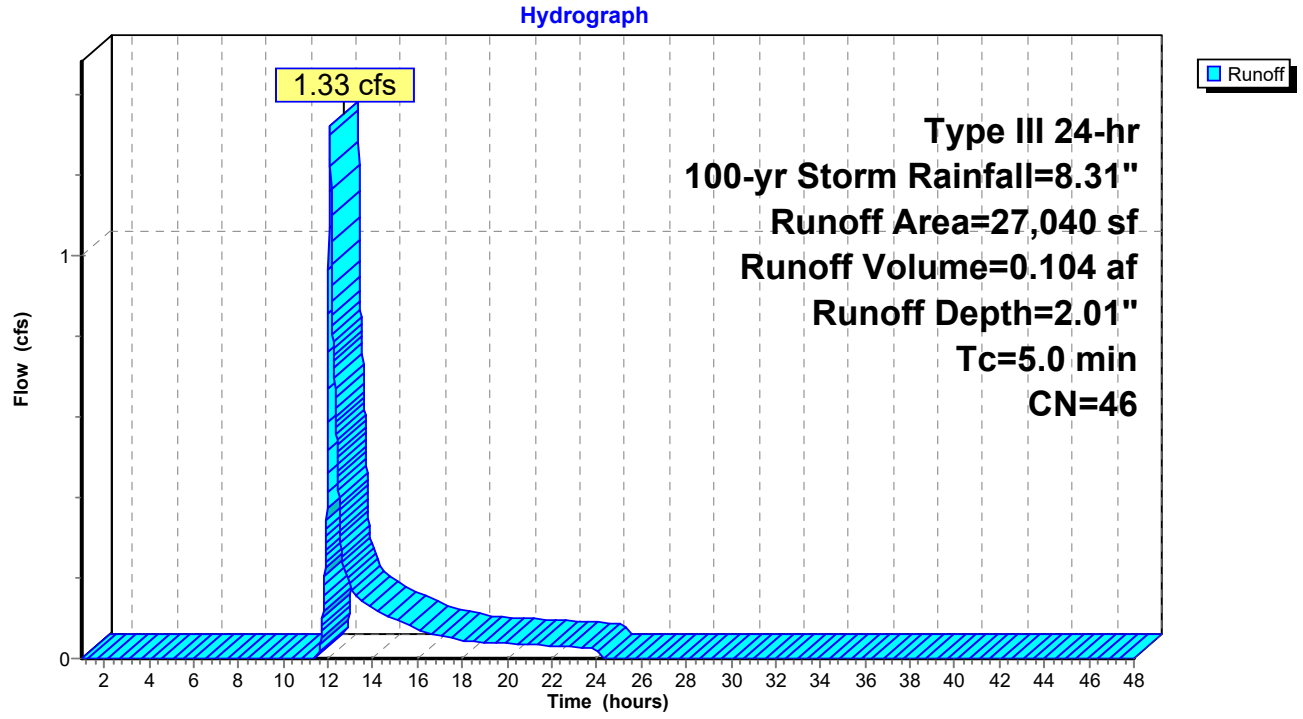
Runoff = 1.33 cfs @ 12.09 hrs, Volume= 0.104 af, Depth= 2.01"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
*	3,240	96	Gravel
	23,800	39	Pasture/grassland/range, Good, HSG A
	27,040	46	Weighted Average
	27,040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-1D: SC-1D BERM



Summary for Subcatchment SC-2: Silver Street

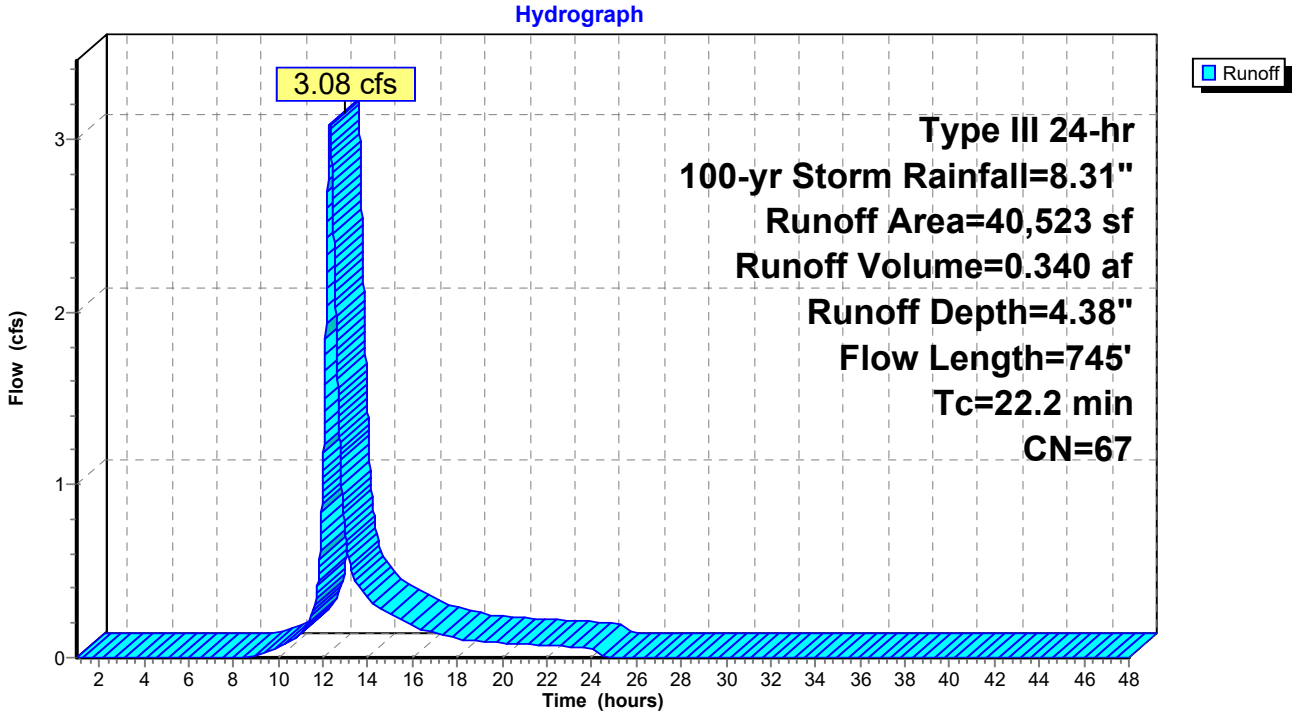
Runoff = 3.08 cfs @ 12.31 hrs, Volume= 0.340 af, Depth= 4.38"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

Area (sf)	CN	Description
15,815	98	Paved parking, HSG A
21,395	39	Pasture/grassland/range, Good, HSG A
3,313	98	Roofs, HSG A
40,523	67	Weighted Average
21,395		52.80% Pervious Area
19,128		47.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	100	0.0200	0.17		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.22"
12.4	645	0.0029	0.87		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
22.2	745	Total			

Subcatchment SC-2: Silver Street



Summary for Subcatchment SC-3: Southwest

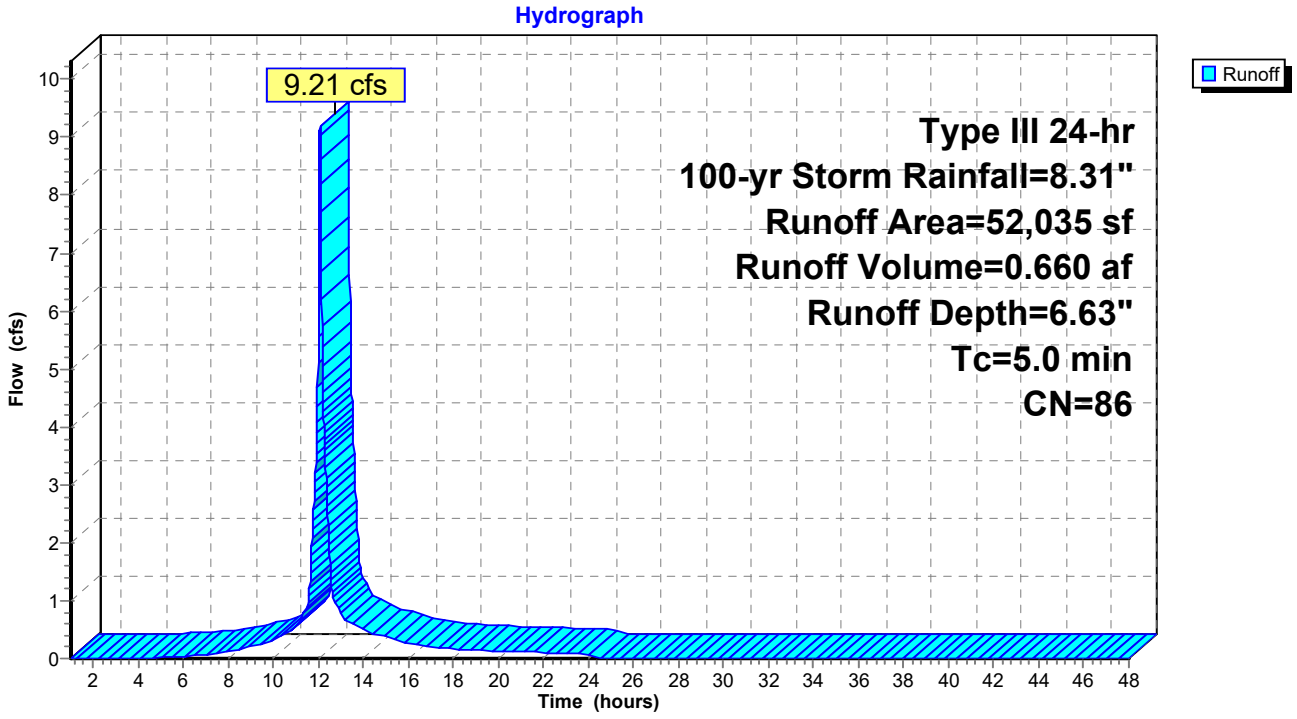
Runoff = 9.21 cfs @ 12.07 hrs, Volume= 0.660 af, Depth= 6.63"
Routed to Link AP-3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.31"

	Area (sf)	CN	Description
*	42,810	96	Gravel
	9,225	39	Pasture/grassland/range, Good, HSG A
	52,035	86	Weighted Average
	52,035		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct Entry**

Subcatchment SC-3: Southwest



Summary for Pond 1P: POND

Inflow Area = 6.915 ac, 4.18% Impervious, Inflow Depth = 6.82" for 100-yr Storm event
Inflow = 33.57 cfs @ 12.30 hrs, Volume= 3.929 af
Outflow = 31.46 cfs @ 12.38 hrs, Volume= 3.862 af, Atten= 6%, Lag= 5.0 min
Primary = 31.46 cfs @ 12.38 hrs, Volume= 3.862 af
Routed to Link AP-1 : AP-1

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 182.43' @ 12.38 hrs Surf.Area= 7,428 sf Storage= 17,294 cf

Plug-Flow detention time= 34.2 min calculated for 3.861 af (98% of inflow)
Center-of-Mass det. time= 23.6 min (821.3 - 797.6)

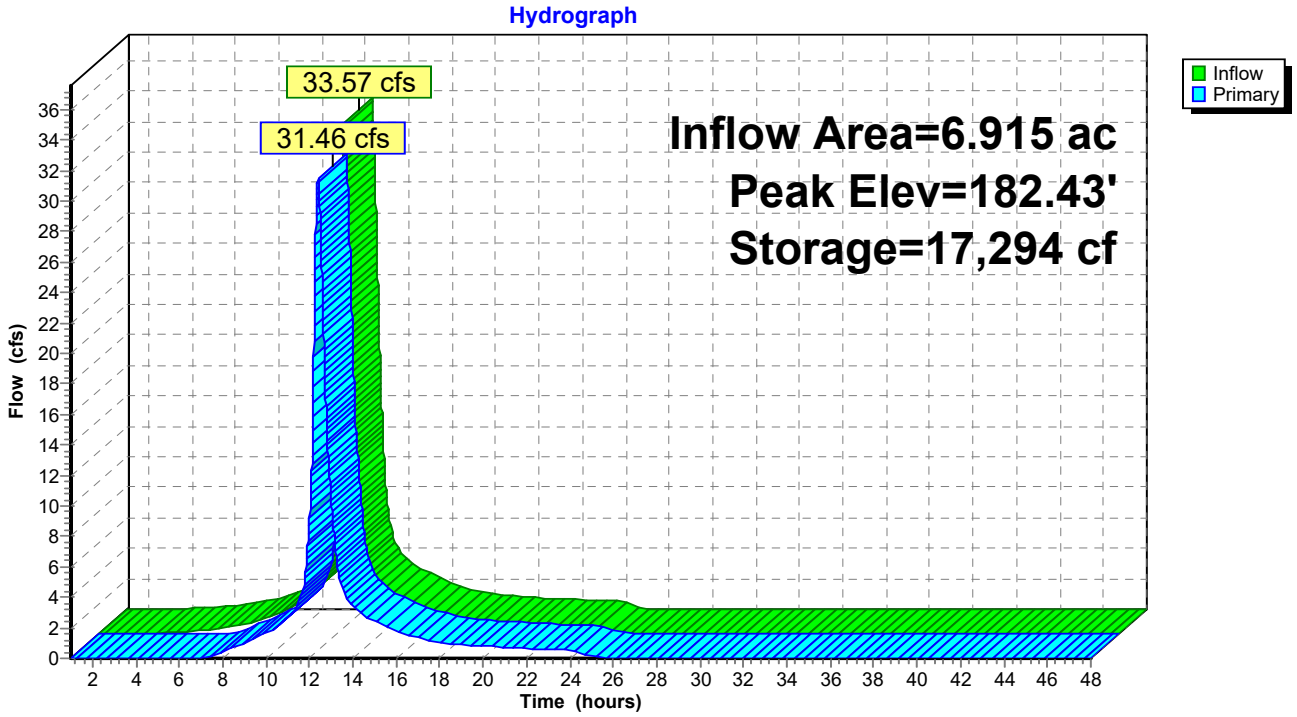
Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	17,805 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.00	1,129	0	0	1,129
179.00	2,262	1,663	1,663	2,271
180.00	3,473	2,846	4,509	3,497
181.00	4,769	4,104	8,613	4,812
182.00	6,591	5,655	14,268	6,654
182.50	7,565	3,536	17,805	7,639

Device	Routing	Invert	Outlet Devices
#1	Primary	181.50'	**6.0' long x 80.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Primary	179.50'	**15.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 179.50' / 179.20' S= 0.0150 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#3	Primary	180.00'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 180.00' / 179.80' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	180.25'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 180.25' / 180.05' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=31.45 cfs @ 12.38 hrs HW=182.43' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 14.21 cfs @ 2.54 fps)
- **2=Culvert** (Inlet Controls 7.08 cfs @ 5.77 fps)
- **3=Culvert** (Inlet Controls 5.26 cfs @ 6.69 fps)
- **4=Culvert** (Inlet Controls 4.90 cfs @ 6.24 fps)

Pond 1P: POND


Hydrograph
33.57 cfs
31.46 cfs
Inflow Area=6.915 ac
Peak Elev=182.43'
Storage=17,294 cf
Inflow
Primary
Flow (cfs)
Time (hours)

Summary for Pond 2P: Treatment Volume

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	2,943 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

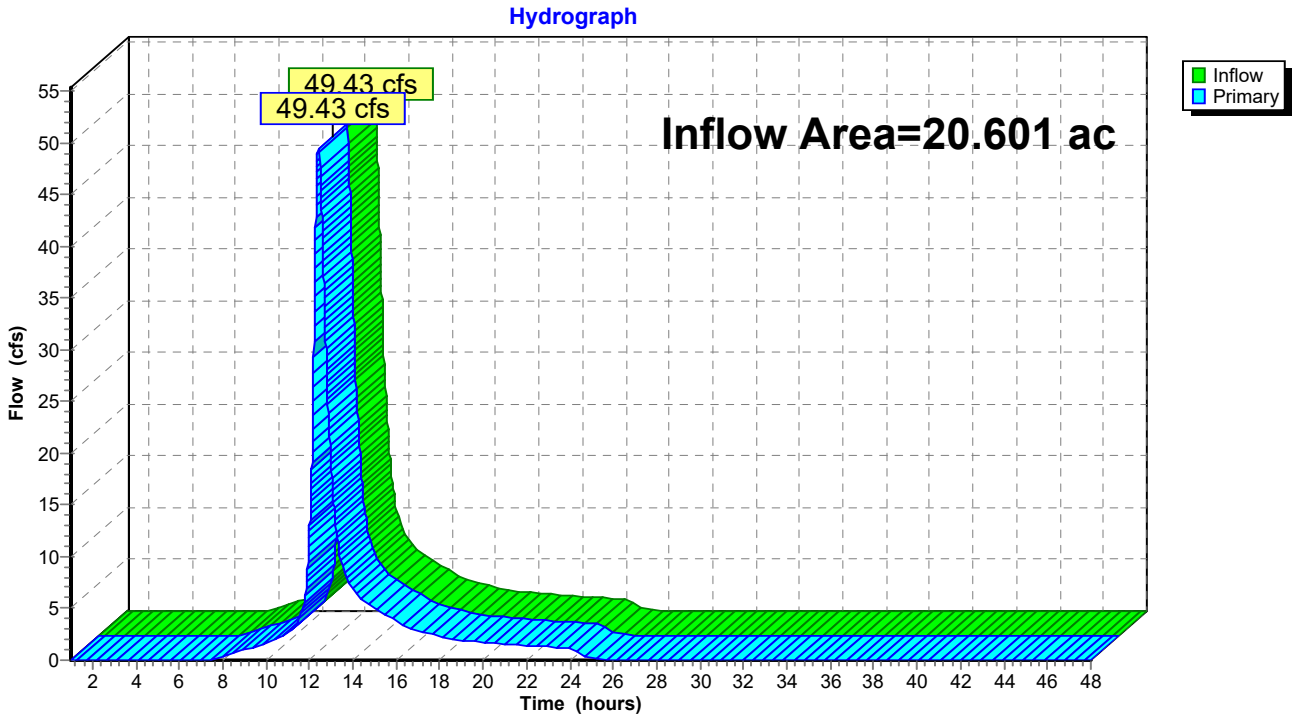
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.00	1,129	0	0	1,129
179.00	2,262	1,663	1,663	2,271
179.33	2,658	811	2,474	2,671
179.50	2,858	469	2,943	2,874

Summary for Link AP-1: AP-1

Inflow Area = 20.601 ac, 2.59% Impervious, Inflow Depth = 3.79" for 100-yr Storm event
Inflow = 49.43 cfs @ 12.41 hrs, Volume= 6.505 af
Primary = 49.43 cfs @ 12.41 hrs, Volume= 6.505 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

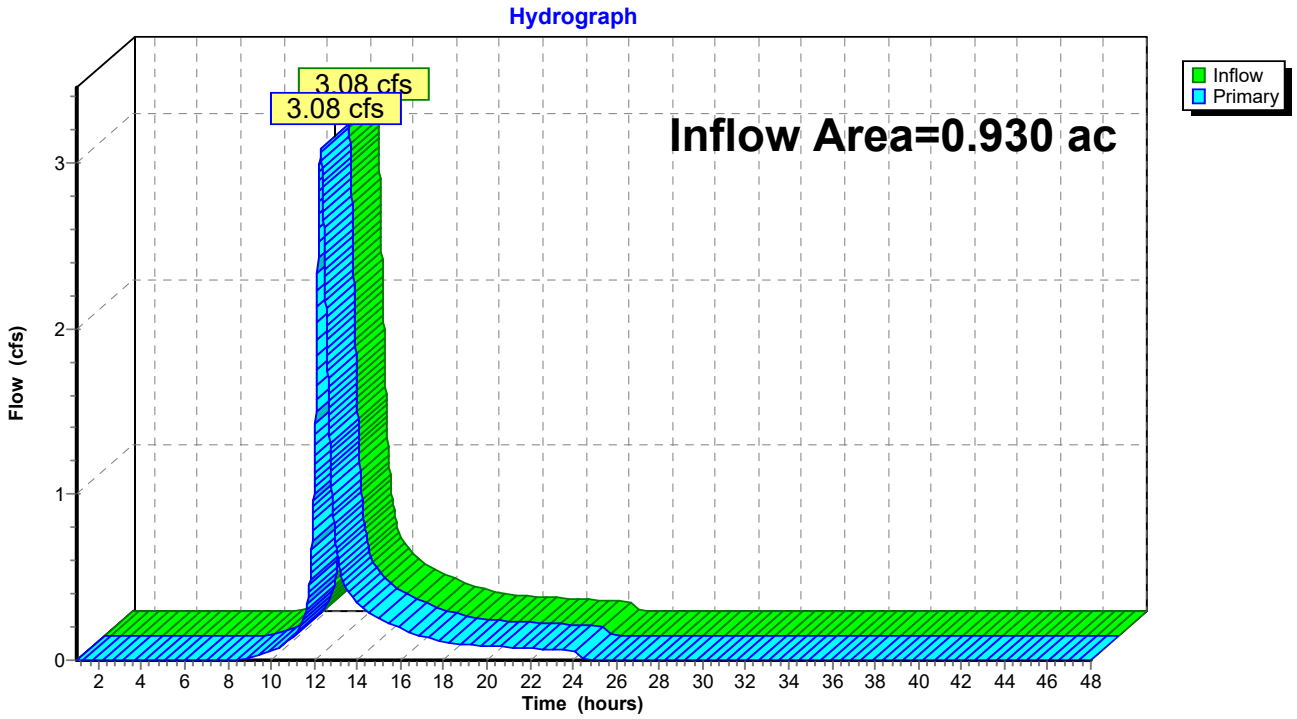


Summary for Link AP-2: AP-2

Inflow Area = 0.930 ac, 47.20% Impervious, Inflow Depth = 4.38" for 100-yr Storm event
Inflow = 3.08 cfs @ 12.31 hrs, Volume= 0.340 af
Primary = 3.08 cfs @ 12.31 hrs, Volume= 0.340 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2

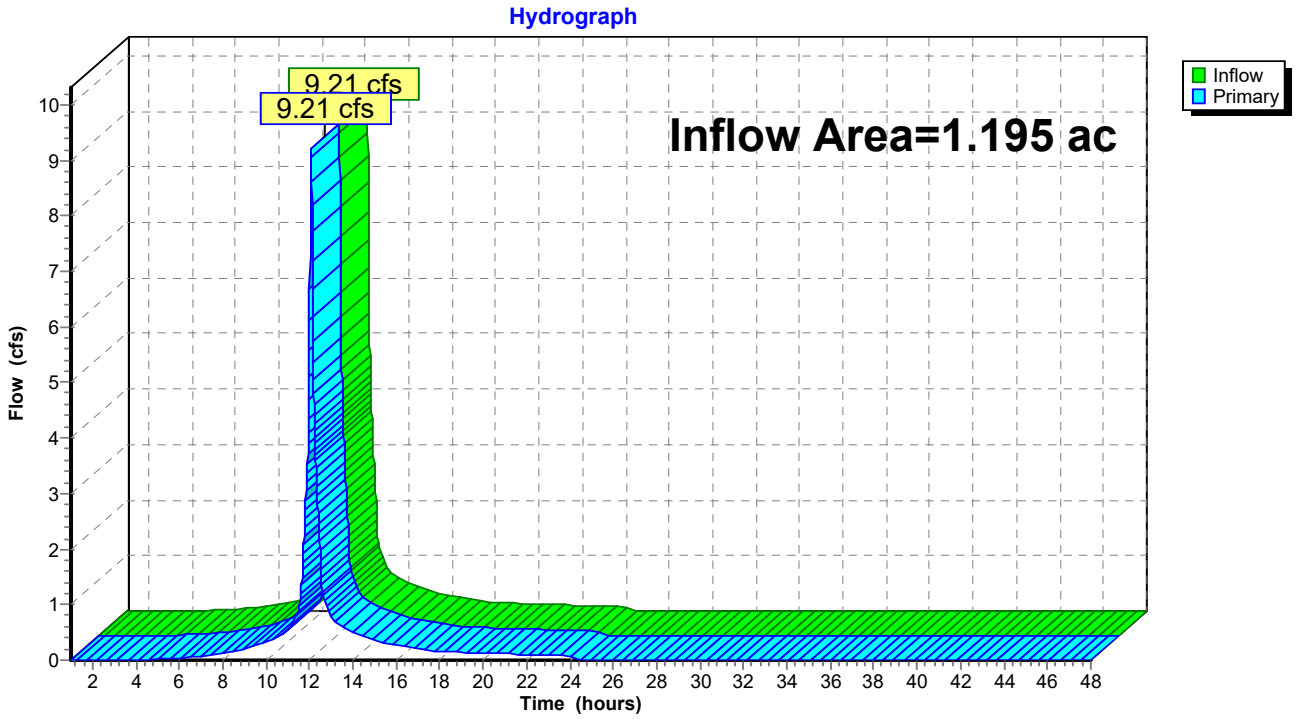


Summary for Link AP-3: AP-3

Inflow Area = 1.195 ac, 0.00% Impervious, Inflow Depth = 6.63" for 100-yr Storm event
Inflow = 9.21 cfs @ 12.07 hrs, Volume= 0.660 af
Primary = 9.21 cfs @ 12.07 hrs, Volume= 0.660 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs

Link AP-3: AP-3



ATTACHMENT E

TREATMENT VOLUME CALCULATIONS

SME
SEVEE & MAHER
ENGINEERS

Agawam Energy Center

SC-1A and SC-1B Treatment Volume Calculation

	Gravel/Pavement Area (SF)	Topping Stone (SF)	Treatment Area (SF)
North Area (SC1A-North)	84,355	75,336	12,816
	3,797		
South Area (SC1A-South)	160,517	108,520	51,997
		Treatment Area (SF)	64,813
		Treatment Volume (CF)	2,701

Treatment Depth	0.5	inches
	0.04	feet

Summary of Treatment Volume

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	2,943 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.00	1,129	0	0	1,129
179.00	2,262	1,663	1,663	2,271
179.33	2,658	811	2,474	2,671
179.50	2,858	469	2,943	2,874

Required Volume: 2701 CF

Volume Provided: 2934 CF

ATTACHMENT F

LONG TERM POLLUTION PREVENTION PLAN

SME
SEVEE & MAHER
ENGINEERS

Long Term Pollution Prevention Plan

Standard #4 of the MassDEP Stormwater Management Handbook requires that a Long Term Pollution Prevention Plan (LTPPP) be prepared and incorporated into the long term operation and maintenance plan of the projects stormwater management system. The purpose of the LTPPP is to identify potential sources of pollution that may affect the quality of stormwater discharges and to describe suggested practices to reduce pollutants in stormwater discharges.

This document should be used in conjunction with the operation and maintenance plan for the facility.

Good housekeeping practices - The Property Owner is to keep the site in a neat and orderly condition so that pollutants are not conveyed to the storm drainage system and adjacent wetlands. Materials swept, blown or washed into the sites detention pond decreases the system's effectiveness and could eventually be conveyed into the adjacent wetland resource area. Some examples of good housekeeping practices are litter control and protected material storage areas. The Property Owner should assign responsibilities to personnel to keep the site in a neat and orderly condition at regular intervals.

Provisions for storing materials and waste products inside or under cover – A dedicated dumpster area should be provided if and when necessary. The trash and waste program should include regular pickup to avoid an overflowing dumpster condition. The water tight dumpster lid should be maintained closed when not actively loading or unloading. A trash disposal company, hired by the Property Owner(s), is to properly dispose the trash at a state approved disposal facility.

Requirements for routine inspections and maintenance of stormwater BMP's - Consistent with Standard 9 of the Massachusetts Stormwater Management Regulations, an Operation and Maintenance Plan has been prepared. The plan details routine inspection and maintenance along with associated record keeping forms.

Spill prevention and response plans – A spill containment and countermeasure plan (SPPC) will be prepared for the site. Beyond the measures for oil containing equipment, exterior spill hazards are to be minimized. Exterior spill hazards have the potential to enter the stormwater drainage system and are to be addressed as follows:

1) Spill hazards of pesticides, paints, and solvents shall be remediated using the

Manufacturers' recommended spill cleanup protocol

2) Vehicle fluid and fuel spills shall be remediated according to local and state regulations governing fuel spills. Spills are to be immediately cleaned up with absorbent materials and properly disposed.

3) The Property Owners shall have the following equipment and materials on hand to address a spill clean-up: brooms, dust-pans, mops, rags, gloves, trash bags, trash containers, and absorptive materials such as sand, sawdust, or kitty litter.

4) Spills of toxic or hazardous materials shall be reported to the Massachusetts Department of Environmental Protection at 1-888-304-1133.

Provisions for maintenance of lawns, garden, and other landscaped areas - It should be a general goal of the Property Owner to achieve a high quality of well-groomed and stable landscape that evolves throughout the changing seasons and overall condition of the property. All landscaped areas are to be maintained with dense vegetative growth or a layer of mulch so as to minimize sediment transport associated with erosion. Litter and waste are to be removed weekly from the landscaped areas and adjoining parking lots and disposed of in an appropriate receptacle.

Requirements for storage and use of fertilizer, herbicides, and pesticides - Fertilizers, herbicides, and pesticides will not to be stored on site. Chemical controls should be used as a last resort to organic and biological control methods.

Snow disposal and deicing chemicals – The parking lot and access road is designed to provide ample snow storage along the perimeter. If necessary, snow removal to an offsite location will occur to remain reasonable access and parking. No snow is to be moved to within 100 feet of a wetland resource area.

The use of de-icing agent such as salt or potassium chloride may be required to maintain a safe driving and walking surface. The de-icing agent for the walkways and building entrances may be kept on site within the building. De-icing agents are not to be stored outside.

ATTACHMENT G

ILLICIT DISCHARGE STATEMENT

SME
SEVEE & MAHER
ENGINEERS

ILLICIT DISCHARGE COMPLIANCE STATEMENT

I verify that no illicit discharges exist from the Agawam Energy Center. Through the implementation of a Long Term Pollution Prevention Plan and Operation and Maintenance Plan, measures are set forth to prevent illicit discharges from entering the stormwater management drainage system.

Signature	**Print Name**	**Date**
Title	**Company**	
Signature	**Print Name**	**Date**
Title	**Company**	

Note: This certification must be signed before stormwater is conveyed to the proposed stormwater drainage system in accordance with Standard 10 of the Massachusetts Stormwater Management Standards.

ATTACHMENT M – STORMWATER PERMIT APPLICATION

Application Date: _____
Application Fee Paid: _____
Date Paid: _____
Inspection Fee Paid: _____
Date Paid: _____

Town of Agawam Department of Public Works
Stormwater Permit Application

Rev. November 2006

Return this application to:
Town of Agawam Department of Public Works
1000 Suffield Street
Agawam, MA 01001

Storm Drain Permit Application / Inspection Fees		
Area of Disturbance*	**Application Fees**	**Inspection Fees**
1 to 5 Acres	$200	$100
Over 5 Acres to 20 Acres	$700	$350
Over 20 Acres to 50 Acres	$1,500	$750
Over 50 Acres	$1,500 plus $25 per Acre over 50	$750 plus $10 per Acre over 50

*If the area of the parcel(s) and area of project disturbance differ such that the area of disturbance will be in a lower fee category, the applicant may submit a certified statement by the project designer, a P.E., of the project's area of disturbance.

1. Project / Site Information

Site Address

City | State | Zip Code

Parcel ID | Parcel Size | Number of Acres to be Disturbed

Is there an existing larger project this site is now a part of? □No □Yes

If **yes**, name of larger project: _____

EXISTING SITE DESCRIPTION: (Example: 5 Acres of forest land, 2 Acre single family residence, 50 Acre Farm Land or Attach Project Narrative.)

Storm Drain Permit #: SD_____

2. Builder / Contractor Information

Builder / Contractor Name

Address

City	State	Zip Code

Contact / Last Name	First Name	Telephone (including area code)

3. Owner Information

Property Owner Name

Address

City	State	Zip Code

Contact / Last Name	First Name	Telephone (including area code)

4. Project Description / Features

- ☐ Single Family/Multi Family Home
- ☐ Sub-division # of Lots: _____
- ☐ New Commercial / Industrial Site Plan
- ☐ Redevelopment Site Plan
- ☐ Re-grading or Land Disturbance
- ☐ Other _____

Proposed Project Site includes the following features:

- ☐ Proposed Impervious Area Existing (ft^2) _____ Proposed (ft^2) _____
- ☐ Detention Pond
- ☐ Sub-surface Detention / Infiltration
- ☐ Wetland Protection Act / Conservation Commission Jurisdiction
- ☐ River Act / Conservation Commission Jurisdiction

FINAL APPROVED PLAN / CONDITIONS OF PERMIT:

Storm Drain Permit #: SD_____

5. Stormwater Management Plan

The Stormwater Permit Application must include submission of a ***Stormwater Management Plan***. The purpose of the Stormwater Management Plan is to ensure that the runoff from a site has been treated for water quality and quantity impacts during the construction of the project and during the long term. This treatment includes, but is not limited to, erosion and sediment control to the extent practicable via structural and non-structural BMPs during construction and the establishment of structural BMPs for the long term controls.

See Agawam Stormwater Management Ordinance (Ch. 175-35) and the Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas prepared by the Massachusetts DEP http://www.mass.gov/dep/water/esfull.pdf for additional information and guidance.

The following minimum information must be included within the Stormwater Management Plan.

Project Plan
- A plan identifying the project site area
- Plan must highlight the portion of the area to be disturbed

Short Term – Erosion and Sediment Control Measures
- Written description of proposed temporary BMPs
- A plan at an appropriate scale of those BMPs
- A description and schedule of maintenance of proposed BMPs
- Construction details
- Reporting requirements of erosion and sediment controls
- On-site hazardous materials handling and storage
- Dust control BMPs
- Off-site sedimentation measures
- Plan and procedures

Long Term - Stormwater Quality and Quantity Controls
- Written description of proposed permanent BMP's
- A plan at a scale of not less than 1"= 40' of those BMPs
- Construction details
- Computations in an acceptable format
- A description and schedule of long term maintenance of proposed BMPs
- Reporting requirements for maintenance and inspections as specified by the DPW

- A description of long term maintenance and inspection schedules shall be submitted for site development projects.

- Construction Certification Statement – A statement to be signed by the contractor and all relevant subcontractors shall be included, certifying that they have read and understand the construction phase requirements and agree to comply.

All components of the Stormwater Management Plan shall be prepared and stamped by a licensed Professional Engineer for all site plans, subdivisions and residential projects greater than 2 building lots.

6. Certification Statement

The owner or authorized representative and all contractors and subcontractors shall sign certification statements as part of the permit application and Stormwater Management Plan. In signing the plan, the authorized representative certifies that the information is true and assumes liability for the plan. In addition, the undersigned agrees:

1. To furnish any additional information relating to the installation of use of the storm drain for which this permit is sought as may be requested by the Superintendent.
2. To accept and abide by all the provisions of Section 175 inclusive of the Ordinances of the Town of Agawam and of all other pertinent ordinance or regulations that may be adopted in the future.
3. To operate and maintain any storm drain and detention facilities, as may be required as a condition of the storm drainage permit in efficient manner at all items, and at no expense to the Town.
4. To cooperate at all items with the Superintendent of Public Works and his representatives in their inspection of storm drains, and any maintenance thereof.
5. To notify the Superintendent of Public Works immediately in the event of any accident, negligence, or other occurrence that occasions discharge to the storm drain of any wastes or process waters not covered by this permit or allowed by Section 175 the Ordinance of the Town of Agawam.
6. To indemnify the Town from loss or damage that may directly or indirectly be occasioned by the installation of the storm drain and related facility or connection.

Owner Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person(s) who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

X	
Applicant's Signature	**Date**
X	
Owner's Signature	Date

Contractors and Subcontractors Certification:

I certify under penalty of law that I understand the terms and conditions of the Storm Drain Permit that authorizes storm water discharges associated with industrial activity from the construction site identified as part of this certification.

X	
Contractor's Signature	**Date**
X	
Subcontractor's Signature	Date

APPLICATION APPROVED AND PERMIT GRANTED	**PERMIT #: SD_____**
Signed	
Superintendent	**Date**

ATTACHMENT N – EVERSOURCE NOTIFICATION

Agawam Energy Center, LLC (QP1365) entered the ISO-NE Transitional Cluster Study on October 2, 2025. Below is a screenshot of the project in the public ISO-NE interconnection queue. A link to this queue is provided here.

ISO New England Study Request Database - Public

Active Projects as of 1/20/2026

FERC Jurisdictional Administered Transmission System

Cluster	QP	Updated	Type	Requested	Alternative Name	Unit	Fuel Type	Net MW	SumMW	WinMW	County	ST	OpDate	SyncDate	Interconnection Point	Serv	SIS	I39	TO Report	Dev	Zone
TCS	1090	10/17/2025	G	1/13/2021	Park City Offshore Wind CNR	WT	WND	0	838.2	838.2	NA	MA	12/31/2029	5/1/2029	Eversource (NSTAR) 345kV West Barnstable	CNR	No	No			SEMA
TCS	1116	10/17/2025	G	4/13/2021	SouthCoast Wind 1	WT	WND	1,200	1,200	1,200	NA	MA	12/31/2031	5/1/2030	Brayton Point making use of QP 837 to connect	CNR	Yes	Yes	ISO-NE	PD	RI
TCS	1123	10/17/2025	G	4/21/2021	Naugatuck Avenue Battery Storage CNR Only (see QP1089)	OT	BAT	0	205.32	205.32	New Haven	CT	5/31/2027	4/15/2027	devon 115kV substation	CNR	No	No		PD	SWCT
TCS	1148	10/17/2025	G	7/13/2021	Lite Brite Battery Storage	OT	BAT	305.62	305.62	305.62	Suffolk	MA	5/26/2028	4/30/2028	Electric Avenue 115 kV substation (bus number 110926), Zone MA_NST	CNR	Yes	Yes	ISO-NE		BOST
TCS	1171	10/17/2025	G	10/25/2021	Twin Energy Wind	WT	WND	18.3	20	20	Oxford	ME	9/21/2026	8/21/2026	Roxbury Substation	CNR	Yes	Yes	ISO-NE	PD	ME
TCS	1238	11/12/2025	G	3/22/2022	Battery Storage	OT	BAT	300	301.26	301.26	Norfolk	MA	4/28/2028	11/30/2027	West Medway 345kV station	CNR	No	No		PD	SEMA
TCS	1365	11/12/2025	G	3/9/2023	Battery Storage	OT	BAT	250	254.2	254.2	Hampden	MA	6/30/2029	1/29/2029	Connect to South Agawam 115 kV switchyard	CNR	No	No		PD	WMA
TCS	1412	11/12/2025	G	6/20/2023	Battery Storage	OT	BAT	168	169.84	169.84	Bristol	MA	9/30/2027	9/15/2027	Direct tap into the Pottersville Substation in Somerset, MA	CNR	No	No		PD	SEMA
TCS	1427	11/12/2025	G	7/21/2023	Solar	PV	SUN	180	183.32	183.32	York	ME	12/30/2029	12/1/2029	Lebanon, Maine Line 391 Buxton Sub (CMP) to Scobie Pond (Eversource). GPS coordinates of the POI: 43°22'51.59"N, 70°55'57.74"W. ** This new tap is located approximately 27.8 miles southwest of Buxton substation and approx. 39.9 miles northeast of the Scobie Pond substation.	CNR	No	No		PD	ME

DPW
1000 Suffield Street
Agawam, MA 01001
Phone: 413-821-0600
Fax: 413-821-0631

Town of Agawam
Department Of Public Works

MEMORANDUM

To:	Planning Board
CC:	File
From:	Engineering Division
Date:	February 18, 2026
Subject:	SP 675 – Proposed Battery Energy Storage System – 769 Silver Street

Per your request, we have reviewed the Application for Site Plan Approval, with accompanying Site Plans and Stormwater Management Plan, for the proposed Battery Energy Storage System (BESS) to be located at 769 Silver Street; prepared by BSC Group; dated January 29, 2026. Based on our review, we have the following comments:

1. The location of the existing sanitary sewer main, water main and laterals shall be shown on the Site Plans. The Contractor shall determine the condition of the existing water line within the easement prior to the beginning of construction.
2. Engineering requests that the Agawam Standard Detail W-2: Water Service in HMA (attached) be added to the Site Plans.
3. The locations of all proposed erosion control measures shall be shown on the Site Plans.
4. The existing and proposed impervious area quantities for the overall project should be included on the Site Plans.
5. The direction of the north arrow appears to be inaccurate on the Site Plans.
6. At least one parking space on the project site must be designated a handicap van accessible space, as per current ADA regulations.
7. Proposed bituminous asphalt installation should have a minimum top course thickness of one and one-half (1.5) inches and a minimum binder course thickness of three (3) inches. The details shown on Sheet AW1-C-301 of the Site Plans should be revised to reflect these standards.
8. Engineering recommends the level spreader for the proposed detention basin outlet be constructed with riprap instead of loam and seed to help prevent sediment erosion from high velocity discharges.
9. As stated in the Stormwater Management Report, the post-development Subcatchment SC-1 was divided into four separate watersheds (SC-1A, B, C & D). These delineations and the time of concentration paths for these watersheds are not shown on the Post-Development Conditions Plan. As such, Engineering was unable to complete their review of the stormwater calculations.
10. The lengths of the time of concentration paths noted on the Pre- & Post-Development Condition Plans appear to be inaccurate. The length of the path segments noted on the plans do not align with the distances provided when measured using the scale noted on the plan.
11. Engineering requests that an electronic copy of the HydroCAD files be submitted for review.
12. The width of the proposed vegetated buffer strip must be a minimum of twenty-five (25) feet in order to provide pretreatment TSS removal, as per the Massachusetts Stormwater Regulations.

Town of Agawam
Department Of Public Works

DPW
1000 Suffield Street
Agawam, MA 01001
Phone: 413-821-0600
Fax: 413-821-0631

13. The proposed detention basin must be designed such that there is one (1) foot of freeboard area between the highest elevation of the basin and the peak elevation of the 100-year storm event. According to the submitted HydroCAD calculations, the 100-year peak elevation is 182.43, which only provides 0.07 feet of freeboard between the highest elevation of the basin – 182.50.
14. The elevations of the basin emergency overflows shall be shown on the Grading Plan or Basin Overflow Section Detail.
15. There was no Operations & Maintenance Plan included with the Stormwater Management Report.
16. The Total Suspended Solids (TSS) removed must be calculated for all proposed BMPs.
17. Engineering is requesting additional information regarding how the treatment volume area between the basin bottom elevation of 178.00 and lowest outlet invert of 179.5 will drain. If this portion of the basin is designed as an infiltration BMP, additional pretreatment of stormwater may be required. The basin should be designed such that all water drains from the basin within 72 hours, as per the Massachusetts Stormwater Regulations. Test pits will need to be performed at the location of the proposed detention basin to determine groundwater elevation and soil infiltration rates.
18. Test pits will be required in all areas that stormwater infiltration is proposed to verify soil conditions and ground water elevations.
19. Engineering is concerned the velocity of the discharge from the detention basin outlet pipes may be too high during heavy storm events. Additional outlet protection may be necessary. It is recommended that a hydraulic analysis of all outlet pipes be performed and submitted to Engineering for review.
20. Engineering recommends the level spreader for the detention basin be expanded to include the discharge from the outlet pipes.
21. Trash racks will need to be installed at the upstream inverts of the basin outlet pipes.
22. Engineering request specifications on the "Clean Gravel Fill" to be used within the topping stone areas to ensure infiltration occurs as anticipated.

Engineering reserves the right to make additional comments as new information is submitted. If you have any questions, please do not hesitate to contact this division.

Sincerely,

Michelle C. Chase, P.E.
Town Engineer

Michael F. Albro, P.E.
Assistant Town Engineer

Benjamin D. Ashley Jr., P.E.
Civil Engineer II

DECOMISSIONING PLAN
AGAWAM ENERGY CENTER

Prepared for Longroad Energy

LONGROAD ENERGY
125 High Street
Boston, MA 02210

February 2026
Revision 1

4 Blanchard Road
P.O. Box 85A
Cumberland, Maine 04021

Tel: 207.829.5016 sme-engineers.com

SME
SEVEE & MAHER
ENGINEERS

TABLE OF CONTENTS

Section No.	Title	Page No.
1.0	**Executive Summary**	**1-1**
2.0	**Acronyms and Abbreviations**	**2-2**
3.0	**Narrative Description of Decommissioning Process**	**3-2**
3.1	Objectives	3-2
3.2	Scope & Boundaries	3-3
3.3	Pre-Decommissioning Planning	3-3
3.4	De-Energization & Isolation	3-3
3.5	Equipment Removal Sequence	3-4
3.6	Site Stabilization	3-5
3.7	Health, Safety & Environmental	3-5
3.8	Documentation & Records	3-5
4.0	**Estimate of Probable Costs**	**4-6**
4.1	Disassembly & Removal	4-7
4.1.1	Project Management and Mobilization	4-7
4.1.2	Site Work/Civil(Site Reclamation)	4-7
4.1.3	BESS and Transformer Foundations	4-8
4.1.4	BESS Units, Step Up Transformers and Undergroun Cables	4-9
4.2	Scrap/Salvage Value	4-11
4.2.1	Presumed Scrap Value of BESS Equipment	4-11
4.2.2	Presumed Value of the Step Up Transformers	4-11
4.2.3	Presumed Value of Underground Cables	4-12
4.3	Decommissioning Summary	4-13
5.0	**Decommissioning Plan Administration**	**5-13**
5.1	Roles & Responsibilities	5-13
5.2	Compliance, Permitting & Reporting	5-14
5.3	Schedule & Phasing	5-14

LIST OF APPENDICES

APPENDIX A SITE PLAN

Agawam Energy Center (AEC) Decommissioning Plan
250 MW Battery Energy Storage System (BESS)

1.0 EXECUTIVE SUMMARY

Project Summary:
Capacity: 250 MW
Assets: 216 BESS units (containerized); 54 step-up transformers
Scope: Full retirement, removal, recycling/disposal, and site restoration

This Decommissioning Plan (the Plan) has been prepared based on the requirements in the Town of Agawam BESS ordinance (Article XXIII of the Code of the Town of Agawam). In accordance with the Ordinance, the Plan includes the following information.

a. A narrative description of the activities to be accomplished, including who will perform that activity and at what point in time, for complete physical removal of all battery energy storage system components, structures, equipment, security barriers, and transmission lines from the site.
b. Disposal of all solid and hazardous waste in accordance with local, state, and federal waste disposal regulations.
c. The anticipated life of the battery energy storage system.
d. The estimated decommissioning costs and how said estimate was determined.
e. The method of ensuring that funds will be available for decommissioning and restoration.
f. The method by which the decommissioning cost will be kept current.
g. A description of the manner in which the site will be restored, including how any changes to the surrounding areas and other systems adjacent to the battery energy storage system, such as, but not limited to, structural elements, building penetrations, means of egress, and required fire detection suppression systems, will be protected during decommissioning and confirmed as being acceptable after the system is removed; and
h. A listing of any contingencies for removing an intact operational energy storage system from service, and for removing an energy storage system from service that has been damaged by a fire or other event.

To present the information above the Plan is broken down into the following Sections.

- Section 2: Narrative Description of Decommissioning Process (items a, c, g and h)
- Section 3: Description of Disposal Methods (item b)
- Section 4: Estimate of Probable Costs (item d)
- Section 5: Decommissioning Plan Administration (items e and f)

The decommissioning cost estimate represents an opinion of probable cost (OPC), in today's dollars.

2.0 ACRONYMS AND ABBREVIATIONS

AEC - Agawam Energy Center
BESS – Battery Energy Storage System
PCS – Power Conversion System
MV – Medium Voltage
LV – Low Voltage
SCADA – Supervisory Control and Data Acquisition
HVAC – Heating, Ventilation, and Air Conditioning
OPC – Opinion of Probable Cost
OEM – Original Equipment Manufacturer
LOTO – Lockout/Tagout
SOC – State of Charge
AHJ – Authority Having Jurisdiction
DC – Direct Current
UN – United Nations
DOT/IATA – U.S. Department of Transportation/International Air Transport Association
ISO – Independent System Operator
QA/QC – Quality Assurance/Quality Control
OSHA – Occupational Safety and Health Administration
ERP – Emergency Response Plan
NFPA – National Fire Protection Association
EPA/RCRA – U.S. Environmental Protection Agency/Resource Conservation and Recovery Act

3.0 NARRATIVE DESCRIPTION OF DECOMMISSIONING PROCESS

3.1 Objectives

In addition to meeting the requirements of the Town of Agawam requirements, the Plan has been prepared with the following objectives:

- Safely de-energize and remove all equipment associated with the BESS project.
- Maximize material recovery and recycling (battery materials, steel, copper, aluminum, electronics).
- Comply with all applicable environmental, health, and safety regulations.
- Restore and stabilize the site to protect human health and the environment.

The decommissioning plan will be implemented upon the end of operations or abandonment for 12 consecutive months. The anticipated life of the BESS system is assumed to be 25 years.

3.2 Scope & Boundaries

The overall AEC site can be broken down into three distinct areas: 1) the entrance area and Operations and Maintenance Building at the entrance off Silver Street; 2) the BESS facility located within the limits of the security fence and sound wall perimeter; and 3) the collection Substation located at the south end of the project site. A Site Plan is included in Appendix A. The scope of this decommissioning plan focuses on the BESS facility located within the security fence as well as the substation and associated interconnection line. The entrance area and Operations and Maintenance building pose no threat to human health or the environment and provide reuse value in their current condition.

The decommissioning will include BESS containers, battery modules/racks, Power Conversion System (PCS)/inverters, transformers, MV and LV cables, SCADA, HVAC, fire safety systems, foundations and pads (as required), access roads (as required), substation fencing, structures and equipment and generator tie (gen tie) line.

3.3 Pre-Decommissioning Planning

The Owner or party responsible for decommissioning shall undertake the following activities prior to decommissioning, as applicable:

- Permits & Notifications: Secure required decommissioning permits; notify utility/ISO, AHJ, fire department, environmental agencies, and landowner(s).
- Hazard Assessment: Perform HAZID/HAZOP specific to lithium-ion systems; review MSDS/SDS for all chemistries; identify PCB status for legacy equipment (if any).
- Site Condition Survey: Document equipment counts, oil volumes per transformer, battery chemistry, structural conditions, and access constraints.
- Contracting Strategy: Engage licensed electrical contractors, hazmat-trained battery handlers, recycling vendors certified and approved to handle specific materials (e.g. batteries, refrigerants etc), licensed disposal facilities and waste transporters.
- Emergency Preparedness: Confirm on-site fire equipment, spill kits are available and in good working order and that the facility's ERP is current for decommissioning activities.

3.4 De-Energization & Isolation

Decommissioning Contractor shall prepare an up-to-date de-energization plan based on the condition of the site at the time of decommissioning. At a minimum, the de-energization plan shall address plans and procedures for:

1. Outage Coordination: Coordination with utility; verify lockout/tagout (LOTO plan, if applicable.

2. System Shutdown: Following OEM procedures for controlled shutdown of PCS/inverters and battery management system.
3. Electrical Isolation: Opening and LOTO of main breakers, DC disconnects, MV switchgear, and transformer secondary/primary; verify absence of voltage with calibrated meters.
4. Residual Energy Management: Discharging battery modules per OEM specs to safe SOC , typically ≤ 5–10% prior to removal.
5. Ancillary Systems (HVAC, Controls, Fire Safety, etc.): Disabling systems per OEM guidance and AHJ requirements after safe isolation.

3.5 Equipment Removal Sequence

BESS System Removal: The following is a typical removal process but should be reviewed and modified based on final equipment and configuration. Reuse and recycling options for lithium-ion batteries are evolving. For the purposes of this plan, it is assumed that the battery modules will be removed intact for second-life reuse or recycling at an off-site facility. The lithium-ion battery cubes can be removed from the BESS area using a small crane and large forklift. The batteries can be transported off-site via truck in accordance with manufacturers shipping recommendations and local and state and federal requirements.

Step 1: Remove SCADA/communications equipment; archive data logs and configurations, if required.

Step 2: Remove HVAC, fire safety systems (dispose per manufacturer/environmental regs).

Step 3: Disconnect and remove battery modules/pods from the Smartskid. Prepare for shipment to recycling facility per UN 3480/3481 and DOT/IATA regulations, using fire-retardant crates or OEM packaging.

Step 4: Disconnect and remove Smartskids from foundation and prepare for shipment to recycling facility.

Step 4: Extract cabling, busways, conduits; segregate copper/aluminum for recycling.

Step-Up Transformer Removal: Transformers will be inspected and electrically tested for resale viability. Units will be drained to minimum oil transport levels per OEM instructions, disconnected and lifted intact onto transport trucks, and shipped to the designated buyer or recycling/refurbishing facility. Oil will be pumped into sealed totes and shipped with the transformer.

Underground Cable Removal: Below grade electrical conductors associated with the BESS units will be removed by a combination of excavation and wire pulls. Recovered wire will be transported off site for recycling. For the purposes of this plan, it is assumed that cables will be sent to a recycling facility in-tact and cables will be broken down and processed by the recycler.

Concrete Slab Removal: After removal of BESS units and Step Up Transformers and related equipment, each reinforced concrete equipment slab will be broken using hydraulic breakers or excavator-mounted hammers. Reinforcing steel (rebar/mesh) will be separated and recycled. Once reinforcing steel is removed the concrete may be crushed on-site and used as fill or broken into pieces sized for transport and hauled to a concrete recycling facility.

3.6 Site Stabilization

Following removal of all above ground structures and equipment and below-ground structures and equipment to 24 inches below grade, the disturbed areas will be re-graded to be consistent with surrounding areas.

The access road from the main gate along the utility easement in the center of the site will be maintained from the main gate to the substation and the secondary access point to Moylan Lane. All other areas within the security fence of the BESS yard will be finished with a 4-inch layer of loam and seed, including fertilizer and mulch to promote re-vegetation.

3.7 Health, Safety & Environmental

Decommissioning contractor shall review and follow applicable health and safety requirements in place at the time the work is performed. A typical list of requirements is provided below.

- Standards & Compliance: OSHA 29 CFR (electrical safety, hazmat); NFPA 70E; NFPA 855 (ESS); EPA RCRA (hazardous waste); DOT hazmat shipping; local/state waste rules.
- Qualifications: Only trained, certified personnel handle battery modules and transformer oil.
- PPE: Arc-rated clothing, voltage-rated gloves, cut-resistant gloves, eye/face protection, respiratory protection as needed.
- Fire Risk Controls: Hot work permits; thermal monitoring of removed modules; designated quarantine area for suspect modules (e.g. abnormal operation, visible damage, or indications of potential failure); Appropriate extinguishing media.
- Spill Prevention: Transformer oil handling plan; secondary containment; spill kits; immediate reporting and remediation per thresholds.

3.8 Documentation & Records

The decommissioning contractor shall maintain records for the tracking and disposal of materials removed from the site. All documentation shall be included in a final Decommissioning As-Built report including the following:

- Waste Manifests: Chain-of-custody for all hazardous and universal waste.
- Certificates: Recycling certificates; destruction certificates; non-PCB confirmation for transformer oil if applicable.

- Environmental Compliance: Permits, notifications, inspection logs, spill reports, air/noise/dust monitoring logs (if required).
- Photo documentation.
- Sign-offs from AHJ/landowner.

4.0 ESTIMATE OF PROBABLE COSTS

The costs of the decommissioning process have been broken down into two parts: 1) Disassembly & Removal and 2) Scrap/Salvage Value.

The Disassembly & Removal section has been divided into four general work items.

a. Project Management (contractor costs, general conditions, equipment, etc.)
b. BESS Units, Step up Transformers and Underground cables
c. BESS and Transformer Foundations
d. Site Work/Civil (site reclamation)

The Scrap/Salvage Value has been broken into two separate items.

a. Presumed scrap value of the BESS units
b. Presumed re-sale value of the Step-Up Transformers
c. Presumed scrap value of Underground Cables

This estimate is based on the site plans, information provided by Owner, and cost data obtained from Wage rates form the Massachusetts Department of Labor, Bureau of Labor Standards, and RS Means Construction Cost Index.

Quantities and unit prices for these individual work items are presented and discussed in the following paragraphs.

This estimate is based on the following assumptions:

- Facility includes 216 BESS “Smartskid” units.
- One step up transformer provided for every four (4) “Smartskids” for a total of 54 step up transformers.
- Each “Smartskid” contains 4 battery pods for a total of 864 battery pods.
- Demolition of 24-inch-thick equipment foundations (or removal to 24-inches below grade).

- Batteries are lithium-ion.
- Step-up transformers have remaining useful life and are resold.
- Decommissioning will remove all materials and structures within 2 feet of the surface as well as all underground cables, except for any underground cables installed below utilities within the utility easement.
- Transport distances: up to one-hour, one-way trip for concrete rubble and up to two-hour, one-way trip for battery and scrap recycling to recycling, or waste facilities.
- Main access road through the center of the site will be maintained. All other surfaces will be covered with 4 inches of loam and seeded.
- All perimeter security fence and sound walls will remain in place, except for the substation fence which will be removed.
- The three existing buildings will remain.

4.1 Disassembly & Removal

4.1.1 Project Management and Mobilization

1.0	Mobilization. Mobilization and demobilization of major equipment and disassembly teams. Establishment of site security, temporary facilities and erosion controls is estimated to be approximately 5% of the decommissioning cost:	$ 201,000
2.0	Project Oversight. Oversight of the decommissioning is estimated at:	$ 135,000
3.0	Incidentals. A budget of approximately 5% of the decommissioning scope is recommended for project incidentals:	$ 201,000
4.0	Contingency. A contingency of approximately 5% of the decommissioning scope is recommended to cover unknowns:	$ 201,000
Total opinion of probable costs for **Project Management:**		**$ 738,000**

4.1.2 Site Work/Civil (Site Reclamation)

1.0 Re-grading of BESS Site.

A. The decommissioning plan includes restoring the area of the BESS Sites. This assumes that all foundation areas will be brought up to grade and sloped to match adjacent grade and drain. The area will be rough graded, and surface scarified to prepare it to receive loam and seed. This includes utilizing a portion of the crushed concrete from foundations as fill.

Approximate area:	299,130	SF
Cost per 1,000 square feet (MSF)	$ 35.00 /MSF	
Total estimate – Re-grading of the site:	$ 10,500	

B. Following the preparation of the area in item A above the site will be finished with the placement of topsoil and other organic matter to support growth, including seed, and mulch.

Approximate disturbed area:	299,130	SF
Cost per square yard (SY)	$ 5.00 / SY	
Total estimate - final loam and seed:	$ 166,200	

The total opinion of probable costs for **Site Work/Civil:** **$ 176,700**

4.1.3 BESS and Transformer Foundations

1.0 Removal of BESS and Transformer Foundations. Removal of the foundations is assumed to require a hydraulic excavator equipped with hydraulic ram (hoe-ram), an additional excavator with bucket for loading, and various dozers and loaders.

Demolition Cost per Unit:	$ 22,500	/unit
Number of Units:	54	units
Total estimate - foundation demolition:	$ 1,215,000	

2.0 Transportation of rubble and disposal. Concrete demolition rubble generated for each BESS unit is estimated to be approximately 90 cubic yards (based on a removal depth of 2 feet below grade). It is assumed the reinforcing steel will be separated from the concrete debris and the remaining materials will be an inert material suitable for disposal at a demolition debris recycling material. It is also assumed that 50% of the concrete rubble (45*54=2430 CY) generated will not be transported offsite but will be used onsite to bring foundation sites back to grade. Costs to transport the remaining foundation rubble for disposal are based on an estimate of 15 CY per truck trip transported to a location within 1 hour (one-way).

Total estimated labor & equipment cost:	$ 340	/dump truck trip
Truck Trips Required (45CY X 54 Units/15CY)	162	trips
Total estimate for BESS foundation concrete costs for all 54 Units:	$ 55,100	
Total estimated disposal cost:	$165	/ton
Total estimate for concrete disposal at recycling facility:	$ 401,000	

The total opinion of probable costs for removal of **BESS Foundations:**	**$ 1,671,100**

4.1.4 BESS Units, Step Up Transformers, Underground Cables, Substation Equipment and Gen Tie Poles and Wires

1.0 Disconnection of Step Up transformers. Disassembly costs for the Step Up transformers are based on the assumption that it will take a 4-man crew and one crane/fork truck 8 hours to test and disconnect each of the 54 transformers.

Estimated labor rate:	$65.00	/man-hour	
Estimated equipment rate:	$100.00	/hour	
Total estimate for BESS disassembly for all 54 Units:			$ 155,600

2.0 Disassembly of BESS Units. Disassembly costs for each Smartskid with 4 battery pods disconnected and removed from Smartskid will take an 4-man crew and one crane/fork truck an estimated 8 hours.

Estimated labor rate:	$65.00	/man-hour	
Estimated equipment rate:	$100.00	/hour	
Total estimate for BESS disassembly for all 216 Smartskid Units:			$ 622,100

3.0 Removal of below grade electrical conductors. Below grade electrical conductors associated with the BESS units will be removed by a combination of excavation and wire pulls. It is assumed that all 3 phase conductors are pulled out together. Recovered wire will be transported off site for recycling.

Estimated labor and equipment rate:	$5.10	/circuit-ft	
Total estimate for removal of below grade cables :			$ 54,000

4.0 Removal of Substation Equipment and Facilities. Remove equipment, supports, control enclosure and all below grade material (to a depth of 3-feet). Assumes that all equipment (e.g. transformer, breakers, switches, etc) are sold for reuse or scrap for a net zero cost.

Lump Sum Cost for Demo and Removal:	$291,500	
Total estimate for Removal of Substation Equipment and Facilities:		$ 291,500

5.0 Removal of Gen Tie Poles and Conductors. Disconnect and remove wires at the utility substation, remove overhead conductors and transmission poles and foundations (to a depth of 3-feet). Steel poles and overhead conductors will be shipped for recycling.

Lump Sum Cost for Demo and Removal:	$41,000	
Total estimate for Removal of Gen Tie Poles and Conductors:		$ 41,000

5.0 Transportation of BESS battery modules. Cost to transport the BESS modules for disposal/recycling is limited by weight. This assumes a single "Pod" is hauled per trip.

Total estimated labor & equipment cost:	$ 800	/transport trip	
Total estimate for BESS transport for all 864 battery pods:			$691,200

6.0 Transportation of Smartskid to haul to recycle, disposal or reuse. Cost of transporting the Smartskids is limited by weight. This assumes a single Smartskid is transported per trip resulting in 216 trips.

Total estimated labor & equipment cost:	$ 800	/transport trip	
Total estimate for transport for all 216 smartskid units:			$172,800

7.0 Transportation of underground cables for recycling. Cost to transport the cable assumes up to 10 tons per trip, resulting in 5 trips.

Total estimated labor & equipment cost:	$ 800	/transport trip	
Total estimate for transportation of cables, requiring 5 trips:			$4,000

8.0 Recycling/Disposal Cost for Lithium-Ion Battery Materials. It is assumed at the time of decommissioning that the battery modules will be removed intact for second-life reuse or recycling at an off-site facility. The processing and recycling of Lithium-Ion Battery modules at a licensed facility will be for zero net cost.

Total estimated disposal cost:	$ 0.00	/lb	
Total disposal cost for 864 battery pods:			$0.00

The total opinion of probable costs for removal of **BESS Units, Step Up Transformers, Underground Cables, Substation Equipment and Gen-Tie Poles and Wires:** **$2,032,200**

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Disassembly & Removal Summary

The total opinion of probable costs for disassembly and removal including, Project Management, Site Work/Civil, BESS and Transformer Foundations and BESS Units, Step Transformers, Substation Equipment and Gen-Tie Poles and Wires is: **$4,618,000**

4.2 Scrap/Salvage Value

For the purposes of this decommissioning plan, we have assumed that transformers will be sold for reuse and all other scrapable metal materials from the project decommissioning will be sold as scrap to a recycling yard in the Springfield, MA area. The presumed scrap / salvage values are based on the following conservative estimates:

4.2.1 Presumed Scrap Value of BESS Equipment

It is assumed at the time of decommissioning that the battery modules will be removed intact for second-life reuse or recycling at an off-site facility for a net zero cost, beyond the shipping costs identified above. Therefore, the analysis below includes Smartstacks only. In estimating the scrap value of the Smartstacks units, a per unit weight of 23,050 lbs was assumed following removal of coolant. The material will vary between steel for enclosures and racks as well as the PCS and other electrical components. It is assumed that units are shipped in-tact for processing at the recycling facility. An average scrap value is used for the purposes of this estimate.

The total weight of 216 Smartstacks is 4,979,000 lbs.

Estimated recycling value for unprepared loads :	$0.10/lb
Total estimated scrap value of non-battery components	$497,900

Total opinion of **presumed scrap value of Smartskid components:** **$497,900**

4.2.2 Presumed Value of the Step Up Transformers

The cost of the step-up transformers is approximately $500,000. Based on our research, typical transformers have a life expectancy of 50 years. Therefore, at 25 years a transformer could have a value of approximately 50% of its original cost. However, to be conservative, we have estimated the value of the internal transformers at 10% of the original transformer cost:

Estimated original cost for step up transformers:	$300,000	each
Estimated value (10%)	$30,000	each

Total opinion of **presumed value for all 54 external transformers:** **$1,620,000**

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4.2.3 Presumed Value of Underground Cables

The estimate of recycling value of underground cables assume cables are delivered to recycling facility without processing. Insulation and sheathing will be removed and disposed of by the recycler:

Estimated recycling value of UG Cable:	$2.00	/lb
Estimated weight of cable	$94,500	lbs

Total opinion of **presumed value underground cables:**	**$189,000**

Scrap/Salvage Value Summary

The total Opinion of probably scrap/salvage value from summing the items above: **$2,306,900**

4.3 Decommissioning Summary

Disassembly & Removal

1.	Project Management and Mobilization	$738,000
2.	Site Work/Civil (Site Reclamation)	$176,700
3.	BESS and Transformer Foundations	$1,671,000
4.	BESS Units, Step Up Transformers and UG Cable, Substation Equip and Gen Tie	$2,032,200
	Disassembly & Removal Total	**$4,618,000**

Scrap/Salvage Value

1.	Presumed scrap value of BESS equipment.	$ 497,900
2.	Presumed value of the Step Up Transformers	$1,620,000
3.	Presumed value of Underground Cables	$ 189,000
	Scrap/Salvage Value Total	**$ 2,306,900**

The total estimated opinion of probable cost for decommissioning is: $2,311,100

5.0 DECOMMISSIONING PLAN ADMINISTRATION

5.1 Roles & Responsibilities

- Owner/Developer: Approves plan, funds activities, oversees compliance and stakeholder engagement.
- Decommissioning Contractor: Executes plan, provides qualified crews, LOTO authority, HSE management, waste logistics.
- Battery Vendor/Recycling Partner: Provides packaging specs, transport guidance, recycling certificates.
- Environmental Consultant: Permitting, waste classification, spill response, stormwater/erosion compliance, monitoring.
- Utility/ISO Liaison: Outage coordination, interconnection termination requirements.
- AHJ/Fire Department: Safety oversight, hot-work approvals, ERP coordination.
- Transportation Vendor (Hazmat): DOT compliance, routing, manifests, incident reporting.

- QA/QC & Documentation Lead: Asset registry, photo logs, manifests, closeout package compilation.
- Transformer Resale Coordinator: Manages testing, certification, resale documentation, buyer coordination, and transport logistics.

5.2 Compliance, Permitting & Reporting

- Regulatory Framework: OSHA (electrical safety, hazmat handling), NFPA 70E, NFPA 855 for ESS, EPA/RCRA for hazardous/universal waste, DOT for lithium-ion transport, EPA Section 608 for refrigerants, and applicable state/local rules.
- Permits/Approvals: Decommissioning permit (if required), road use/oversize load permits, waste transporter permits, air/dust control plans, stormwater/erosion control.
- Recordkeeping: Waste manifests, certificates of recycling/disposal, spill logs, incident reports, daily JHAs, toolbox talks, LOTO logs, ERP drills.
- Stakeholder Notifications: Utility, AHJ, landowner(s), neighbors (if required), environmental agencies for any reportable events.
- Closeout Certification: Submission of complete documentation set; sign-off by Owner and AHJ.

5.3 Schedule & Phasing

- Phase 1 (2–3 months): Permits, planning, mobilization, safety setup, de-energization.
- Phase 2 (6–9 months): Battery removal, packaging, transport, recycling; concurrent PCS/transformer removal for resale.
- Phase 3 (2–4 months): Civil removal (including slab demolition), site restoration, closeout.
- Total Duration: ~10–16 months (subject to vendor capacity and permit windows).

APPENDIX A

SITE PLANS

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SILVER STREET

PERIMETER ACCESS DRIVES TO BE RECLAIMED, FINISHED WITH LOAM AND SEED

BESS AREA TO BE RECLAIMED, FINISHED WITH LOAM AND SEED

CENTER ACCESS DRIVE TO REMAIN

SECURITY FENCE AND SOUNDWALL TO REMAIN

BESS UNITS TO BE REMOVED (TYP)

SECURITY FENCE TO REMAIN

ALL CABLES TO BE REMOVED EXCEPT WITHIN UTILTIY EASTMENT (TYP)

UTILITY EASEMENT

EQUIPMENT FOUNDAITONS TO BE REMOVED TO MINIMUM 2' BELOW GRADE

BUILDINGS TO REMAIN

UNDERGROUND CABLES WITHIN THE UTILITY EASEMENT TO BE ABANDONED IN PLACE

STEP UP TRANSORMERS TO TO BE REMOVED (TYP)

COLLECTION SUBSTATION EQUIPMENT AND FENCING TO BE REMOVED. YARD TO BE RECLAIMED WITH LOAM AND SEED.

GENERATOR LEAD LINE TO BE REMOVED, INCLUDING STRUCTURES AND CONDUCTOR

ALL CABLES TO BE REMOVED EXCEPT WITHIN UTILTIY EASTMENT (TYP)

UTILITY EASEMENT

UTILITY SUBSTATION

0 30 60 120

1 INCH = 60 FEET

NOTES

1. SEE DECOMMISSIONING PLAN FOR FULL DETAIL ON DECOMMISSIONING PROCESS

REV.	BY	DATE	STATUS
B	TMH/SME	02/02/2026	ISSUED FOR REVIEW
A	TMH/SME	01/19/2026	ISSUED FOR REVIEW

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

DECOMMISSIONING PLAN

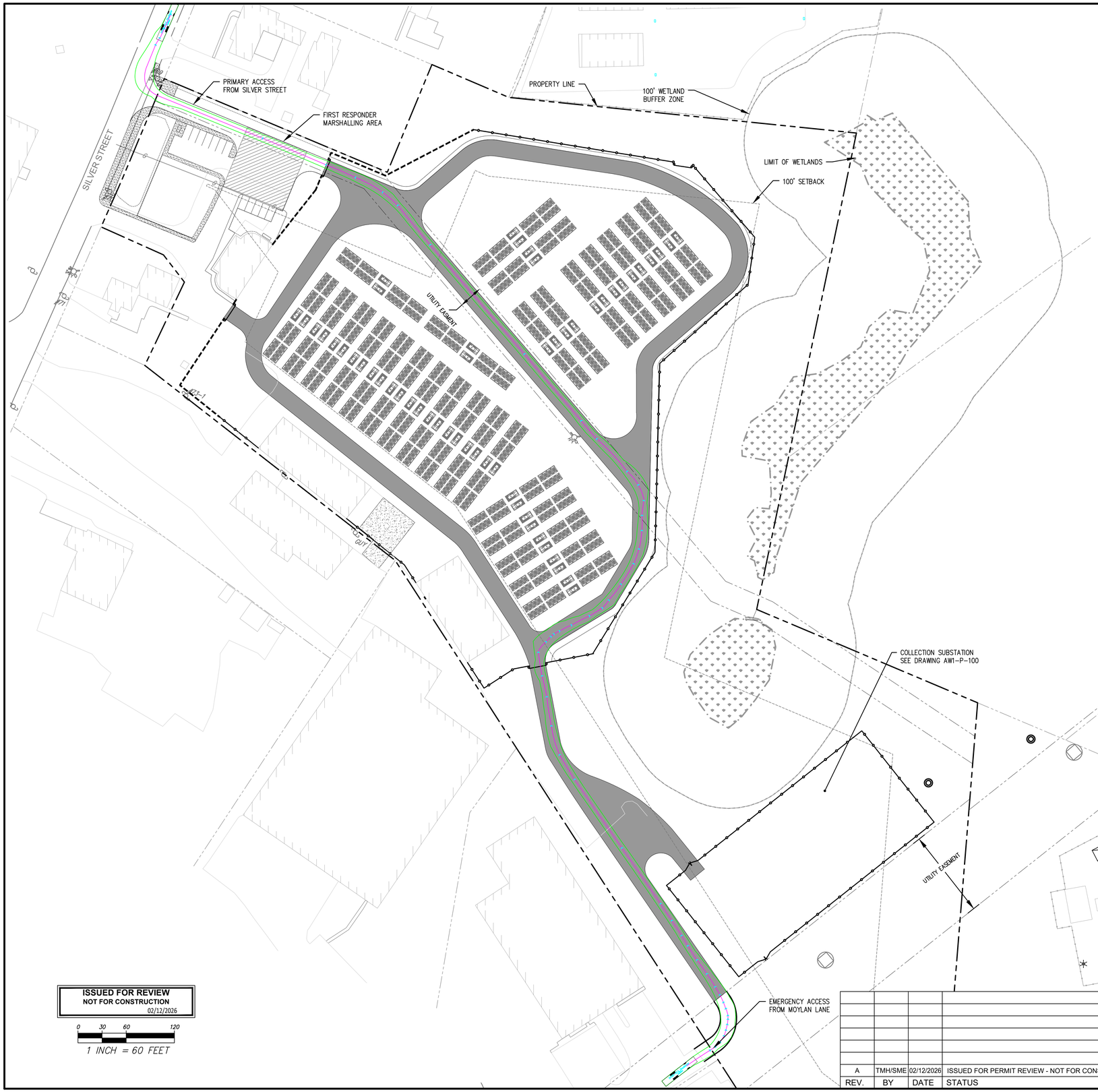
APPLICANT:
AGAWAM ENERGY CENTER, LLC
C/O MICHAEL ALVAREZ
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

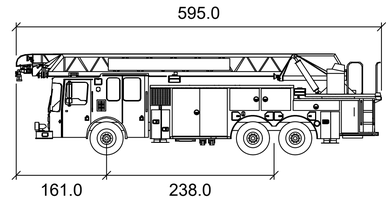
SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	11/14/2025
SCALE:	1"=60'

JOB NO. 250741 DWG FILE FIGURE 1

REV B





0100-012 Gladiator

inches

VEHICLE SPEED: 6 MPH

N

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION
02/12/2026

0 30 60 120

1 INCH = 60 FEET

REV.	BY	DATE	STATUS
A	TMH/SME	02/12/2026	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

SWEPT PATH ANALYSIS - SHEET 1

APPLICANT:
AGAWAM ENERGY CENTER, LLC
C/O MICHAEL ALVAREZ
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL• CIVIL• GEOTECHNICAL• WATER• COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 •Fax 207.829.5692 •sme-engineers.com

DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	02/12/2026
SCALE:	1"=60'

JOB NO. 250741 DWG FILE AW1-C-205-1 REV A

PRIMARY ACCESS FROM SILVER STREET

FIRST RESPONDER MARSHALLING AREA

SILVER STREET

PROPERTY LINE

100' WETLAND BUFFER ZONE

LIMIT OF WETLANDS

100' SETBACK

UTILITY EASEMENT

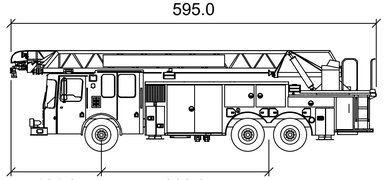
COLLECTION SUBSTATION SEE DRAWING AW1-P-100

UTILITY EASEMENT

UTILITY SUBSTATION

EMERGENCY ACCESS FROM MOYLAN LANE

595.0



161.0 238.0

0100-012 Gladiator

inches

VEHICLE SPEED: 6 MPH

N

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION
02/12/2026

0 30 60 120

1 INCH = 60 FEET

REV.	BY	DATE	STATUS
A	TMH/SME	02/12/2026	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

SWEPT PATH ANALYSIS - SHEET 2

APPLICANT:
AGAWAM ENERGY CENTER, LLC
C/O MICHAEL ALVAREZ
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL• CIVIL• GEOTECHNICAL• WATER• COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 •Fax 207.829.5692 •sme-engineers.com

DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	02/12/2026
SCALE:	1"=60'

JOB NO. 250741 DWG FILE AW1-C-205-2 REV A

PRIMARY ACCESS
FROM SILVER STREET

FIRST RESPONDER
MARSHALLING AREA

SILVER STREET

PROPERTY LINE

100' WETLAND
BUFFER ZONE

LIMIT OF WETLANDS

100' SETBACK

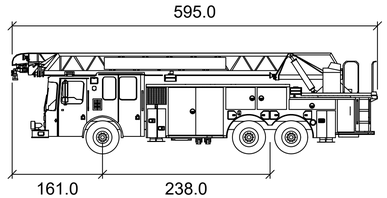
UTILITY EASEMENT

COLLECTION SUBSTATION
SEE DRAWING AW1-P-100

UTILITY EASEMENT

UTILITY SUBSTATION

EMERGENCY ACCESS
FROM MOYLAN LANE



0100-012 Gladiator

inches

VEHICLE SPEED: 6 MPH

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ISSUED FOR REVIEW
NOT FOR CONSTRUCTION
02/12/2026

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1 INCH = 60 FEET

REV.	BY	DATE	STATUS
A	TMH/SME	02/12/2026	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

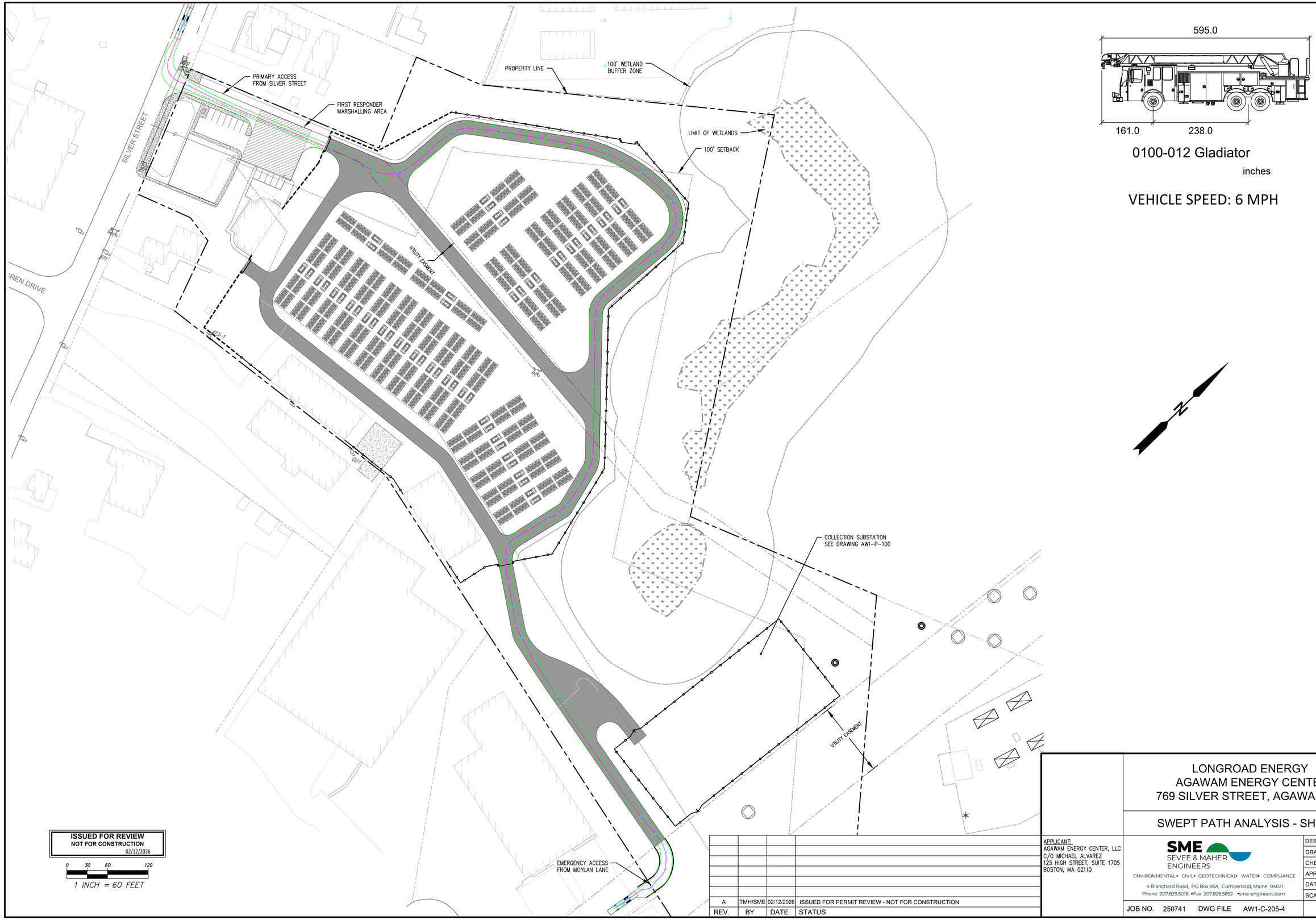
SWEPT PATH ANALYSIS - SHEET 3

APPLICANT:
AGAWAM ENERGY CENTER, LLC
C/O MICHAEL ALVAREZ
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL• CIVIL• GEOTECHNICAL• WATER• COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 •Fax 207.829.5692 •sme-engineers.com

DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	02/12/2026
SCALE:	1"=60'

JOB NO. 250741 DWG FILE AW1-C-205-3 REV A



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VEHICLE SPEED: 6 MPH

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NOT FOR CONSTRUCTION
02/12/2026

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1 INCH = 60 FEET

REV.	BY	DATE	STATUS
A	TMH/SME	02/12/2026	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION

APPLICANT:
AGAWAM ENERGY CENTER, LLC
C/O MICHAEL ALVAREZ
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

SWEPT PATH ANALYSIS - SHEET 4

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Phone 207.829.5016 •Fax 207.829.5692 •sme-engineers.com

DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	02/12/2026
SCALE:	1"=60'

JOB NO. 250741 DWG FILE AW1-C-205-4

REV A

PRIMARY ACCESS
FROM SILVER STREET

FIRST RESPONDER
MARSHALLING AREA

PROPERTY LINE

100' WETLAND
BUFFER ZONE

LIMIT OF WETLANDS

100' SETBACK

SILVER STREET

REN DRIVE

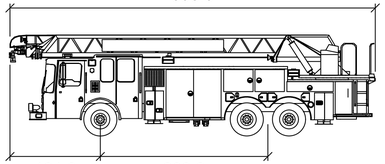
UTILITY EASEMENT

COLLECTION SUBSTATION
SEE DRAWING AW1-P-100

UTILITY EASEMENT

EMERGENCY ACCESS
FROM MOYLAN LANE

595.0



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0100-012 Gladiator

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VEHICLE SPEED: 6 MPH

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ISSUED FOR REVIEW
NOT FOR CONSTRUCTION
02/12/2026

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1 INCH = 60 FEET

REV.	BY	DATE	STATUS
A	TMH/SME	02/12/2026	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

SWEPT PATH ANALYSIS - SHEET 5

APPLICANT:
AGAWAM ENERGY CENTER, LLC
C/O MICHAEL ALVAREZ
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL• CIVIL• GEOTECHNICAL• WATER• COMPLIANCE
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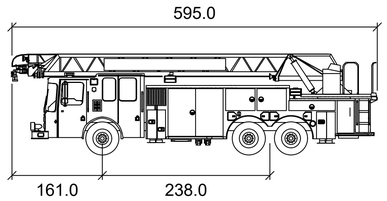
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	02/12/2026
SCALE:	1"=60'

JOB NO. 250741 DWG FILE AW1-C-205 - 5

REV A



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VEHICLE SPEED: 6 MPH

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NOT FOR CONSTRUCTION
02/12/2026

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1 INCH = 10 FEET

REV.	BY	DATE	STATUS
A	TMH/SME	02/12/2026	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION

APPLICANT:
AGAWAM ENERGY CENTER, LLC
C/O MICHAEL ALVAREZ
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

SWEPT PATH ANALYSIS - SHEET 6

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Phone 207.829.5016 •Fax 207.829.5692 •sme-engineers.com

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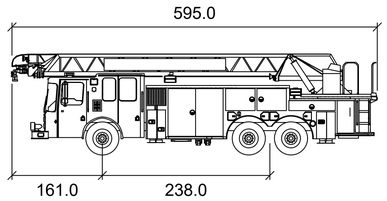
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	02/12/2026
SCALE:	1"=10'

JOB NO. 250741 DWG FILE AW1-C-205-6 REV A



0100-012 Gladiator

inches

VEHICLE SPEED: 6 MPH

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ISSUED FOR REVIEW
NOT FOR CONSTRUCTION
02/12/2026

0 5 10 20

1 INCH = 10 FEET

REV.	BY	DATE	STATUS
A	TMH/SME	02/12/2026	ISSUED FOR PERMIT REVIEW - NOT FOR CONSTRUCTION

APPLICANT:
AGAWAM ENERGY CENTER, LLC
C/O MICHAEL ALVAREZ
125 HIGH STREET, SUITE 1705
BOSTON, MA 02110

LONGROAD ENERGY
AGAWAM ENERGY CENTER
769 SILVER STREET, AGAWAM, MA

SWEPT PATH ANALYSIS - SHEET 7

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL• CIVIL• GEOTECHNICAL• WATER• COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 •Fax 207.829.5692 •sme-engineers.com

DESIGN BY:	TMH/SME
DRAWN BY:	EES/SME
CHECKED BY:	TMH/SME
APRV'D BY:	TMH/SME
DATE:	02/12/2026
SCALE:	1"=10'

JOB NO. 250741 DWG FILE AW1-C-205-7 REV A

Taryn Egerton

From: Derek Myers
Sent: Wednesday, February 11, 2026 2:49 PM
To: Taryn Egerton
Subject: RE: 769 Shoemaker Ln.

Yes. Lol sorry 769 Silver St.

From: Taryn Egerton <TEgerton@agawam.ma.us>
Sent: Wednesday, February 11, 2026 11:13 AM
To: Derek Myers <afdinsp@agawam.ma.us>
Subject: RE: 769 Shoemaker Ln.

Just to confirm – you mean 769 Silver Street (the BESS)?

Taryn Egerton
Planning Director & Conservation Agent
Planning Department

413.726.9737 | tegerton@agawam.ma.us

TOWN OF Agawam MASSACHUSETTS

Please be aware that applications approved by the Town of Agawam are considered public information. Unfortunately, email spammers often monitor municipal records and attempt to compromise communications by sending fraudulent emails, many of which appear to be invoices from the town to applicants.

To avoid confusion or potential scams, please note that the Planning Office including the Planning Board, Zoning Board of Appeals, and Conservation Commission requires all application fees to be submitted at the time of application.

If you receive an invoice after submitting your application, we recommend you to contact our office at 413-726-9737 to determine the authenticity of the invoice.

From: Derek Myers <afdinsp@agawam.ma.us>
Sent: Wednesday, February 11, 2026 9:58 AM
To: Taryn Egerton <TEgerton@agawam.ma.us>
Subject: 769 Shoemaker Ln.

Taryn,
We will need a Swept path analysis for the project at 769 Shoemaker Ln. Agawam, MA. I have attached documents with dimensions they should use.

Town of Agawam

Building Department

1000 Suffield Street, Agawam, Massachusetts 01001
Telephone - (413) 821-0632

February 4, 2026

To: Office of Planning and Community Development:

Re: Site Plan Review Comments for 769 Silver Street Agawam, MA 01001- BESS Project;

The Building Department has no zoning issues or concerns at this time for the proposed Site plan with the last revision date of January 19, 2026 for the above referenced address.

Respectfully,

Kevin Duquette

Kevin Duquette
Inspector of Buildings
Town of Agawam

Town of Agawam

Building Department

1000 Suffield Street, Agawam, Massachusetts 01001
Telephone - (413) 821-0632

February 4, 2026

To: Office of Planning and Community Development:

Re: Site Plan Review Comments for 769 Silver Street Agawam, MA 01001- BESS Project;

The Building Department has no zoning issues or concerns at this time for the proposed Site plan with the last revision date of January 19, 2026 for the above referenced address.

Respectfully,

Kevin Duquette

Kevin Duquette
Inspector of Buildings
Town of Agawam

Site Plan Approval Application

Under the Town of Agawam Zoning Ordinance Section 180-13 Site Plans

Proposed Storage Building

Project Location:

699 Silver Street
Agawam, Massachusetts 01001
(Parcel ID: G6-2-12)

Submitted To:

Town of Agawam Planning Board
1000 Suffield Street
Agawam, Massachusetts 01001

Applicant & Property Owner:

MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, Massachusetts 01001

RLA Project File No. 250903

March 5, 2026

R LEVESQUE ASSOCIATES, INC.

A LAND PLANNING SERVICES COMPANY

40 School Street, Westfield, MA 01085

p 413.568.0985 · f 413.568.0986 · www.rlaland.com

TABLE OF CONTENTS

SECTION

1. COVER LETTER
2. ADMINISTRATIVE FORMS
    2.1 ZONING DETERMINATION
    2.2 FORM D – APPLICATION FOR SITE PLAN APPROVAL
3. PROJECT NARRATIVE
4. LOCUS MAP
5. DEED REFERENCE

LIST OF APPENDICES

APPENDICES

APPENDIX A: SITE PLAN SET

APPENDIX B: STORMWATER REPORT

I. COVER LETTER

R LEVESQUE ASSOCIATES, INC.
40 School Street, P.O. BOX 640, Westfield, MA 01085
p 413.568.0985 · f 413.568.0986 · www.rlaland.com

March 5, 2026

Violet Baldwin, Chairperson
Town of Agawam Planning Board
1000 Suffield Street
Agawam, Massachusetts 01001

RE: Site Plan Approval Application
699 Silver Street
Agawam, Massachusetts 01001
(Parcel ID: G6-2-12)
RLA Project File No. 250903

Dear Chairperson Baldwin and Board Members:

On behalf of the applicant and property owner, MSR Properties, LLC c/o Rick Mahan, please find the requisite number of copies of a Site Plan Approval application and supporting documentation. The applicant proposes the construction of a storage building with associated site improvements located at the above-referenced property.

As required, a copy of this application packet has been submitted electronically via email to the Town of Agawam Planning Department.

We are requesting to be placed on the Board's next available agenda. Should you have any questions or comments regarding this submission, please do not hesitate to contact our office at your earliest convenience.

Sincerely,
R LEVESQUE ASSOCIATES, INC.

Nina Fazio

Nina Fazio
Permitting Coordinator

2. ADMINISTRATIVE FORMS

2.1 ZONING DETERMINATION

2.2 FORM D – APPLICATION FOR SITE PLAN APPROVAL

The Commonwealth of Massachusetts

Town of Agawam

Inspection Services - Building Department

1000 Suffield Street, Agawam MA 01001 – (413) 821-0632

OFFICE ONLY
Date Filed:
RECEIVED BY BUILDING DEPARTMENT
FEB 26 2026
TOWN OF AGAWAM

Application for Zoning Determination

FILING INSTRUCTIONS: Deliver this form (no fee required) to Inspection Services.
For digital submissions, please confirm receipt. A *complete* application will be processed within 30 days.
The applicant must pick-up, or arrange for the receipt of, this processed form.

1) PROPERTY INFORMATION			
a. Street Address	699 Silver Street	**b. Zoning District**	HA, TB
c. Assessor's Map	G6	**d. Lot(s)**	2-12
e. Registry of Deeds Book	20869	**f. Page**	318
g. Overlay Districts	☐Historic Preservation ☐ Mixed-Use Business C		
h. Previous Special Permits, Site Plan Approvals, Findings or Variances Issued for this Site			

2) APPLICANT & OWNER INFORMATION			
a. Applicant Name	MSR Properties, LLC	**b. Applicant Phone**	413-788-9529
c. Applicant Email	rick@mahanslate.com		
d. Applicant Mailing Address	699 Silver Street, Agawam, MA 01001		
e. Applicant Relationship to Property	☑Owner ☐ Agent ☐Other:		
f. Representative Name *(if any)*	R Levesque Associates, Inc.	**g. Rep. Phone**	413-568-0985
h. Rep. Email	NinaF@rlaland.com		
i. Owner Mailing Address	699 Silver Street, Agawam, MA 01001		
j. Owner Name *(if different)*	MSR Properties, LLC	**k. Owner Phone**	413-788-9529
l. Owner Email	rick@mahanslate.com		
m.Owner Mailing Address	699 Silver Street, Agawam, MA 01001		

3) PROJECT & SITE DETAILS
NOTE: Any omission of requested information may result in an INCOMPLETE determination

	Existing	***Proposed*** ☐ *No changes to building, site or lot*	-FOR BUILDING DEPT. REVIEW- REQUIRED / NCU	
a. Lot Size	136,159 SF	136,159 SF	LOT SIZE	☐
b. Frontage	**189** FT	189 FT	FRONTAGE	☐
c. Front Lot Line	**80.5** FT	80.5 FT	FRONT SB	☐
d. Side Lot Line (Left/Right)	L: FT **124** R: 25.5 FT	L: 76 FT R: 76 FT	SIDE SB	☐
e. Rear Lot Line	FT 311	FT 131	REAR SB	☐
f. Building Height	<40 FT	<40 FT	BLDG HT	☐
g. Total BLDG/Res Area	15,000 SF N/A SF	22,440 SF N/A SF	AREA LIM	☐
h. BLDG Coverage (Footprint)	15,000 SF 11 % of lot	22,440 SF 16 % of lot	LOT COVER	☐
i. Impervious Coverage	56,346 SF 41 % of lot	103,713 SF 76 % of lot	IMPERVIOUS	☐
j. Parking/Loading Spaces	P: 19 L: **N/A**	P: **31** L: N/A	PARKING	☐
k. Bicycle/EV Charge Spaces	B: **0** EV: **0**	B: **0** EV: 0	BIKE/EV	☐
l. Signs (Size & Type)	x T: **Ground**	x T: Ground	SIGNS	☐
m. Fence (Size & Type)	LIN FT T:	LIN FT T:		
n. Wetland Area	0 (Off-site) SF	0 (Off-site) SF		
o. Utility Services	☑ Town Water ☑ Town Sewer	☑ Town Water ☑ Town Sewer	NON-CONFORMING USE	☐

p. Current Use of Property	Industrial - Mahan Slate Roofing
q. Proposed Use of Property	Industrial - Mahan Slate Roofing

r. Project Description

The applicant proposes an accessory storage building.

s. I have attached additional narrative, plans or supporting materials *(any oversize plans should also be included in an 8.5 x 11" format)*	☑ Yes ☐ No
t. Work is proposed in or within 100' of a wetland or 200' of a stream/river, or construction will occur within the Floodplain district. ***If so, CONSERVATION COMMISSION review is required.***	☑ Yes ☐ No ☐ Unsure
u. The following projects shall be required to comply with the requirements of a STORM DRAIN PERMIT: **[1] Any alteration to sites on parcels of one acre or greater.** **[2] Any alteration to individual lots less than one acre, but which are contiguous or are deemed part of a common project which is one acre or greater.**	☑ Yes ☐ No ☐ Unsure
v. The project will affect at least one of the following; additional gross floor area by 2,000 square feet, any change of use, changes to parking and/ or curb cuts.	☑ Yes ☐ No

4) CERTIFICATION

This determination is based only on the information provided, which I represent as accurate. The issuance of a Zoning Determination does not relieve the Applicant of the responsibility to obtain other zoning or non-zoning permits, as may be required, and this determination is based on the zoning in effect at the issue date and grants no protection from any pending or future zoning changes. Additional information may be requested and required to properly process this form. Any non-zoning related comments provided are cursory in nature; Applicants should follow-up with appropriate Town Departments. ***Sec. 1-7 of the Town of Agawam's General Ordinances authorizes the denial of a license or permit where an outstanding debt or obligation to the Town exists.***

Signature	Nina Fazio	**Date**	02-26-2026

☐ Applicant ☑ Applicant's Representative

ZONING DETERMINATION - OFFICE USE ONLY

☐ Approved ☐ Denied: ☐ The proposed use is not permitted in the subject zoning district
☐ Only permissible with variance relief from the Zoning Board of Appeals

☒ Approved ***Pending additional approval:***

Per Zoning Ordinance Section(s)	Required Permit(s)	Approval Required	Permitting Authority
180-13-B-1	☒ Building Permit(s)	☐ Special Permit(s)	☒ Planning Board
180-13-B-4	☒ Electrical Permit(s)	☒ Site Plan Review	☐ Board of Appeals
	☒ Plumbing/Gas Permit(s)	☐ Variance	☐ City Council

Town Building Official		**Issue Date**	2/26/2026

This determination may be appealable to the Zoning Board of Appeals under the provisions of MGL Ch. 40A Sec. 8.
Revised 09/08/2022

TOWN OF AGAWAM, MASSACHUSETTS

FORM D

Application for Site Plan Approval

Please complete the following form and electronically submit with site plans, completed Zoning Determination and Storm Water Management Report to: siteplan@agawam.ma.us in addition to sending four (4) hard copies of the Site Plan and one (1) hard copy of the Storm Water Management Report and completed Zoning Determination to:

Agawam Planning Department

36 Main Street

Agawam, MA 01001

March 5 20 26

1. Name of Business Mahan Slate Roofing, Co.

   Address 699 Silver Street, Agawam, MA 01001

   Phone # 413-788-9529 email rick@mahanslate.com

2. Name of Applicant/Owner MSR Properties, LLC

   Address 699 Silver Street, Agawam, MA 01001

   Phone # 413-788-9529 email rick@mahanslate.com

3. Name of Engineer/Architect R Levesque Associates, Inc.

   Address 40 School Street, Westfield, MA 01085

   Phone # 413-568-0985 email ninaf@rlaland.com

4. Please give a brief description of the proposed project:

   The applicant proposes the construction of a storage building with associated site improvements accessory to the existing building at 699 Silver Street. Please refer to the attached project narrative for greater detail.

3. PROJECT NARRATIVE

PROJECT NARRATIVE

For

PROPOSED STORAGE BUILDING
699 SILVER STREET
AGAWAM, MASSACHUSETTS 0001
(PARCEL ID: G6-2-12)

INTRODUCTION

On behalf of the applicant and property owner, MSR Properties, LLC c/o Rick Mahan, R Levesque Associates, Inc. is providing this project narrative as a supplement to the Site Plan Approval application. The applicant proposes the construction of a storage building with associated site improvements accessory to the existing building at 699 Silver Street.

The applicant respectfully requests Site Plan Approval from the Planning Board in accordance with:

(1) Section 180-13(B)(1) for non-residential construction greater than 2,000 SF; and
(2) Section 180-13(B)(4) for changes to parking.

PROPERTY DESCRIPTION

The subject property is located east of Silver Street and consists of approximately 3.13 ± acres as shown on the associated site plan prepared by R Levesque Associates, Inc. The subject property is owned by MSR Properties, LLC and is recorded in the Hampden County Registry of Deeds in Book 20869, Page 318. A copy of the deed reference is included within this application packet under Section 5. According to the Town of Agawam Zoning Map, the subject property is located within the Industrial B (IB) zoning district. A Locus Map is included within this application packet under Section 4.

EXISTING CONDITIONS & SURROUNDING LAND USES

The subject property is currently improved with an existing 15,000 ± SF building with associated site improvements utilized by Mahan Slate Roofing Co. The subject property is bound by commercial and industrial utilized parcels within the Industrial A (IA) and Industrial B (IB) zoning districts.

PROJECT DESCRIPTION

The applicant proposes the construction of a storage building with associated site improvements. Associated site improvements include, but are not limited to, stormwater management, additional parking, utility connection, and site landscaping.

The proposed project work will proceed in the following general sequence:

1. Installation of erosion controls along the permitted limit of work;
2. Clear and grub the project area;
3. Demolition and removal of existing stormwater basin and associated site improvements;
4. Construction of new subsurface stormwater management system;
5. Extension of existing utility connections;
6. Construction of a 7,440 ± SF storage building;
7. Restripe and expand existing parking area;
8. Installation of site landscaping; and
9. Site stabilization and removal of erosion controls at the direction of the Town of Agawam Conservation Commission.

PARKING & SITE CIRCULATION

The existing parking area will be restriped and modestly expanded. The revised layout has been designed to improve overall organization of parking stalls while maintaining safe and efficient internal vehicle circulation throughout the site. A total of thirty-one (31) parking spaces are proposed, including two (2) ADA compliant accessible spaces located in proximity to the primary building entrance.

The proposed modifications are limited to internal site improvements and do not alter existing traffic patterns or access configuration. No changes are proposed to the established site access along Silver Street, and existing ingress and egress operations will remain unchanged. Circulation aisles have been configured to maintain adequate maneuverability for passenger vehicles and service traffic while minimizing disturbance to existing site features.

UTILITIES

Utility service to the proposed storage building will be provided through connections extended from the existing principal structure. Utility demand for the new building is

anticipated to be minimal and primarily limited to electrical service necessary for lighting and basic operational functions. Final utility routing, connection details, and service requirements will be coordinated as part of the final architectural and mechanical design process. All installations will comply with applicable utility provider standards and local regulations and may be refined as necessary.

LANDSCAPING & LIGHTING

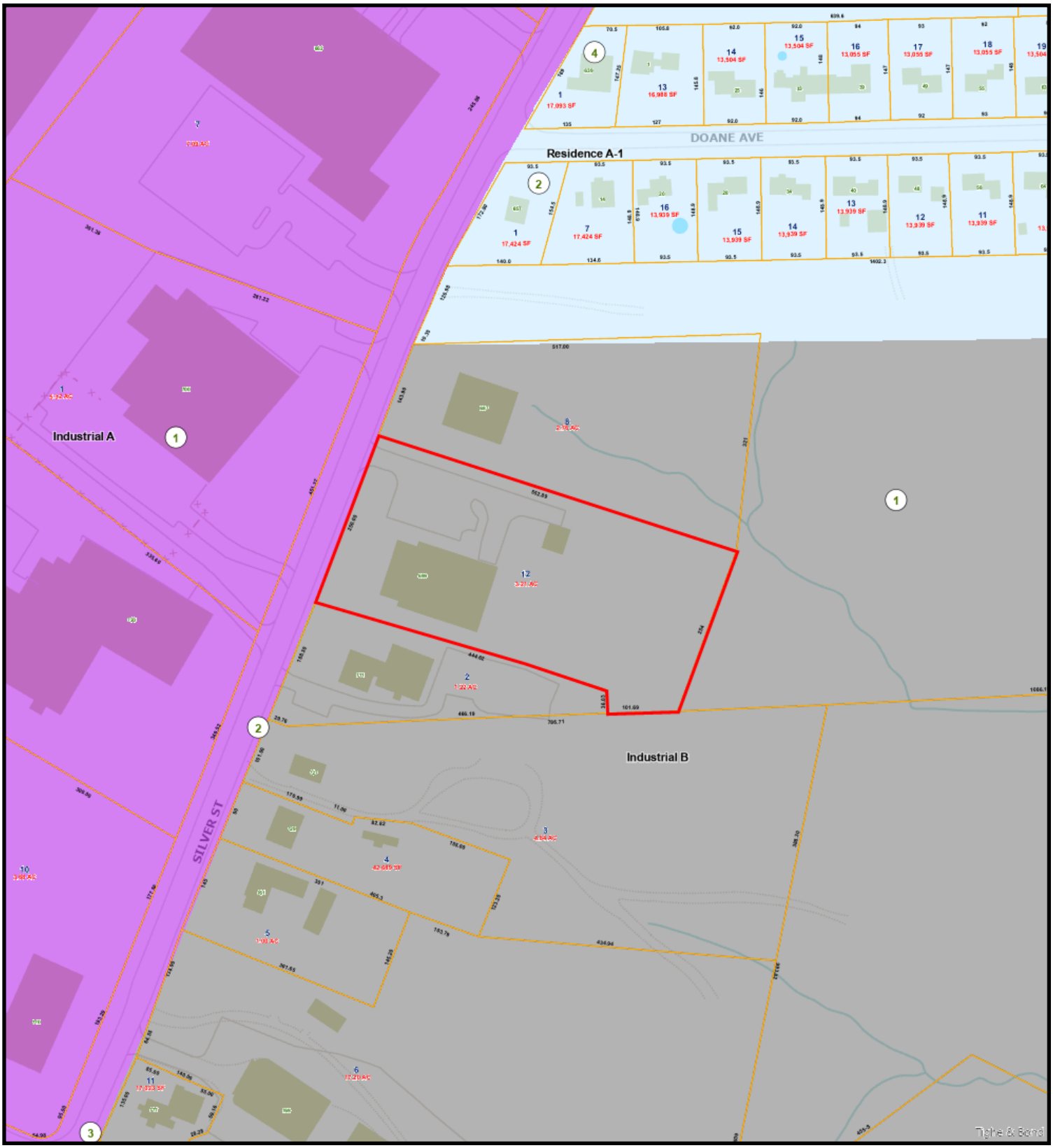
Landscape improvements are proposed to enhance site aesthetics and provide additional buffering along the northern edge of the parking area. Disturbed lawn areas associated with site improvements will be restored through placement of loam and seed to promote stabilization.

Site lighting will remain unchanged from existing conditions.

[END OF PROJECT NARRATIVE]

4. LOCUS MAP

(SOURCE: TOWN OF AGAWAM GIS)



Locus Map

2/23/2026 11:14:22 AM

Scale: 1"=200'

Scale is approximate

The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analyses.

5. DEED REFERENCE

(SOURCE: HAMPDEN COUNTY REGISTRY OF DEEDS)

Bk 20869 Pg318 #50848
09-14-2015 @ 10:49a

MASSACHUSETTS STATE EXCISE TAX
HAMPDEN COUNTY REGISTRY OF DEEDS
Date: 09-14-2015 @ 10:49am
Ctl#: 83 Doc#: 50848
Fee: $4,240.80 Cons: $930,000.00

QUITCLAIM DEED

SILVER STREET REALTY, LLC, a Massachusetts Limited Liability Company having a principal place of business at 699 Silver Street, Agawam, Hampden County, Massachusetts,

for consideration paid and in full consideration of **NINE HUNDRED THIRTY THOUSAND AND 00/100 ($930,000.00) DOLLARS**

grants to **MSR PROPERTIES, LLC**, a Massachusetts Limited Liability Company having a principal place of business at 32 Verge Street, Springfield, Hampden County, Massachusetts,

with ***QUITCLAIM COVENANTS***

The address of the within premises is: Lot A Silver Street, Agawam, Massachusetts, and also known as 699 Silver Street, Agawam, Massachusetts.

The land in Agawam, Hampden County, Massachusetts with the buildings thereon, being known and designated lot "A" as shown on a plan entitled Division of Property Agawam, Massachusetts for: (Owner) Park West Bank and Trust Company, Date: January 8, 1998, D.L. Bean, Inc. Surveyors & Engineers" which plan is recorded with the Hampden County Registry of Deeds herewith in Book of Plans 307, Page 65, to which plan reference may be had for a more particular description.

Containing according to said plan 3.1662 acres.

Granting together with the above described property, the right and easement running in favor of the grantee, its successors and assigns, to divert and flow water which may be generated or congregates on the land of the grantee herein onto that portion of the remaining land of the grantor as is shown on a plot plan by D.L. Bean, Inc. Land Consultants, dated March 20, 1988 which plan is annexed hereto and incorporated herein by reference, and the right to enter to do necessary repairs, maintenance and improvements to the same.

Being the premises conveyed to the Grantor herein by Deed dated January 23, 2001 and recorded in the Hampden County Registry of Deeds in Book 11483, Page 246.

The grantor is not classified for the current taxable year as a corporation for federal income tax purposes.

Property Address: 699 Silver Street Agawam, MA 01001

WITNESS my hand and seal this 10 day of September, 2015.

Witness:

SILVER STREET REALTY, LLC

By: Jean M. Graham, Manager
JEAN M. GRAHAM, Manager

COMMONWEALTH OF MASSACHUSETTS

Hampden, ss

Then personally appeared **JEAN M. GRAHAM, Manager of Silver Street Realty, LLC**, on this 10 day of September, 2015, before me, the undersigned Notary Public, who proved to me through satisfactory evidence of identification in the form of a driver's license or is personally known to me, to be the person whose name is signed on this document and acknowledged to me that she signed it voluntarily for its stated purpose and that it is the free act and deed of Silver Street Realty, LLC.

Notary Public

STEPHEN R. MANNING
NOTARY PUBLIC
Commonwealth of Massachusetts
My Commission Expires 04/20/2018

DONALD E. ASHE, REGISTER
HAMPDEN COUNTY REGISTRY OF DEEDS

APPENDIX A: SITE PLAN SET

SITE PLAN SET ENTITLED “PROPOSED STORAGE BUILDING”

PREPARED FOR MSR PROPERTIES, LLC

PREPARED BY R LEVESQUE ASSOCIATES, INC.

DATED MARCH 5, 2026

APPENDIX B: STORMWATER REPORT

STORMWATER DRAINAGE REPORT

PREPARED FOR MSR PROPERTIES, LLC

PREPARED BY R LEVESQUE ASSOCIATES, INC.

DATED MARCH 5, 2026

Stormwater Drainage Report

Proposed Storage Building

699 Silver Street
Agawam, MA 01001
(Parcel ID: G6-2-12)



Applicant/Property Owner:

MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

RLA Project File: 250903

March 5, 2026

R LEVESQUE ASSOCIATES, INC
A LAND PLANNING SERVICES COMPANY
40 School Street · Westfield, MA 01085
p 413.568.0985 · f 413.568.0986 · www.rlaland.com

TABLE OF CONTENTS

SECTION PAGE NO.

I. INTRODUCTION....1-1

2. SITE DESCRIPTION....2-1

2.1 Predevelopment Conditions....2-1
2.2 Resource Areas....2-1
2.2.1 Floodplain....2-1
2.2.2 Natural Heritage and Endangered Species Program....2-1
2.2.3 Aquifer Protection District....2-2
2.3 Soils....2-2
2.4 Post Development Conditions....2-2

3. STORMWATER MANAGEMENT SYSTEM....3-4

3.1 Drainage Calculations....3-4
3.1.1 Design Points....3-5
3.1.2 Pre-Development Hydrology....3-5
3.1.3 Post-Development Hydrology....3-5
3.1.4 Peak Discharge Rates....3-5
3.2 Hydraulic Analysis....3-6
3.3 MassDEP Stormwater Management Standards....3-6
3.4 Stormwater Best Management Practices....3-9
3.4.1 Deep Sump Catch Basins....3-9
3.4.2 Proprietary Sedimentation Devices....3-9
3.4.3 Subsurface Infiltration Basin....3-9
3.5 Protection of Stormwater Best Management Practices during Construction....3-9
3.6 Inspection and Maintenance of Stormwater Best Management Practices....3-10
3.7 Illicit Discharge Compliance Statement....3-10
3.8 Low-Impact Development Alternatives Analysis Narrative....3-10

4. CONCLUSION....4-11

List of Tables

Table Page No.

Table 2.4: Hydrologic Soil Group Classification....2-2

Table 3.1: Design Rainfall Data – Hampden County....3-4

Table 3.1.4 Pre- and Post-Development Peak Discharge Rates....3-5

List of Figures

Figure

Figure 1: Site Locus – USGS Map
Figure 2: FEMA Flood Map
Figure 3: NHESP Map
Figure 4: Pre-Development Watershed Plan
Figure 5: Post-Development Watershed Plan
Figure 6: Inlet Area Plan

Appendices

APPENDIX A: CHECKLIST FOR STORMWATER REPORT
APPENDIX B: SOILS INFORMATION
APPENDIX C: PRE- AND POST- DEVELOPMENT HYDROLOGIC ANALYSIS (2, 10, & 100 YEAR STORM EVENTS)
APPENDIX D: HYDRAULIC ANALYSIS
APPENDIX E: MASSDEP CALCULATIONS
APPENDIX F: CONSTRUCTION PERIOD EROSION CONTROL PLAN
APPENDIX G: LONG-TERM OPERATION AND MAINTENANCE PLAN
APPENDIX H: ILLICIT DISCHARGE COMPLIANCE STATEMENT
APPENDIX I: LOW IMPACT DEVELOPMENT CONSIDERATIONS

I. INTRODUCTION

The applicant, MSR Properties, LLC, is proposing to construct a storage building on a parcel identified as lot G6-2-12 in Agawam, Massachusetts. The proposed project will include the construction of a storage building, paved parking areas, and the construction of a stormwater management system. Currently, the majority of stormwater runoff from the property sheet flows to an existing stormwater basin and wetlands off-site to the east. The proposed development will generally maintain the existing drainage patterns of the site and direct treated stormwater towards the same design points as in pre-development conditions.

The proposed project involves the following:

1. Construction of a storage building;
2. Construction of paved parking areas;
3. Construction of a new stormwater management system including deep sump hooded catch basins, proprietary sedimentation devices, and a subsurface infiltration basin.

The purpose of this report is to present information regarding the technical aspects of the stormwater management system for the proposed project. All work is intended to be in full compliance with the Town of Agawam Stormwater Management Permit requirements as well as the Massachusetts Department of Environmental Protection Stormwater Management Handbook.

2. SITE DESCRIPTION

2.1 Predevelopment Conditions

The property to be developed is located at 699 Silver Street and is listed as Parcel G6-2-12 by the Town of Agawam Assessor's Office. The property is zoned Industrial B, as referenced from Agawam GIS. The property is bounded to the north by an industrial warehouse, to the east by a vacant parcel containing wetlands, to the south by a commercial office, and to the west by Silver Street. The parcel to be developed is approximately 3.13 acres in size. Figure 1 – USGS Map illustrates the location of the project.

The project site currently contains an existing industrial-use building with associated parking areas in the westerly portion of the parcel. The easterly portion of the parcel contains paved and gravel areas, and an existing stormwater basin. Stormwater runoff from the westerly portion of the site is collected in existing catch basins located at low points in the parking area. The runoff is then conveyed to the existing stormwater basin through underground pipe. The stormwater basin is equipped with an outlet pipe that directs stormwater downgradient towards wetlands to the east. Stormwater runoff from the easterly portion of the parcel sheet flows downgradient towards the wetlands to the east. The existing topography of the parcel slopes down moderately from west to east. The grade at the westerly edge of the property is approximately 194 feet and slopes to approximately 184 feet at the easterly edge. The northeasterly corner of the parcel is wooded and slopes steeply down to approximately 175 feet. Please refer to the existing conditions plan submitted herewith for more detailed topographical information and Figure 4 "Pre-Development Watershed Plan" for sub-catchment area boundaries.

2.2 Resource Areas

Portions of the proposed site improvements are located within the 100' and 50' jurisdictional wetland buffer zone areas associated with off-site bordering vegetated wetlands. Please refer to the Notice of Intent filing with the conservation commission for additional information regarding resource areas.

2.2.1 Floodplain

R. Levesque Associates, Inc. performed due diligence research on the property in regard to FEMA flood zone mapping. As demonstrated by the most recent FEMA Flood Insurance Rate Maps, the property is not located within any flood hazard areas, see Figure 2 – FEMA FIRM Map.

2.2.2 Natural Heritage and Endangered Species Program

R. Levesque Associates, Inc. performed due diligence research on the property in regard to Natural Heritage and Endangered Species Program (NHESP) areas. A portion of the property is

located within an NHESP priority habitat of endangered species, see Figure 3 – NHESP Map & Zone II Map.

2.2.3 Aquifer Protection District

R. Levesque Associates, Inc. performed due diligence research on the property in regard to wellhead protection overlay districts. The property is not located within a Zone II Wellhead Protection Area; see Figure 3 – NHESP & Zone II Map.

2.3 Soils

R. Levesque Associates, Inc. researched the soils located on site with information readily available by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). Based on a review of the USDA Soil Survey of Hampden County, Massachusetts, Central Part, the site is comprised of the following soil types:

Table 2.4: Hydrologic Soil Group Classification

Soil Description	Map Unit Symbol	Hydrologic Soil Group
Merrimac fine sandy loam	254A	A
Merrimac fine sandy loam	254B	A
Merrimac fine sandy loam	254C	A

A total of four (4) test pits were conducted by Dennis Lacourse SE# 1297 to verify the existing site soil characteristics and evaluate the ability of the site to support the proposed stormwater drainage system components. The test pits were spread out across the areas of the proposed subsurface infiltration basin to establish the elevation of the estimated seasonal high groundwater and soil conditions. Groundwater was encountered in some of the test pits and was estimated to be at a depth of 122 inches to 130 inches below grade. The depth of the test pits ranged from 120 inches to 130 inches below grade. In general, the soil evaluations confirmed the NRCS mapping. See Appendix B for additional soils information.

2.4 Post Development Conditions

The proposed site improvements include a number of stormwater management features to properly meet the requirements set forth by the Town of Agawam Stormwater Management Permit requirements. The proposed stormwater features include:

- Deep-sump hooded catch basins
- Proprietary sedimentation devices
- Subsurface infiltration basin

The applicant is proposing to construct a storage building on the subject property. The proposed development includes the construction of a storage building, impervious parking areas, and a stormwater management system. No changes to the existing building are proposed.

The proposed stormwater management system will collect runoff from the impervious surfaces via deep sump catch basins strategically located at low points across the site. The inlet structures will be connected via a network of underground infrastructure which will convey the runoff towards proprietary sedimentation devices for additional water quality treatment. Runoff will then be conveyed to a subsurface infiltration basin for groundwater recharge and peak discharge rate attenuation. Roof runoff from the proposed storage building will be collected via underground piping and conveyed to the subsurface infiltration basin. The subsurface infiltration basin was designed to accommodate peak discharge rates for storm events up to and including the 100-year 24-hour storm event. The system has been equipped with an outlet control structure designed such that runoff will discharge downgradient to a level spreader. Overall, the proposed site improvements will maintain the general drainage patterns of the site while improving water quality and reducing/maintaining peak discharge rates. See Figure 5 – Post-Development Watershed Plan for delineation of sub-catchment areas.

3. STORMWATER MANAGEMENT SYSTEM

R. Levesque Associates, Inc. has prepared the following drainage system calculations for the proposed project site. These calculations were performed to document compliance with the guidelines set forth by the Town of Agawam Stormwater Management Permit requirements and the Massachusetts Department of Environmental Protection Stormwater Management Handbook (MassDEP Handbook). A detailed hydrologic analysis of the system was completed in order to evaluate the performance of the stormwater management system components, see Appendix C – Pre- and Post-Development Hydrologic Analysis. The proposed stormwater management system will collect runoff from on-site impervious areas and utilize stormwater best management practices to provide water quality treatment, groundwater recharge, and peak discharge rate attenuation.

3.1 Drainage Calculations

R. Levesque Associates, Inc. utilized the HydroCAD software program, Version 10.20-7a, developed by HydroCAD Software Solutions LLC, in order to create and analyze the site hydrology. The HydroCAD software is based upon the Soil Conservation Service (SCS) "Technical Release 20 – Urban Hydrology for Small Watersheds" and "Technical Release 55 – Urban Hydrology for small Watersheds" which are generally accepted industry standard methodologies. The analysis was conducted in order to establish the peak discharge rates and estimated run-off volume from the project site. This was accomplished to properly evaluate pre- and post-development conditions during various storm events. Contributing drainage areas were identified and soils, surface cover, watershed slope, and flow paths were evaluated to develop the necessary HydroCAD model input parameters.

Drainage calculations were performed for the Pre- and Post-Development conditions for the 24-hour, 2, 10, and 100-year Type III storm events. The total rainfall for each of the storm events was based upon data provided by the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 point precipitation frequency estimates. The total rainfall values used in the hydrologic modeling for each event are shown in the following table:

Table 3.1: Design Rainfall Data – Hampden County		
2-year, 24-hour storm	10-year, 24-hour storm	100-year, 24-hour storm
3.22 inches	5.18 inches	8.31 inches

3.1.1 Design Points

In order to compare the difference between pre- and post-development peak flows, existing and proposed watersheds were delineated. Two Design Points (DP) were established with a flow path representing the longest time of concentration of run-off in each tributary watershed. For this analysis, the design points were determined as follows:

- DP-1 – Offsite Wetland: This design point represents runoff from the project area which flows to the wetlands on the adjacent parcel.
- DP-2 – Silver Street: This design point represents runoff from the project area which flows to Silver Street.

3.1.2 Pre-Development Hydrology

The project area under existing conditions contains three (3) sub-catchments tributary to the design points described above. The sub-catchments were delineated based on the existing topography of the parcel and surrounding areas. The existing watershed area is shown on the attached Figure 4 entitled "Pre-Development Watershed Plan". Peak discharge rates for the design point are depicted in Table 3.1.4 on the following page.

3.1.3 Post-Development Hydrology

The project area under proposed conditions was broken down into three (3) sub-catchments discharging to the design points as described in existing conditions. The proposed watershed areas are shown on the attached Figure 5 entitled "Post-Development Watershed Plan". Peak discharge rates for the design point are depicted in Table 3.1.4 below.

3.1.4 Peak Discharge Rates

The table below summarizes the Pre- and Post-Development peak discharge rates for each Design Point:

Table 3.1.4 Pre- and Post-Development Peak Discharge Rates

	2-year storm (cfs)		10-year storm (cfs)		100-year storm (cfs)	
	Pre-	Post-	Pre-	Post-	Pre-	Post-
Design Point 1	3.4	3.3	5.2	5.1	8.2	6.8
Design Point 2	0.0	0.0	0.0	0.0	0.1	0.1

As depicted in table 3.1.4, the post-development peak discharge rates do not increase over pre-development peak discharge rates for each of the storm events presented. This is accomplished by providing on-site attenuation through the proposed subsurface infiltration basin.

3.2 Hydraulic Analysis

R. Levesque Associates, Inc. utilized the Hydraflow Storm Sewer Extension for AutoCAD Civil 3D 2024 software program, developed by Autodesk, Inc., to analyze the hydraulic capacity of the proposed underground infrastructure. The analysis was conducted to verify that the proposed conveyance piping has sufficient capacity to convey up to and including the 24-hour, 10-year storm event. The data from the analysis was used to properly size the conveyance piping such that there is no or minimal surcharge of stormwater above the rim elevations within the paved areas. As part of the input parameters required for the hydraulic analysis, the tributary inlet areas were delineated based on topography, any additional connected discharges, characteristic land use coverages and flow paths, see Figure 6 – Inlet Area Plan. A minimum Time of Concentration (Tc) of (6) minutes was used in the calculations. Please refer to Appendix D for the hydraulic analysis of the proposed stormwater management system.

3.3 MassDEP Stormwater Management Standards

R. Levesque Associates, Inc. has designed the proposed stormwater management system to be in compliance with the MassDEP Stormwater Management Standards. Chapter 1, Volume 3 of the MassDEP Handbook outlines specific calculations, and other information, that must be submitted with each report to document compliance. The following summary highlights elements of the proposed project and how they apply to each standard.

- *Standard #1 - No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

  The proposed project provides best management practices designed to the guidelines of the MassDEP Handbook. Therefore, no new untreated stormwater is discharged.

- *Standard #2 – Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.*

  The proposed stormwater management system has been designed such that the post-development peak discharge rates do not exceed the pre-development peak discharge rates for the 2-year, 10-year, and 100-year 24-hour storms. See Appendix C for the Hydrologic Analysis.

- *Standard #3 - Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater BMPs, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required volume as determined in accordance with the Massachusetts Stormwater Handbook.*

  The proposed subsurface infiltration basin has been designed with the capacity to infiltrate the required recharge volume for the tributary impervious areas. See Appendix E for the Required Recharge Volume Calculations.

- *Standard #4 – Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of TSS. It is presumed that this standard is met when:*

  a. *Suitable practices for source control and pollution prevention are identified in a long term pollution prevention plan, and thereafter are implemented and maintained;*

  b. *Structural stormwater BMPs practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and*

  c. *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook*

  The proposed stormwater management system has been designed to provide the required total suspended solids pre-treatment prior to discharge to the subsurface infiltration basin. See Appendix E for the Water Quality and Total Suspended Solids Removal Calculations.

- *Standard #5 - For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by MassDEP to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.*

  This standard is not applicable.

- *Standard #6 – Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater BMPs determined by MassDEP to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.*

  This standard is not applicable.

- *Standard #7 – A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural BMPs requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.*

  This standard is not applicable.

- *Standard #8 – A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention) shall be developed and implemented.*

  A Construction Period Erosion Control Plan has been provided in Appendix F.

- *Standard #9 – A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

  A Long-term Operation & Maintenance Plan has been provided in Appendix G.

- *Standard #10 - All illicit discharges to the stormwater management system are prohibited.*

  An illicit discharge statement will be provided prior to discharge of stormwater to post-construction BMPs. See Appendix H for a copy of the Illicit Discharge Statement.

3.4 Stormwater Best Management Practices

The proposed stormwater management system was designed utilizing stormwater best management practices (BMP) as set forth by the MassDEP Handbook. The BMPs utilized as part of the stormwater management system include deep-sump hooded catch basins, proprietary sedimentation devices, and a subsurface infiltration basin. All the BMPs were designed to meet the requirements of the MassDEP Handbook and will provide water quality treatment, groundwater recharge, and peak rate attenuation in order to mitigate the impacts of the proposed site improvements. See Appendix E – MassDEP Calculations for the calculations required to document compliance. The following section provides a description of the best management practices (BMPs) being utilized on site.

3.4.1 Deep Sump Catch Basins

Deep-sump catch basins equipped with oil/gas hoods are being utilized as structural pretreatment devices within the proposed stormwater management system. The catch basins will be constructed with a 4'-0" deep sump to act as a settling chamber and allow for adequate storage of collected sediments. Catch basins are typically first in the line of water quality treatment.

3.4.2 Proprietary Sedimentation Devices

A proprietary sedimentation device is being utilized on site for the pretreatment of stormwater runoff, in addition to the catch basins, prior to conveyance to the basin. The stormwater management system is utilizing a proprietary treatment device to ensure that the required water quality treatment is being performed prior to discharge to the subsurface infiltration basin.

3.4.3 Subsurface Infiltration Basin

Subsurface infiltration basins are well suited to provide groundwater recharge from watershed areas such as those associated with this project. The subsurface infiltration basin provides groundwater recharge by providing storage of runoff prior to discharge out of the system from the overflow device. The subsurface infiltration basin consists of underground stormwater chambers embedded in stone. Stormwater discharge is conveyed to the subsurface infiltration basins via up-gradient drainage infrastructure.

3.5 Protection of Stormwater Best Management Practices during Construction

Protection of the stormwater best management practices during construction will ensure the proper functioning of the stormwater management system and provide protection to the undisturbed areas until the site has been stabilized. Certain specific erosion and sedimentation controls and

good practices to be performed by the site contractor have been documented in a Construction Period Erosion Control Plan. See Appendix F – Construction Period Erosion Control Plan.

3.6 Inspection and Maintenance of Stormwater Best Management Practices

Frequent maintenance of the stormwater best management practices is essential to ensuring that the stormwater management system will function properly long-term. The MassDEP provides guidelines for the regular inspection and maintenance of the proposed stormwater best management practices. A Long-Term Stormwater Operation and Maintenance Plan has been prepared which dictates the inspection frequency and maintenance operations for each BMP. See Appendix G – Long-Term Operation and Maintenance Plan.

3.7 Illicit Discharge Compliance Statement

RLA has prepared an Illicit Discharge Compliance Statement to document compliance with the Massachusetts Department of Environmental Protection Stormwater Management Handbook, see Appendix H.

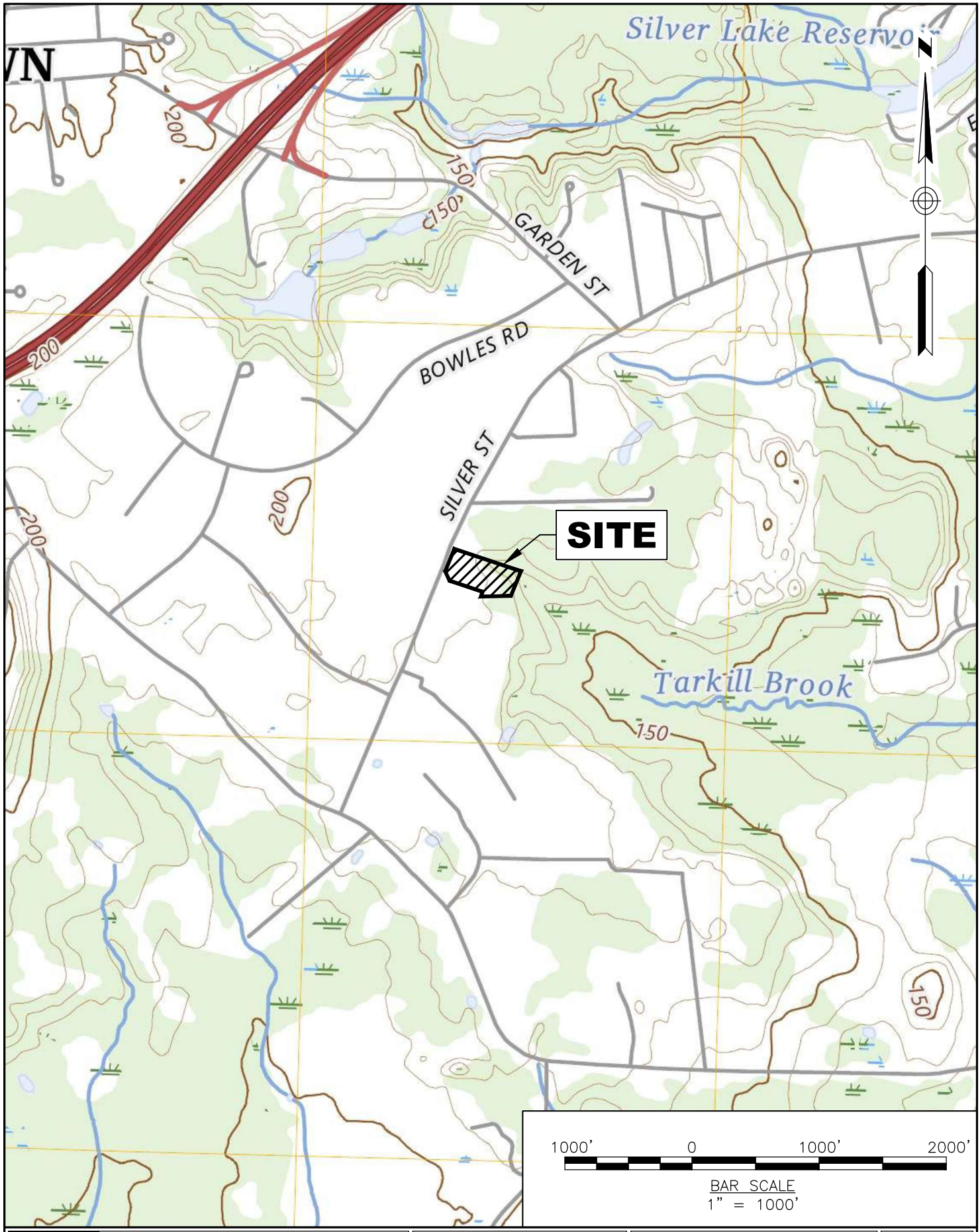
3.8 Low-Impact Development Alternatives Analysis Narrative

RLA has prepared a Low-Impact Development Alternatives Analysis Narrative as part of the Stormwater Drainage Report, see Appendix I.

4. CONCLUSION

The proposed stormwater management system has been designed to mitigate the impacts of the proposed site improvements by providing a control for runoff water quality and water quantity. Implementation of stormwater best management practices such as deep-sump hooded catch basins, proprietary sedimentation devices, and a subsurface infiltration basin allow for a stormwater drainage design that is in conformance with the criteria set forth in the Town of Agawam Stormwater Management Permit requirements and the Massachusetts Department of Environmental Protection Stormwater Management Handbook.

Figure 1: Site Locus – USGS Map



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SITE LOCUS
USGS MAP

MSR Properties, LLC
699 Silver Street
Agawam, MA 01001

Proposed Storage Building
699 Silver Street
Agawam, MA 01001

JOB NO: 250903
DATE: 3/2/26
SCALE: AS NOTED

FIG-1

Figure 2: FEMA Flood Map



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FEMA
FLOOD MAP

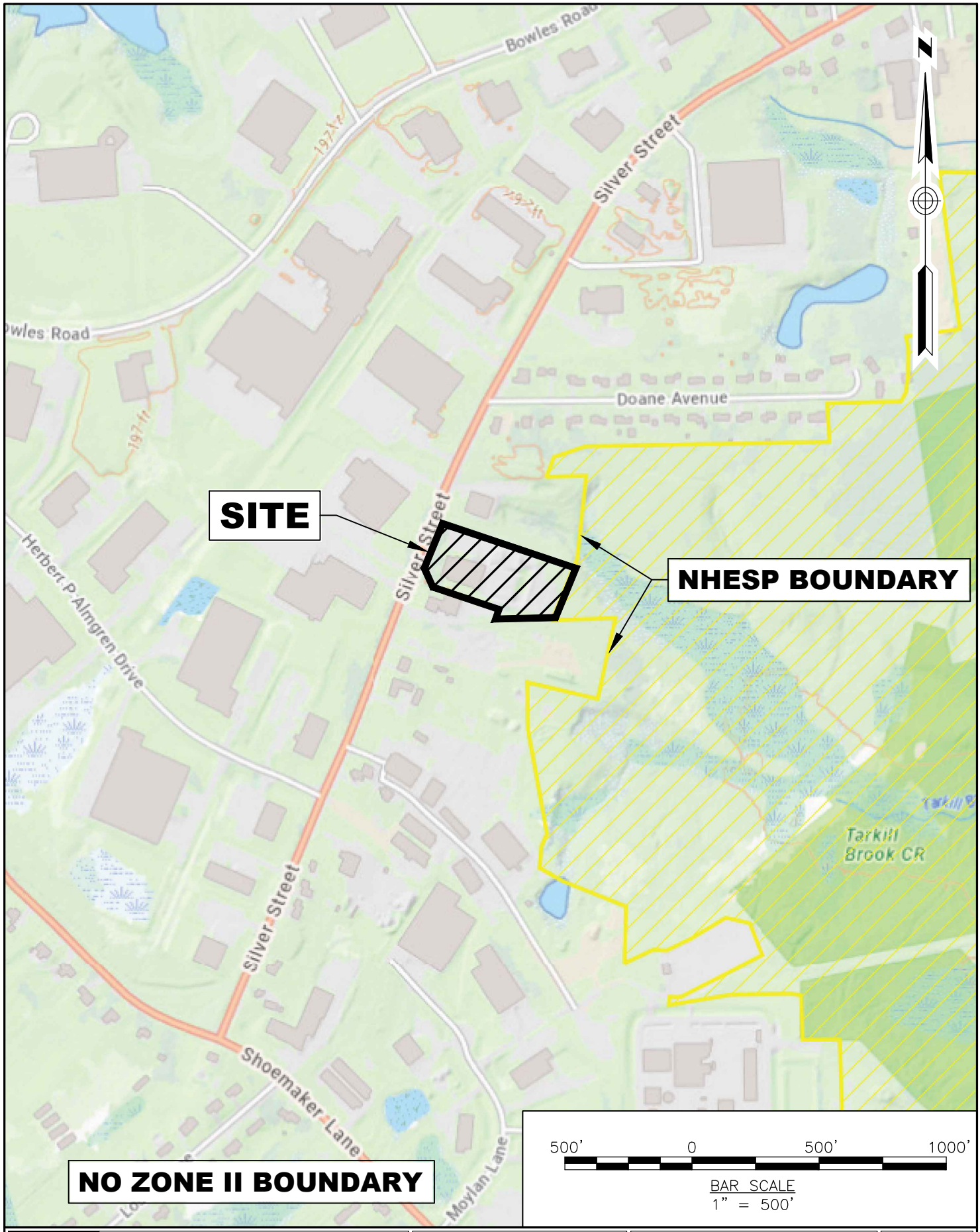
MSR Properties, LLC
699 Silver Street
Agawam, MA 01001

Proposed Storage Building
699 Silver Street
Agawam, MA 01001

JOB NO: 250903
DATE: 3/2/26
SCALE: AS NOTED

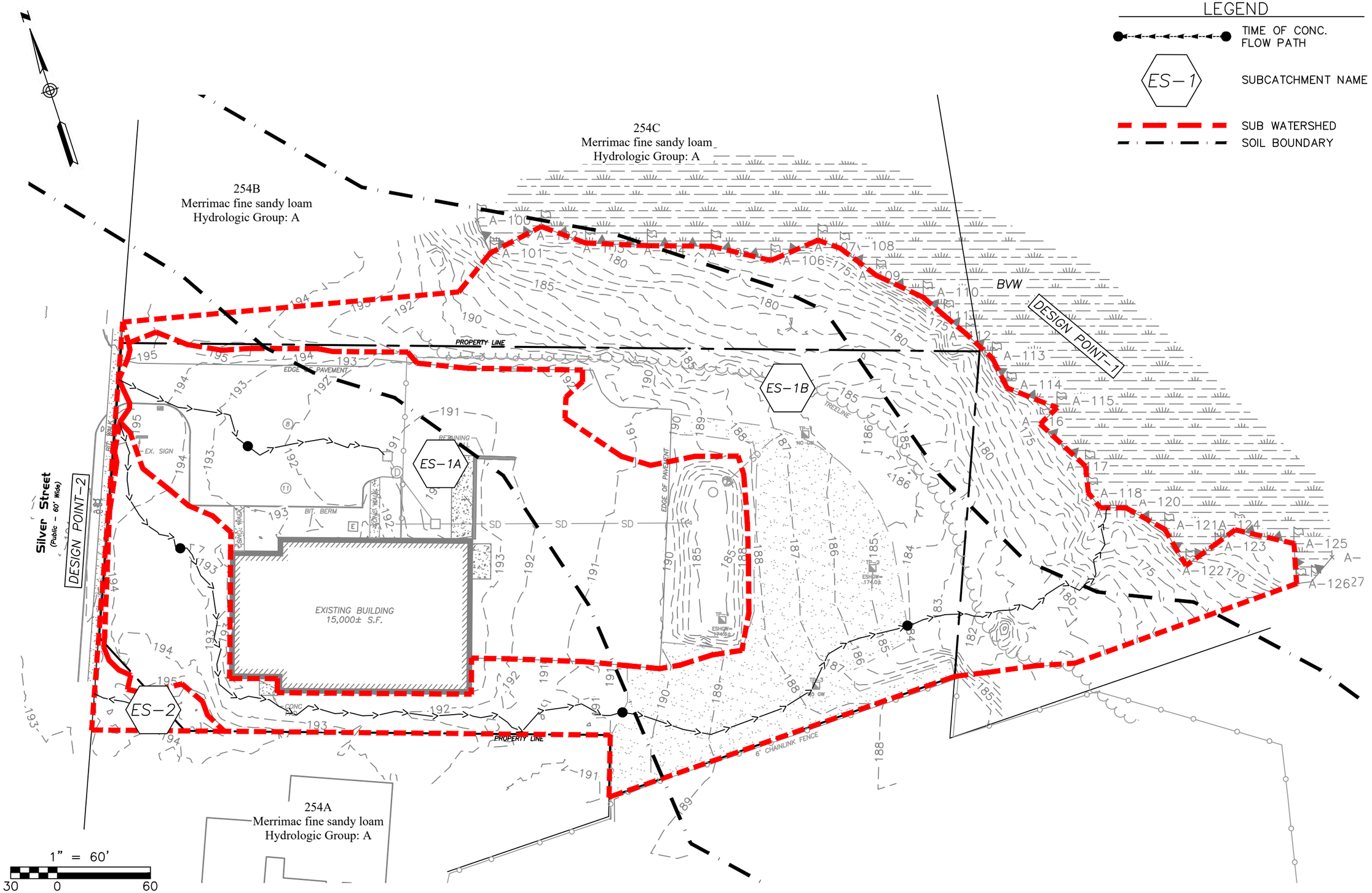
FIG-2

Figure 3: NHESP Map



R LEVESQUE ASSOCIATES, INC A Land Planning Services Company 40 School Street · P.O. Box 640 · Westfield, MA 01086 ph: 413.568.0985 fax: 413.568.0986 rlaland.com	NHESP & Zone II Map	MSR Properties, LLC 699 Silver Street Agawam, MA 01001 Proposed Storage Building 699 Silver Street Agawam, MA 01001	JOB NO: 250903 DATE: 3/2/26 SCALE: AS NOTED FIG-3

Figure 4: Pre-Development Watershed Plan



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Pre-Development Watershed Plan

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

MSR Properties, LLC
699 Silver Street
Agawam, MA. 01001

JOB NO.: 250903
DATE: 3/5/26
SCALE: As Noted

FIG-4

Figure 5: Post-Development Watershed Plan

LEGEND

TIME OF CONC. FLOW PATH

ES–1 SUBCATCHMENT NAME

SUB WATERSHED

SOIL BOUNDARY

254B
Merrimac fine sandy loam
Hydrologic Group: A

254C
Merrimac fine sandy loam
Hydrologic Group: A

254A
Merrimac fine sandy loam
Hydrologic Group: A

Silver Street
(Public – 60' Wide)

DESIGN POINT–2

DESIGN POINT–1

PS–1A

PS–1B

PS–2

BVW

PROPERTY LINE

EDGE OF PAVEMENT

BIT. BERM

CONC. PAD

CONC. ROAD

EXISTING BUILDING
15,000± S.F.
FFE=193.5±

PROPOSED
STORAGE BUILDING
7,440 S.F.

O.H. DOOR

O.H. DOOR

NO GW

NO DW

6' CHAINLINK FENCE

1" = 60'

30 0 60

R LEVESQUE ASSOCIATES, INC
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Post-Development Watershed Plan

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

MSR Properties, LLC
699 Silver Street
Agawam, MA. 01001

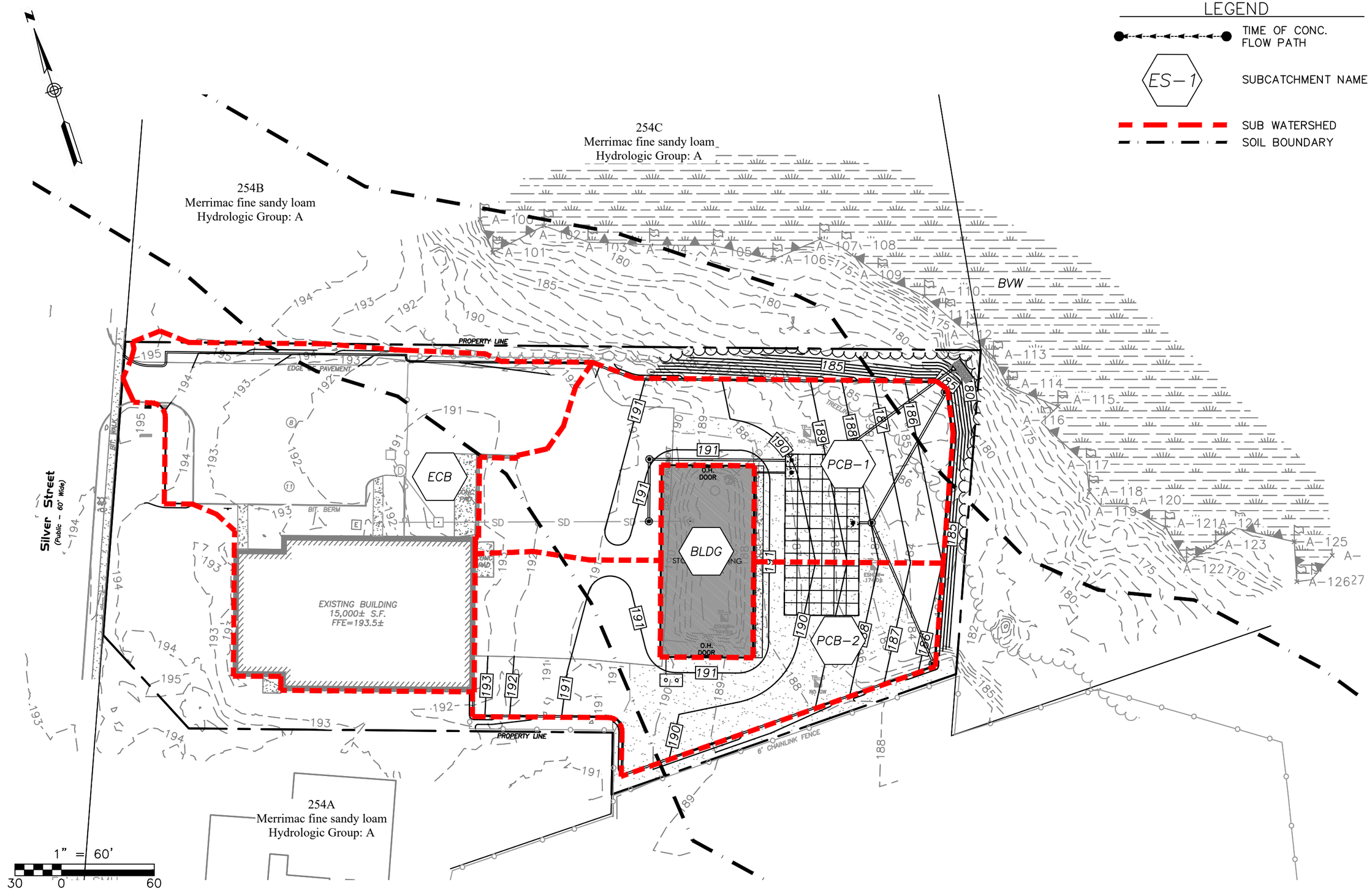
JOB NO.: 250903

DATE: 3/5/26

SCALE: As Noted

FIG-5

Figure 6: Inlet Area Plan



R LEVESQUE ASSOCIATES, INC
A Land Planning Services Company
40 School Street · P.O. Box 640 · Westfield, MA 01086
ph: 413.568.0985 fax: 413.568.0986 rlaland.com

Inlet Area Plan

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

MSR Properties, LLC
699 Silver Street
Agawam, MA. 01001

JOB NO.: 250903
DATE: 3/5/26
SCALE: As Noted

FIG-6

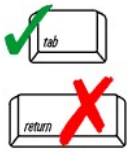
Appendix A: Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

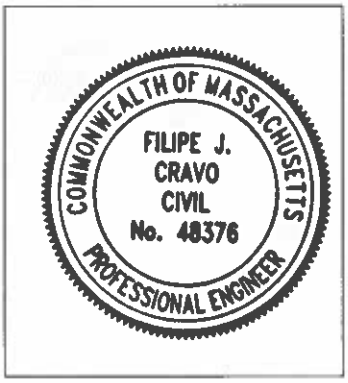
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Signature and Date 3/5/26

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☒ Other (describe): Propietary Sedimentation Devices, Deep Sump Catch Basins, Subsurface Infiltration Basin

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

☐ is within the Zone II or Interim Wellhead Protection Area

☐ is near or to other critical areas

☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)

☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☒ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix B: Soils Information

- NRCS Soils Report
- Soil Evaluation Logs

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Hampden County, Massachusetts, Central Part

699 Silver Street, Agawam MA



January 22, 2026

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....12
Map Unit Descriptions.....12
Hampden County, Massachusetts, Central Part.....14
254A—Merrimac fine sandy loam, 0 to 3 percent slopes.....14
254B—Merrimac fine sandy loam, 3 to 8 percent slopes.....15
254C—Merrimac fine sandy loam, 8 to 15 percent slopes.....17
References.....20

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



Map Scale: 1:1,050 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hampden County, Massachusetts, Central Part
Survey Area Data: Version 19, Sep 5, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	1.6	47.9%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	1.6	49.1%
254C	Merrimac fine sandy loam, 8 to 15 percent slopes	0.1	2.9%
Totals for Area of Interest		**3.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Hampden County, Massachusetts, Central Part

254A—Merrimac fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyqr
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash

Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Walpole

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqs
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Walpole

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

254C—Merrimac fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2tyqt
Elevation: 0 to 1,030 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Eskers, outwash plains, moraines, kames, outwash terraces
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash plains, dunes, deltas, outwash terraces

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

AAA ENVIRONMENTAL CONSULTING
238 Park Street
Easthampton, MA 01027
Tel.414-527-7861/Fax 413-527-7862

Site Suitability for On-site Sewage Disposal

Performed by: Dennis R. Lacourse **Health Agent** **Date:**

Site Address

699 Silver Street

Agawam MA 01001

Owner Name and Address

Mahan Slate Roofing

699 Silver Street

Agawam MA 01001

☒ **New Construction** ☐ **Repair**

Office Review

Published Soil Survey Available: ☐ No X Yes

Year Published:	Publication Scale:	Soil Map Unit:	Drainage Class:	Soil Limitations:
1978	**1 : 190,080**	**38**	**Merrimac sandy loam**	**None, Rapid Perc Rates**

Surficial Geological Report Available: ☐ No ☐ Yes

Year Published:	Publication Scale:	Geological Material (Map Unit):	Landform:

Flood Insurance Rate Map Above 500 yr flood boundary ☐ Within 500 yr flood boundary ☐ Within 100 yr flood boundary

Wetland Area: National Wetland Inventory Map (Map Unit): Wetlands Conservancy Program Map (Map Unit):

Current Water Resource Conditions (USGS): Month: ☐ Range: Above Normal ☐ Range: Normal ☐ Range: Below Normal

Other References Reviewed:

Percolation Test Results

	Time	Measurement
Begin Saturation		
End Saturation		
12" Depth Measurement		
9" Depth Measurement		
6" Depth Measurement		
Elapsed time 9"to 6"		

Percolation Rate:

Bottom of Percolation Test Hole:

	Time	Measurement
Begin Saturation		
End Saturation		
12" Depth Measurement		
9" Depth Measurement		
6" Depth Measurement		
Elapsed time 9"to 6"		

Percolation Rate:

Bottom of Percolation Test Hole:

Determination for Seasonal High Water Table

Method Used

☐ Depth observed standing on observation hole _____ inches ☐ Depth weeping from side of observation hole _____ inches

☒ Depth to soil mottles 122 &130 Inches ☐ Ground water adjustment _____ feet

Index Well Number: _____ Reading Date: _____ Index well level: _____

Adjustment Factor: _____ Adjusted Ground Water Level: _____

Depth of Naturally Occurring Pervious Material

Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? Yes No

If not, what is the depth of naturally occurring pervious material? _____

On Site Review

Deep Hole Number; **1 & 2** Date: **10/24/2025** Time: **9 A.M.** Weather: **Partly Cloudy**

Location (identify on site plan): Landform: **Outwash Plain**

Land Use: **Commercial** Vegetation: **Parking Lot** Slope (%): **None** Surface Stones (%): **None**

Distance from:						
	Open Water Body:	200+ Feet	Drainage Way:	None Feet	Possible Wet Area:	None Feet
	Property Line:	200+ Feet	Drinking Water Well:	Town Feet	Other:	Feet

Deep Observation Hole Log One					
Depth From Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (structure, stones, boulders, consistency, % gravel)
0 to 18	Fill	Crushed	Stones	Gravel, Massive	Fill
18 to 21	Ap	SL	10 Yr. 3/2		Firm, Roots, Massive
21 to 41	Bw	LS	5 Yr. 4/6		Firm, Roots, Cobbles, Massive
41 to 120	C	FS	7.5 Yr. 4/4		Very Loose, No Gravel or stones, Massive
Deep Observation Hole Log Two					
0 to 12	Fill	Fill	Crushed	Stones	
12 to 26	Bw	MS	5 Yr. 4/6	5% 10 Yr. at 130"	Firm, Cobbles, Gravel, Roots
26 to 130	C	FS	7.5 Yr. 4/4		Very Loose, Massive, No Gravel or stones

Parent Material: **Outwash**

Depth to Groundwater: Standing Water in the Hole: **0 / 0** Depth to Bedrock: **120" / 130"**

Estimated Seasonal High Ground Water: **None / 130"** Weeping from Pit Face: **No / No**

Certification

I certify that I am currently approved by the Department of Environmental Protection Pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise, and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated on the attached soil evaluation form, are accurate and in accordance with 310 CMR 15.100 through 15.107

Signature: _____ **Date:** 12-24-2025

Depth of Naturally Occurring Pervious Material

Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? Yes No

If not, what is the depth of naturally occurring pervious material? _____

On Site Review

Deep Hole Number; Date: Time: Weather:

Location (identify on site plan): Landform:

Land Use: Vegetation: Slope (%): Surface Stones (%):

Distance from:	Open Water Body:	Feet	Drainage Way:	Feet	Possible Wet Area:	Feet
	Property Line:	Feet	Drinking Water Well:	Feet	Other:	Feet

Deep Observation Hole Log Three

Depth From Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (structure, stones, boulders, consistency, % gravel)
0 to 22	Fill	Fill	Crushed Stones	5% at 122"	Crushed Stones
22 to 38	Bw	SL	5 Yr. 4/6	10 Yr. 5/8	Firm, Roots
38 to 120	C	FS	7/5 Yr. 4/4		Very Loose, Massive, No Gravel or Stones

Deep Observation Hole Log Four

0 to 32	Fill	Fill	Crushed Stones	5% at 122'	Fill
32 to 40	Bw	SL	5Yr. 4/6	10 Yr. 5/8	Firm, Roots
40 to 125	C	FS	7.5 Yr. 4/4		Very Loose, Massive, No Gravel Or Stones

Parent Material: **Outwash**

Depth to Groundwater: Standing Water in the Hole: **0 / 0** Depth to Bedrock: **125" / 125"**

Estimated Seasonal High Ground Water: **0 / 122"** Weeping from Pit Face: **No / No**

Certification

I certify that I am currently approved by the Department of Environmental Protection Pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise, and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated on the attached soil evaluation form, are accurate and in accordance with 310 CMR 15.100 through 15.107

Signature: _____ **Date:** 10-24-2025

S:\Projects\3025250903 - Nishan - 699 Silver St, Agawam\05 CAD\3025250903 - EXIST.dwg

ZONING REVIEW - Industrial B (IB)

TYPE (MINIMUM)	REQUIRED	PROPOSED
AREA	1 ACRE	-
FRONTAGE	100 FT	-
FRONT YARD	15 FT	-
SIDE YARD	10 FT	-
REAR YARD	25 FT	-
HEIGHT MAX.	40 FT / 3 STORIES	-
MAXIMUM COVERAGE MAX.	-	-

NOTES

1. THE RECORD OWNER OF THE SUBJECT PARCEL IS 699 PROPERTIES, LLC. SEE HAMPDEN COUNTY REGISTRY OF DEEDS BOOK 22111 PAGE 224 AND BOOK 20888 PAGE 318.
2. THE PROPERTY LINES SHOWN HEREON ARE BASED UPON AN UNRECORDED PLAN ENTITLED "PLAN OF LAND IN AGAWAM, MASSACHUSETTS SURVEYED AND MAPPED FOR (OWNER) PREPARED BY R.G.E. ASSOCIATES, INC." AND WERE PROVIDED TO R.L. LEVESQUE ASSOCIATES, INC. BY 699 PROPERTIES, LLC.
3. THE EXISTING BUILDING SHOWN HEREON ARE BASED ON AN APPROXIMATE MEASUREMENT OF THE OUTSIDE DIMENSIONS OF THE EXISTING STRUCTURES. THE ACTUAL LOCATION OF THE EXISTING BUILDINGS IF THE PLAN HEREON IS USED FOR CONSTRUCTION WORK THAT WOULD AFFECT OR TIE INTO THE EXISTING BUILDINGS, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT R.L. LEVESQUE ASSOCIATES, INC. PRIOR TO SAID LAYOUT TO DETERMINE PROPER CONTROL POINTS AND EXTENT OF ANY SUCH WORKS AND CERTIFY THAT THE SUBJECT OF THIS PLAN SHOWN TO BE ACCURATE. IT SHOULD NOT BE PLEASE NOTE THAT THE EMPHASIS ART SHOWN TO BE ACCURATE. IT SHOULD NOT BE NO RESPONSIBILITY FOR ANY THIRD PARTY LAYOUT OF THE PLAN SHOWN HEREON
4. THIS PLAN WAS BEEN PREPARED FOR SITE PLANNING PURPOSES AND SHALL NOT BE USED FOR THE CONVEYANCE OF LAND OR FOR ANY OTHER USE.
5. SUBJECT PARCEL CONTAINS 136,168.0 S.F. OR 3.126 ACRES
6. THE SUBJECT PROPERTIES SHOWN HEREON MAY BE SUBJECT TO RIGHTS AND EASEMENTS AS CONTAINED IN THE VARIOUS DEEDS OF RECORD DESCRIBING SAID PROPERTIES. THE LOCATION OF ANY SUCH RIGHTS AND EASEMENTS IS NOT THE SUBJECT OF THIS PLAN.
7. METHODS UTILIZED BY R.L. LEVESQUE ASSOCIATES, INC. ON 08-12-2025
8. BY R.L. LEVESQUE ASSOCIATES, INC. ON 09-15-2025. AN UNRECORDED EXISTING CONDITIONS SITE PLAN PREPARED BY SMITH ASSOCIATES SURVEYORS, INC., DATED DECEMBER 11, 2014, AND NOW LOCAL.
9. THE LOCATION AND ONLY RECORD DATA FOR THE TOWN OF AGAWAM WAS USE R.L. LEVESQUE ASSOCIATES, INC. MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. R.L. LEVESQUE ASSOCIATES, INC. FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH IT IS BELIEVED TO BE CORRECT. R.L. LEVESQUE ASSOCIATES, INC. REQUESTS THAT DIG SAFE BE NOTIFIED AT LEAST 72 HOURS PRIOR TO EXCAVATION.
10. ADJACENT PROPERTY LINES AND ABUTTERS SHOWN HEREON ARE RETRIEVED FROM THE TOWN OF AGAWAM MEB GIS.
11. THE SUBJECT PARCEL IS ZONED INDUSTRIAL B ACCORDING TO THE TOWN OF AGAWAM ZONING MAP.
12. THE SUBJECT PARCEL IS NOT LOCATED WITHIN A SPECIAL FLOOD ZONE AREA ACCORDING TO FLOOD INSURANCE RATE MAP NUMBER 25013C0308E - EFFECTIVE DATE: 07-16-2013
13. THE SUBJECT PROPERTY IS PARTIALLY LOCATED WITHIN NATURAL HERITAGE & ENDANGERED SPECIES PROGRAM (NHESP) JURISDICTION.

R L A
R.L. LEVESQUE ASSOCIATES, INC.
Civil Engineers • Land Surveyors
Landscape Architects • Land Planners
40 School Street
Westfield, MA 01085
rlalandscape

EXISTING CONDITIONS PLAN

699 Silver Street
Agawam, MA 01001
Parcel ID# 66 2 12

DRAFT

PREPARED FOR:
699 Silver Street
Agawam, MA 01001

REVISIONS	DATE

DRAFTED BY: TL

UNAUTHORIZED ALTERATION OF THIS DOCUMENT IS A VIOLATION OF MASSACHUSETTS GENERAL LAWS

SCALE: 1"=30'
PROJECT NO. 3025250903
DATE: 12/19/2025

EX-1

Appendix C: Pre- and Post- Development Hydrologic Analysis (2, 10, 100 Year Storm Events)

NOAA Atlas 14, Volume 10, Version 3
Location name: Agawam, Massachusetts, USA*
Latitude: 42.0534°, Longitude: -72.6513°
Elevation: 193 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.341 (0.263-0.439)	0.410 (0.316-0.528)	0.523 (0.401-0.677)	0.616 (0.470-0.801)	0.744 (0.551-1.02)	0.841 (0.611-1.17)	0.942 (0.665-1.36)	1.05 (0.708-1.57)	1.21 (0.784-1.87)	1.34 (0.849-2.12)
10-min	0.483 (0.373-0.622)	0.581 (0.448-0.749)	0.740 (0.568-0.958)	0.872 (0.666-1.14)	1.05 (0.781-1.44)	1.19 (0.865-1.66)	1.34 (0.942-1.93)	1.49 (1.00-2.22)	1.72 (1.11-2.66)	1.90 (1.20-3.00)
15-min	0.569 (0.439-0.732)	0.683 (0.526-0.881)	0.870 (0.668-1.12)	1.03 (0.784-1.34)	1.24 (0.919-1.69)	1.40 (1.02-1.96)	1.57 (1.11-2.28)	1.76 (1.18-2.62)	2.02 (1.31-3.12)	2.24 (1.41-3.53)
30-min	0.768 (0.592-0.988)	0.925 (0.713-1.19)	1.18 (0.908-1.53)	1.40 (1.06-1.82)	1.69 (1.25-2.30)	1.91 (1.39-2.66)	2.14 (1.51-3.10)	2.40 (1.61-3.57)	2.76 (1.78-4.26)	3.05 (1.93-4.82)
60-min	0.967 (0.746-1.24)	1.17 (0.899-1.50)	1.49 (1.14-1.93)	1.76 (1.35-2.29)	2.14 (1.58-2.91)	2.42 (1.76-3.37)	2.71 (1.91-3.93)	3.04 (2.04-4.52)	3.49 (2.26-5.40)	3.86 (2.44-6.10)
2-hr	1.24 (0.963-1.59)	1.49 (1.15-1.91)	1.90 (1.47-2.44)	2.23 (1.72-2.89)	2.70 (2.01-3.66)	3.04 (2.23-4.24)	3.41 (2.44-4.96)	3.84 (2.59-5.70)	4.48 (2.91-6.90)	5.02 (3.18-7.89)
3-hr	1.42 (1.11-1.81)	1.71 (1.33-2.18)	2.18 (1.69-2.79)	2.57 (1.98-3.31)	3.11 (2.33-4.22)	3.51 (2.58-4.88)	3.94 (2.83-5.73)	4.46 (3.01-6.58)	5.24 (3.41-8.04)	5.91 (3.76-9.27)
6-hr	1.78 (1.40-2.25)	2.16 (1.70-2.74)	2.79 (2.18-3.55)	3.31 (2.57-4.23)	4.02 (3.04-5.44)	4.54 (3.38-6.32)	5.12 (3.72-7.46)	5.84 (3.96-8.60)	6.97 (4.54-10.6)	7.95 (5.07-12.4)
12-hr	2.18 (1.72-2.74)	2.70 (2.13-3.39)	3.54 (2.78-4.47)	4.24 (3.31-5.39)	5.20 (3.96-7.01)	5.91 (4.42-8.19)	6.69 (4.90-9.74)	7.69 (5.22-11.3)	9.28 (6.07-14.1)	10.7 (6.83-16.6)
24-hr	2.56 (2.03-3.19)	3.22 (2.55-4.02)	4.29 (3.39-5.38)	5.18 (4.08-6.54)	6.41 (4.91-8.61)	7.31 (5.51-10.1)	8.31 (6.14-12.1)	9.62 (6.56-14.0)	11.7 (7.70-17.8)	13.6 (8.74-21.0)
2-day	2.89 (2.31-3.59)	3.68 (2.94-4.56)	4.96 (3.95-6.18)	6.02 (4.76-7.55)	7.48 (5.77-10.0)	8.54 (6.48-11.8)	9.73 (7.26-14.2)	11.3 (7.76-16.4)	14.0 (9.20-21.1)	16.4 (10.5-25.2)
3-day	3.16 (2.54-3.90)	4.02 (3.22-4.97)	5.42 (4.33-6.73)	6.58 (5.23-8.22)	8.18 (6.34-10.9)	9.34 (7.12-12.8)	10.6 (7.97-15.5)	12.4 (8.51-18.0)	15.4 (10.1-23.1)	18.0 (11.6-27.6)
4-day	3.41 (2.74-4.19)	4.32 (3.47-5.33)	5.81 (4.66-7.20)	7.05 (5.62-8.79)	8.76 (6.80-11.7)	9.99 (7.64-13.7)	11.4 (8.55-16.5)	13.3 (9.12-19.2)	16.4 (10.8-24.6)	19.2 (12.4-29.4)
7-day	4.08 (3.30-4.99)	5.11 (4.13-6.27)	6.80 (5.48-8.37)	8.20 (6.57-10.2)	10.1 (7.90-13.4)	11.5 (8.84-15.7)	13.1 (9.84-18.8)	15.2 (10.5-21.8)	18.6 (12.4-27.8)	21.7 (14.1-33.1)
10-day	4.74 (3.85-5.79)	5.84 (4.74-7.13)	7.63 (6.17-9.36)	9.11 (7.32-11.3)	11.2 (8.72-14.7)	12.6 (9.70-17.1)	14.3 (10.7-20.4)	16.5 (11.4-23.6)	20.0 (13.3-29.8)	23.2 (15.0-35.2)
20-day	6.83 (5.58-8.27)	7.98 (6.52-9.68)	9.87 (8.03-12.0)	11.4 (9.25-14.0)	13.6 (10.6-17.6)	15.2 (11.7-20.2)	16.9 (12.6-23.6)	19.1 (13.3-27.1)	22.4 (14.9-33.1)	25.2 (16.4-38.2)
30-day	8.58 (7.05-10.4)	9.76 (8.01-11.8)	11.7 (9.55-14.2)	13.3 (10.8-16.2)	15.5 (12.2-19.9)	17.1 (13.1-22.6)	18.9 (14.0-26.0)	20.9 (14.6-29.6)	23.9 (16.0-35.2)	26.4 (17.2-39.8)
45-day	10.8 (8.88-12.9)	12.0 (9.88-14.4)	14.0 (11.5-16.9)	15.7 (12.8-19.0)	17.9 (14.1-22.8)	19.7 (15.1-25.6)	21.5 (15.8-29.1)	23.3 (16.4-32.8)	25.9 (17.4-38.0)	27.9 (18.2-42.0)
60-day	12.6 (10.4-15.1)	13.9 (11.5-16.6)	16.0 (13.1-19.2)	17.7 (14.5-21.5)	20.1 (15.8-25.4)	21.9 (16.8-28.3)	23.7 (17.4-31.8)	25.5 (17.9-35.7)	27.7 (18.7-40.5)	29.3 (19.2-44.0)

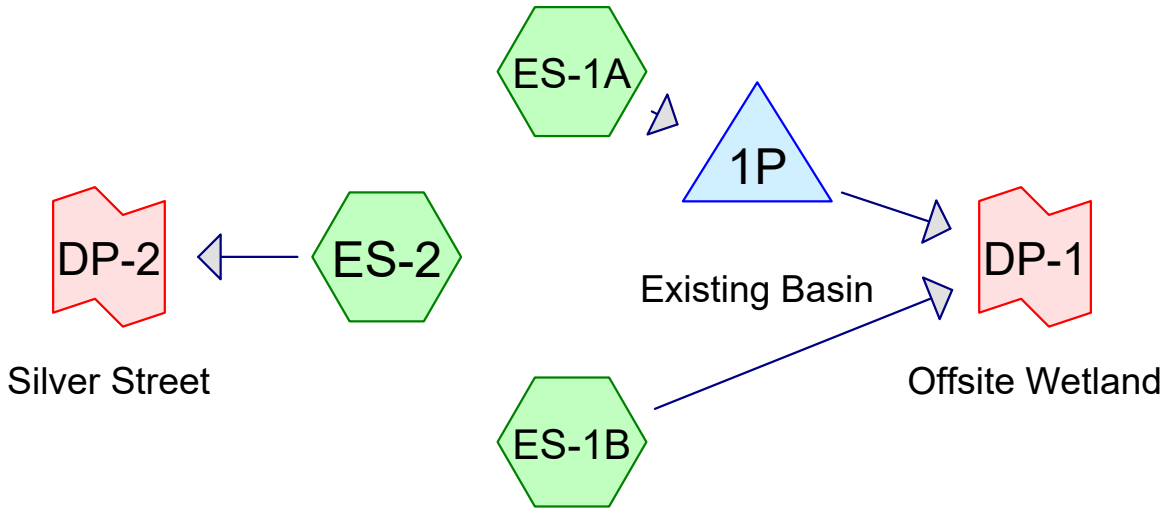
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



Subcat Reach Pond Link

Routing Diagram for 250903 - PRE
Prepared by R Levesque Associates, Printed 2/27/2026
HydroCAD® 10.20-7a s/n 13073 © 2025 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.22	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.18	2
3	100-Year	Type III 24-hr		Default	24.00	1	8.31	2

Time span=0.00-48.00 hrs, dt=0.03 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES-1A: Runoff Area=67,363 sf 80.39% Impervious Runoff Depth=2.42"
Flow Length=196' Slope=0.0200 '/' Tc=6.0 min CN=WQ Runoff=3.9 cfs 13,582 cf

Subcatchment ES-1B: Runoff Area=113,211 sf 2.08% Impervious Runoff Depth=0.61"
Flow Length=895' Tc=26.8 min CN=WQ Runoff=1.0 cfs 5,749 cf

Subcatchment ES-2: Runoff Area=2,918 sf 3.70% Impervious Runoff Depth=0.11"
Flow Length=42' Slope=0.0400 '/' Tc=6.0 min CN=WQ Runoff=0.0 cfs 27 cf

Pond 1P: Existing Basin Peak Elev=185.66' Storage=1,984 cf Inflow=3.9 cfs 13,582 cf
12.0" Round Culvert n=0.013 L=40.0' S=0.0100 '/' Outflow=2.6 cfs 13,422 cf

Link DP-1: Offsite Wetland Inflow=3.4 cfs 19,170 cf
Primary=3.4 cfs 19,170 cf

Link DP-2: Silver Street Inflow=0.0 cfs 27 cf
Primary=0.0 cfs 27 cf

Total Runoff Area = 183,492 sf Runoff Volume = 19,358 cf Average Runoff Depth = 1.27"
69.14% Pervious = 126,874 sf 30.86% Impervious = 56,618 sf

Summary for Subcatchment ES-1A:

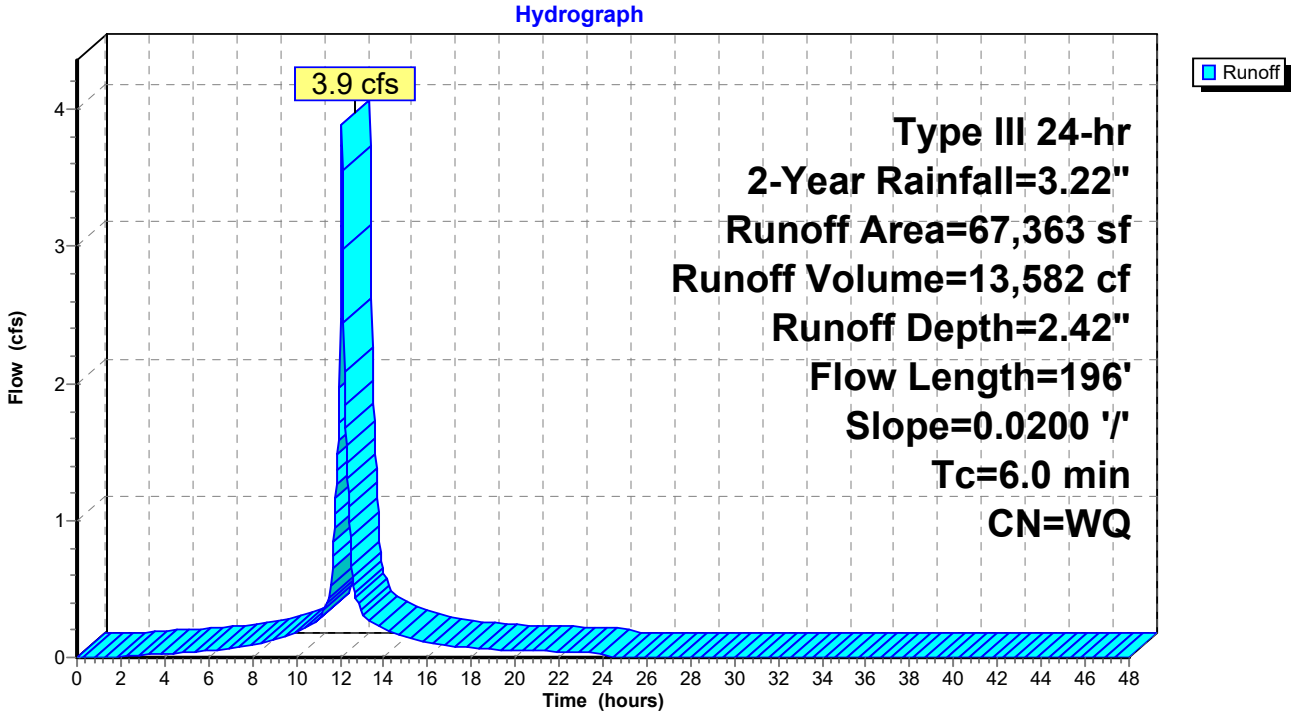
Runoff = 3.9 cfs @ 12.08 hrs, Volume= 13,582 cf, Depth= 2.42"
Routed to Pond 1P : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
12,775	39	>75% Grass cover, Good, HSG A
432	96	Gravel surface, HSG A
39,138	98	Paved parking, HSG A
15,017	98	Roofs, HSG A
67,363		Weighted Average
13,208	41	19.61% Pervious Area
54,155	98	80.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.33		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.6	96	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.9	196	Total, Increased to minimum Tc = 6.0 min			

Subcatchment ES-1A:



Summary for Subcatchment ES-1B:

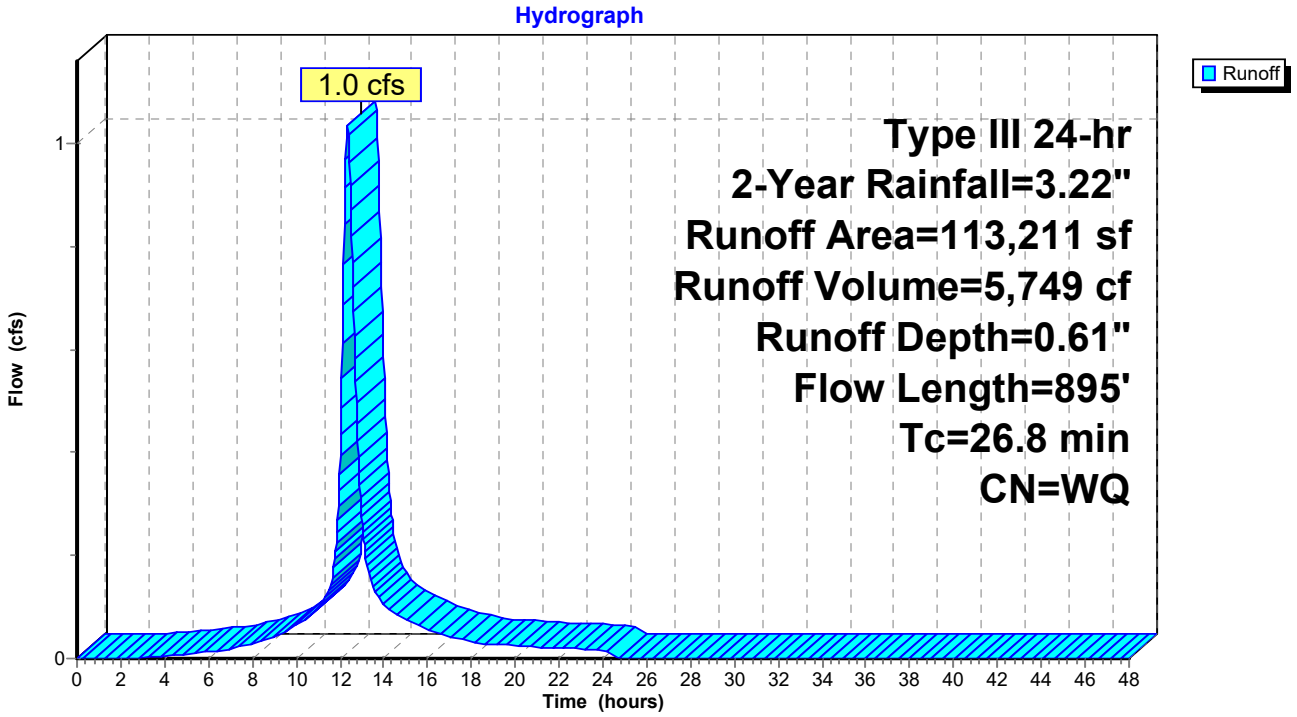
Runoff = 1.0 cfs @ 12.35 hrs, Volume= 5,749 cf, Depth= 0.61"
Routed to Link DP-1 : Offsite Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
40,547	39	>75% Grass cover, Good, HSG A
22,366	96	Gravel surface, HSG A
2,354	98	Paved parking, HSG A
47,944	30	Woods, Good, HSG A
113,211		Weighted Average
110,857	47	97.92% Pervious Area
2,354	98	2.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0200	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
12.9	382	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	226	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.4	187	0.0700	1.32		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.8	895	Total			

Subcatchment ES-1B:



Summary for Subcatchment ES-2:

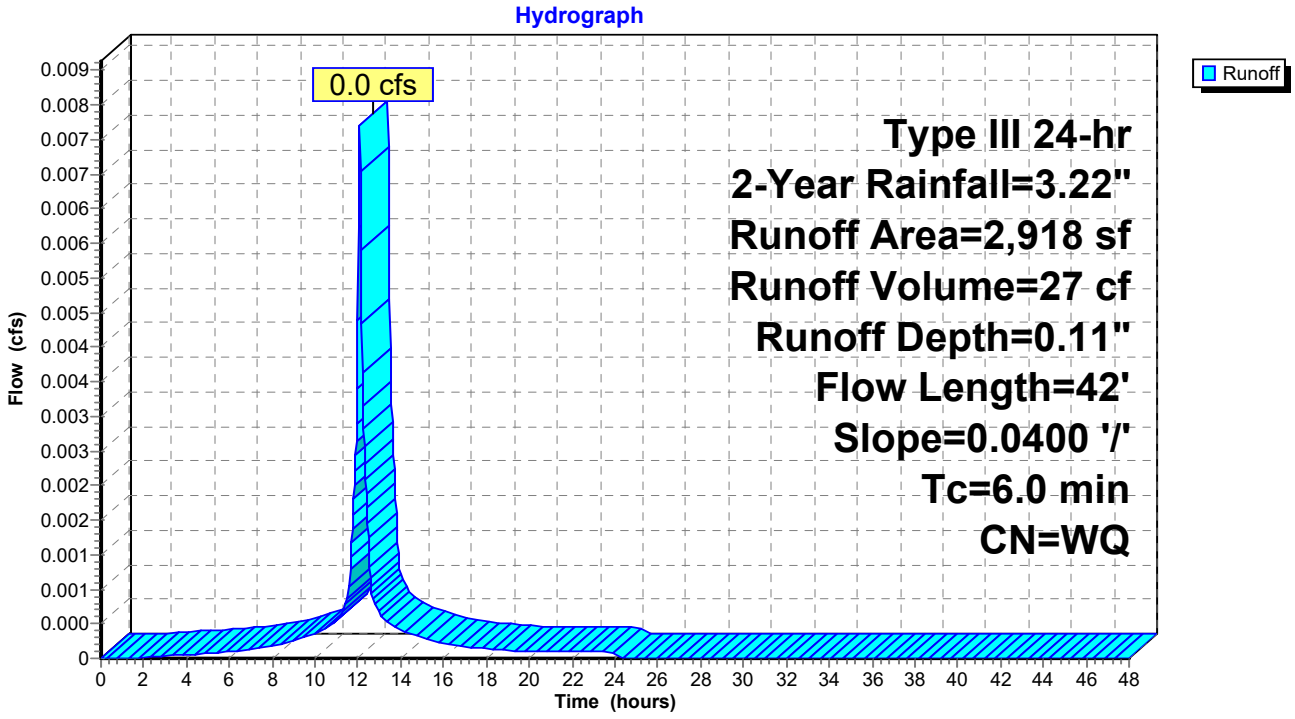
Runoff = 0.0 cfs @ 12.08 hrs, Volume= 27 cf, Depth= 0.11"
Routed to Link DP-2 : Silver Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
2,810	39	>75% Grass cover, Good, HSG A
108	98	Paved parking, HSG A
2,918		Weighted Average
2,810	39	96.30% Pervious Area
108	98	3.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	42	0.0400	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
3.8	42	Total, Increased to minimum Tc = 6.0 min			

Subcatchment ES-2:



Summary for Pond 1P: Existing Basin

Inflow Area = 67,363 sf, 80.39% Impervious, Inflow Depth = 2.42" for 2-Year event
Inflow = 3.9 cfs @ 12.08 hrs, Volume= 13,582 cf
Outflow = 2.6 cfs @ 12.17 hrs, Volume= 13,422 cf, Atten= 33%, Lag= 5.3 min
Primary = 2.6 cfs @ 12.17 hrs, Volume= 13,422 cf
Routed to Link DP-1 : Offsite Wetland

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 185.66' @ 12.17 hrs Surf.Area= 2,528 sf Storage= 1,984 cf

Plug-Flow detention time= 35.8 min calculated for 13,413 cf (99% of inflow)
Center-of-Mass det. time= 28.5 min (785.0 - 756.4)

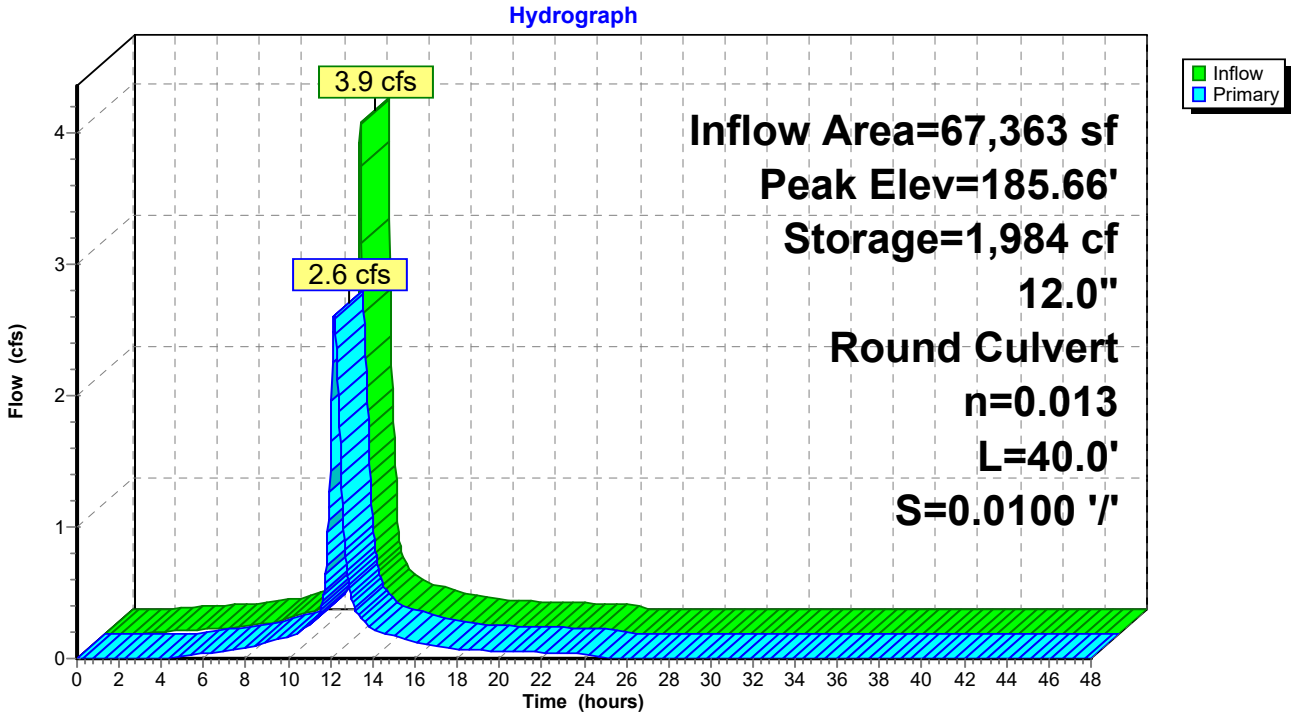
Volume	Invert	Avail.Storage	Storage Description
#1	184.50'	10,389 cf	**Existing Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.50	604	168.0	0	0	604
185.00	1,790	222.0	572	572	2,283
186.00	2,963	257.0	2,352	2,924	3,638
187.00	3,745	275.0	3,346	6,271	4,445
188.00	4,504	293.0	4,119	10,389	5,307

Device	Routing	Invert	Outlet Devices
#1	Primary	184.70'	**12.0" Round Culvert** L= 40.0' Ke= 0.200 Inlet / Outlet Invert= 184.70' / 184.30' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=2.6 cfs @ 12.17 hrs HW=185.66' (Free Discharge)
1=Culvert (Barrel Controls 2.6 cfs @ 4.33 fps)

Pond 1P: Existing Basin

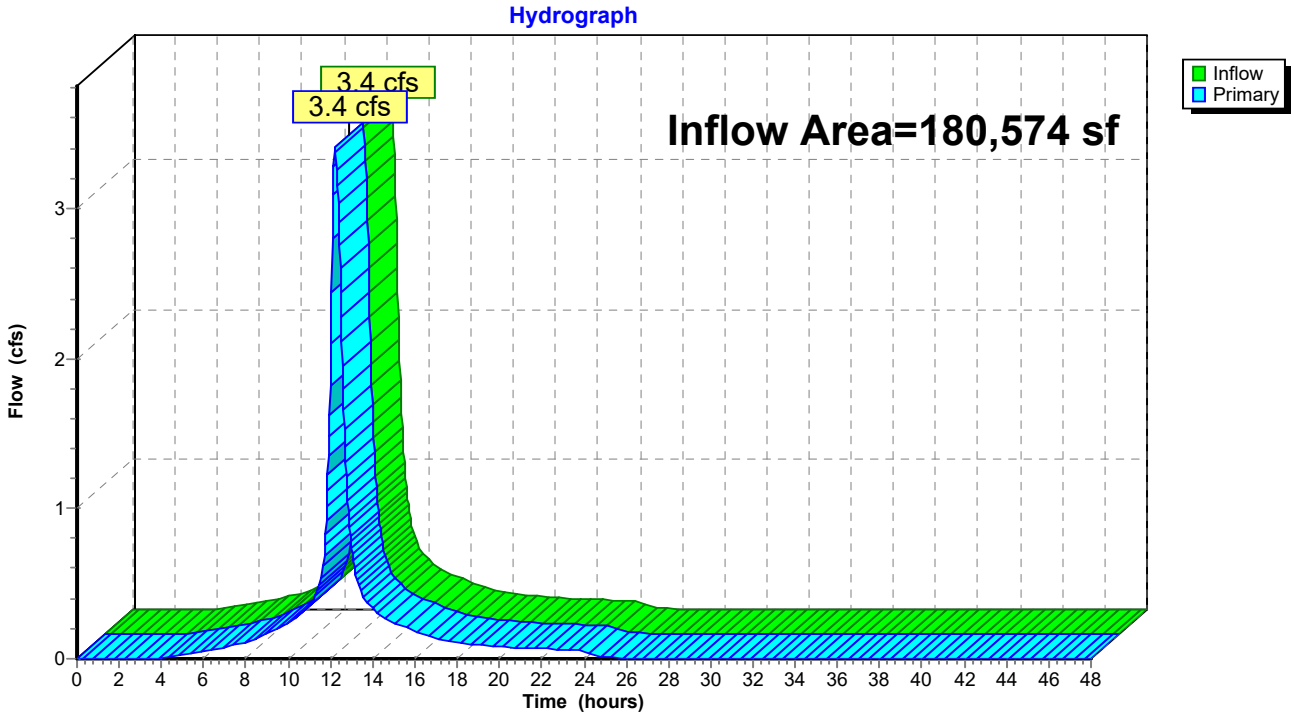


Summary for Link DP-1: Offsite Wetland

Inflow Area = 180,574 sf, 31.29% Impervious, Inflow Depth = 1.27" for 2-Year event
Inflow = 3.4 cfs @ 12.21 hrs, Volume= 19,170 cf
Primary = 3.4 cfs @ 12.21 hrs, Volume= 19,170 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link DP-1: Offsite Wetland

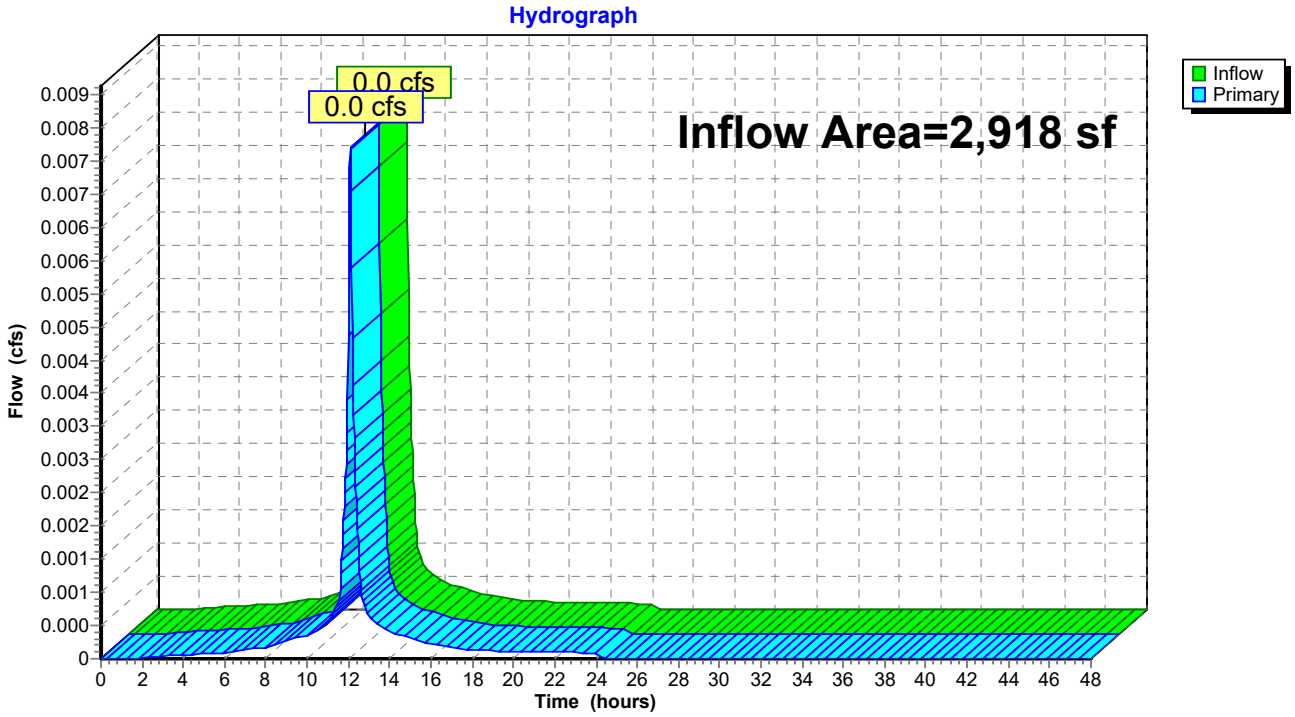


Summary for Link DP-2: Silver Street

Inflow Area = 2,918 sf, 3.70% Impervious, Inflow Depth = 0.11" for 2-Year event
Inflow = 0.0 cfs @ 12.08 hrs, Volume= 27 cf
Primary = 0.0 cfs @ 12.08 hrs, Volume= 27 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link DP-2: Silver Street



Time span=0.00-48.00 hrs, dt=0.03 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES-1A: Runoff Area=67,363 sf 80.39% Impervious Runoff Depth=4.05"
Flow Length=196' Slope=0.0200 '/' Tc=6.0 min CN=WQ Runoff=6.3 cfs 22,730 cf

Subcatchment ES-1B: Runoff Area=113,211 sf 2.08% Impervious Runoff Depth=1.12"
Flow Length=895' Tc=26.8 min CN=WQ Runoff=1.7 cfs 10,599 cf

Subcatchment ES-2: Runoff Area=2,918 sf 3.70% Impervious Runoff Depth=0.41"
Flow Length=42' Slope=0.0400 '/' Tc=6.0 min CN=WQ Runoff=0.0 cfs 100 cf

Pond 1P: Existing Basin Peak Elev=186.09' Storage=3,209 cf Inflow=6.3 cfs 22,730 cf
12.0" Round Culvert n=0.013 L=40.0' S=0.0100 '/' Outflow=3.6 cfs 22,569 cf

Link DP-1: Offsite Wetland Inflow=5.2 cfs 33,169 cf
Primary=5.2 cfs 33,169 cf

Link DP-2: Silver Street Inflow=0.0 cfs 100 cf
Primary=0.0 cfs 100 cf

Total Runoff Area = 183,492 sf Runoff Volume = 33,430 cf Average Runoff Depth = 2.19"
69.14% Pervious = 126,874 sf 30.86% Impervious = 56,618 sf

Summary for Subcatchment ES-1A:

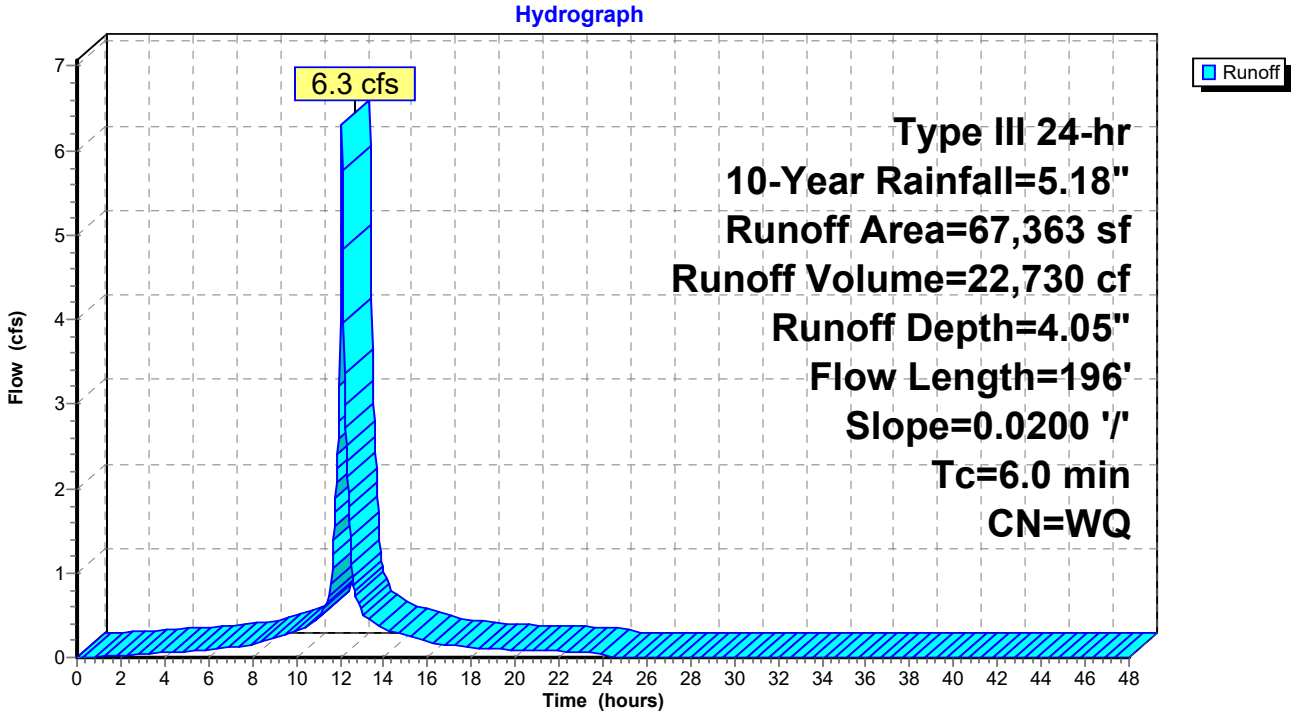
Runoff = 6.3 cfs @ 12.08 hrs, Volume= 22,730 cf, Depth= 4.05"
Routed to Pond 1P : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (sf)	CN	Description
12,775	39	>75% Grass cover, Good, HSG A
432	96	Gravel surface, HSG A
39,138	98	Paved parking, HSG A
15,017	98	Roofs, HSG A
67,363		Weighted Average
13,208	41	19.61% Pervious Area
54,155	98	80.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.33		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.6	96	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.9	196	Total, Increased to minimum Tc = 6.0 min			

Subcatchment ES-1A:



Summary for Subcatchment ES-1B:

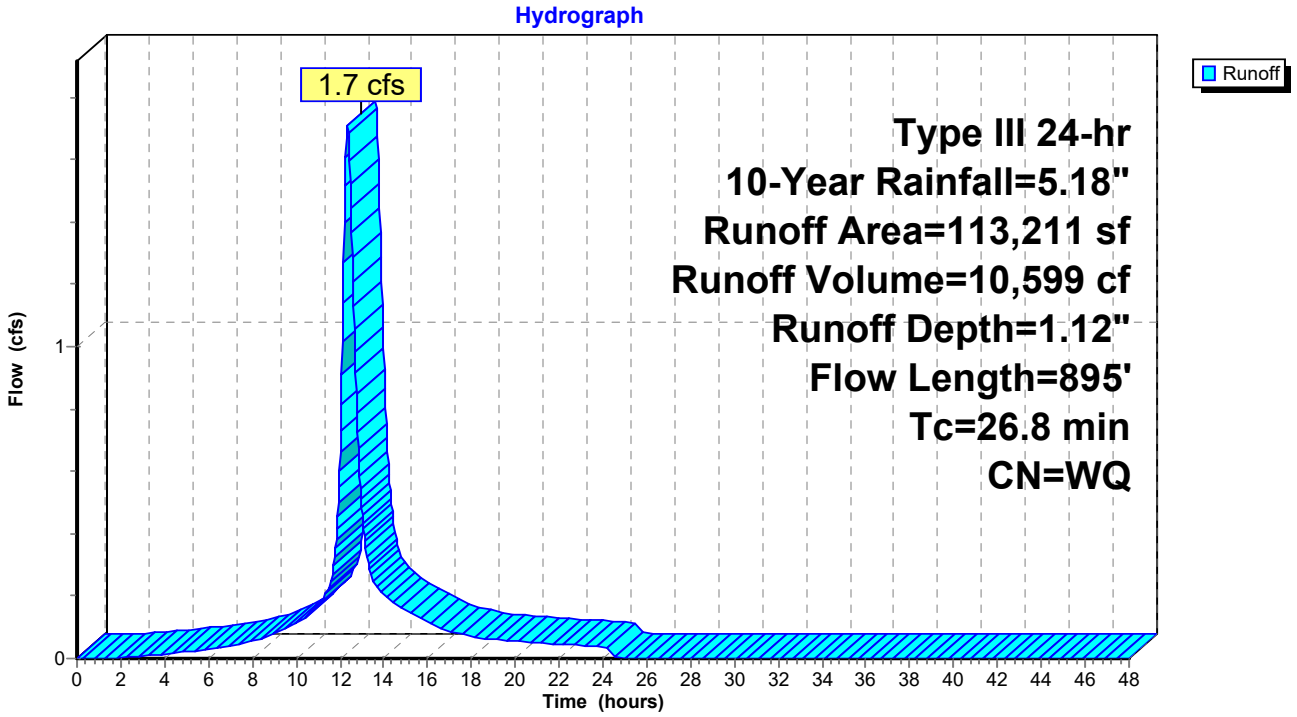
Runoff = 1.7 cfs @ 12.35 hrs, Volume= 10,599 cf, Depth= 1.12"
Routed to Link DP-1 : Offsite Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (sf)	CN	Description
40,547	39	>75% Grass cover, Good, HSG A
22,366	96	Gravel surface, HSG A
2,354	98	Paved parking, HSG A
47,944	30	Woods, Good, HSG A
113,211		Weighted Average
110,857	47	97.92% Pervious Area
2,354	98	2.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0200	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
12.9	382	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	226	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.4	187	0.0700	1.32		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.8	895	Total			

Subcatchment ES-1B:



Summary for Subcatchment ES-2:

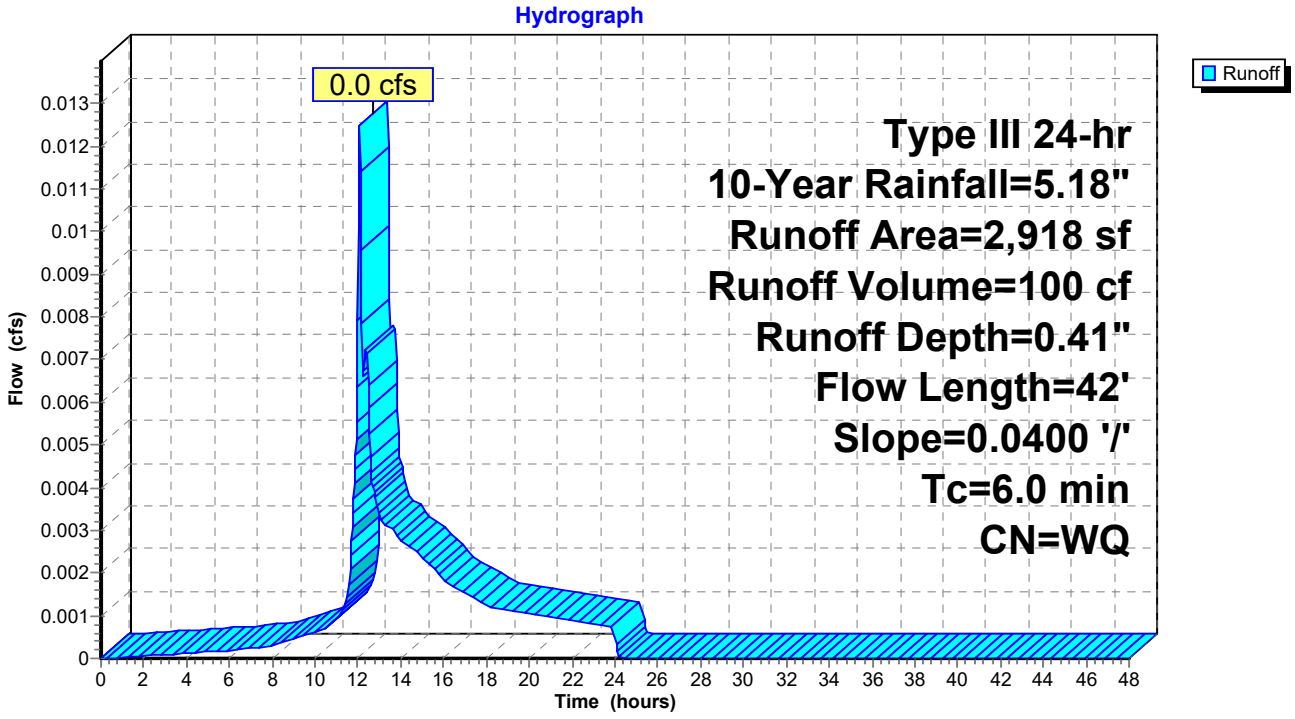
Runoff = 0.0 cfs @ 12.08 hrs, Volume= 100 cf, Depth= 0.41"
Routed to Link DP-2 : Silver Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (sf)	CN	Description
2,810	39	>75% Grass cover, Good, HSG A
108	98	Paved parking, HSG A
2,918		Weighted Average
2,810	39	96.30% Pervious Area
108	98	3.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	42	0.0400	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
3.8	42	Total, Increased to minimum Tc = 6.0 min			

Subcatchment ES-2:



Summary for Pond 1P: Existing Basin

Inflow Area = 67,363 sf, 80.39% Impervious, Inflow Depth = 4.05" for 10-Year event
Inflow = 6.3 cfs @ 12.08 hrs, Volume= 22,730 cf
Outflow = 3.6 cfs @ 12.20 hrs, Volume= 22,569 cf, Atten= 43%, Lag= 7.0 min
Primary = 3.6 cfs @ 12.20 hrs, Volume= 22,569 cf
Routed to Link DP-1 : Offsite Wetland

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 186.09' @ 12.20 hrs Surf.Area= 3,033 sf Storage= 3,209 cf

Plug-Flow detention time= 28.5 min calculated for 22,569 cf (99% of inflow)
Center-of-Mass det. time= 23.6 min (773.9 - 750.3)

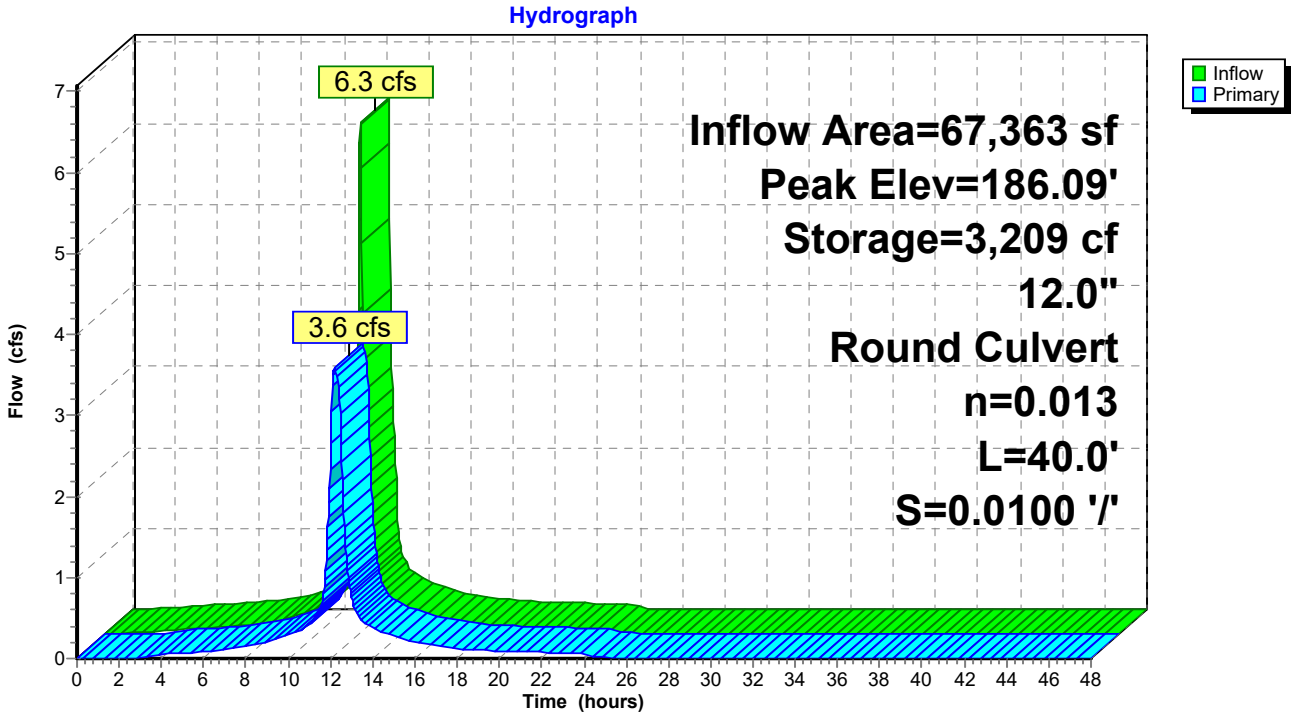
Volume	Invert	Avail.Storage	Storage Description
#1	184.50'	10,389 cf	**Existing Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.50	604	168.0	0	0	604
185.00	1,790	222.0	572	572	2,283
186.00	2,963	257.0	2,352	2,924	3,638
187.00	3,745	275.0	3,346	6,271	4,445
188.00	4,504	293.0	4,119	10,389	5,307

Device	Routing	Invert	Outlet Devices
#1	Primary	184.70'	**12.0" Round Culvert** L= 40.0' Ke= 0.200 Inlet / Outlet Invert= 184.70' / 184.30' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=3.6 cfs @ 12.20 hrs HW=186.09' (Free Discharge)
1=Culvert (Barrel Controls 3.6 cfs @ 4.56 fps)

Pond 1P: Existing Basin

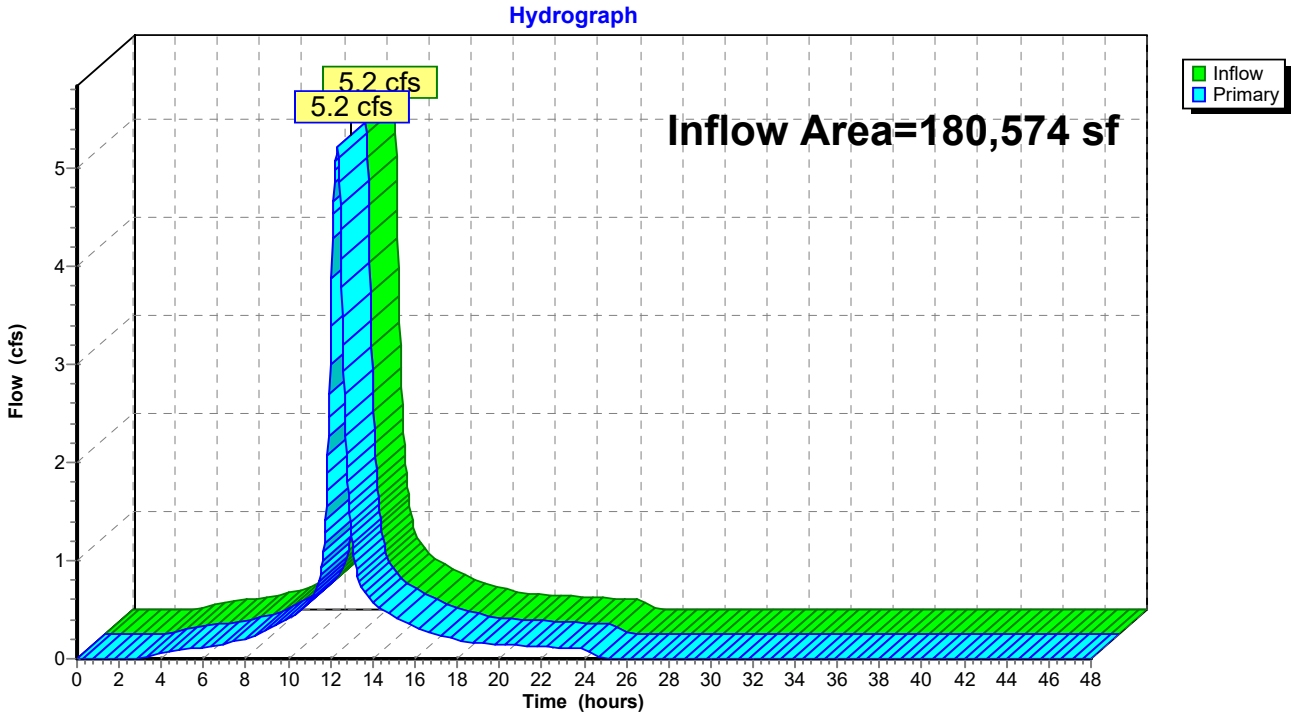


Summary for Link DP-1: Offsite Wetland

Inflow Area = 180,574 sf, 31.29% Impervious, Inflow Depth = 2.20" for 10-Year event
Inflow = 5.2 cfs @ 12.33 hrs, Volume= 33,169 cf
Primary = 5.2 cfs @ 12.33 hrs, Volume= 33,169 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link DP-1: Offsite Wetland

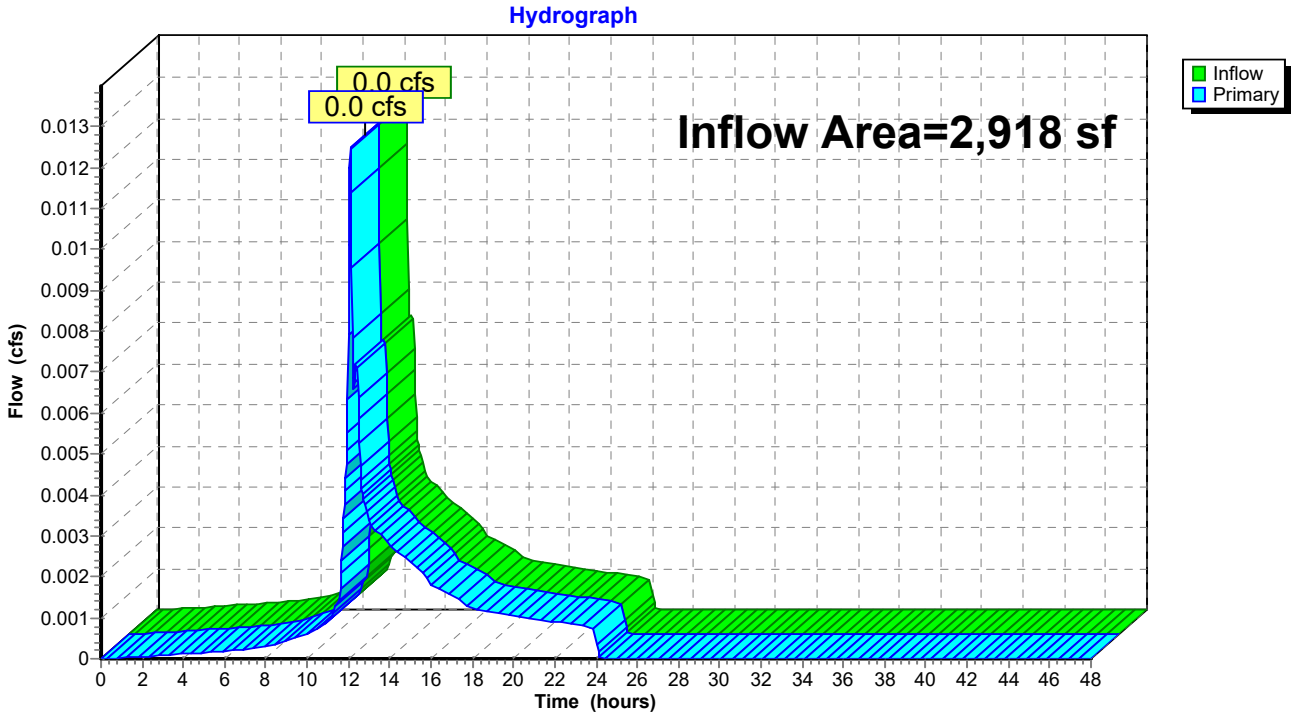


Summary for Link DP-2: Silver Street

Inflow Area = 2,918 sf, 3.70% Impervious, Inflow Depth = 0.41" for 10-Year event
Inflow = 0.0 cfs @ 12.08 hrs, Volume= 100 cf
Primary = 0.0 cfs @ 12.08 hrs, Volume= 100 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link DP-2: Silver Street



Time span=0.00-48.00 hrs, dt=0.03 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES-1A: Runoff Area=67,363 sf 80.39% Impervious Runoff Depth=6.78"
Flow Length=196' Slope=0.0200 '/' Tc=6.0 min CN=WQ Runoff=10.4 cfs 38,074 cf

Subcatchment ES-1B: Runoff Area=113,211 sf 2.08% Impervious Runoff Depth=2.38"
Flow Length=895' Tc=26.8 min CN=WQ Runoff=3.3 cfs 22,500 cf

Subcatchment ES-2: Runoff Area=2,918 sf 3.70% Impervious Runoff Depth=1.54"
Flow Length=42' Slope=0.0400 '/' Tc=6.0 min CN=WQ Runoff=0.1 cfs 375 cf

Pond 1P: Existing Basin Peak Elev=186.88' Storage=5,839 cf Inflow=10.4 cfs 38,074 cf
12.0" Round Culvert n=0.013 L=40.0' S=0.0100 '/' Outflow=5.1 cfs 37,914 cf

Link DP-1: Offsite Wetland Inflow=8.2 cfs 60,414 cf
Primary=8.2 cfs 60,414 cf

Link DP-2: Silver Street Inflow=0.1 cfs 375 cf
Primary=0.1 cfs 375 cf

Total Runoff Area = 183,492 sf Runoff Volume = 60,949 cf Average Runoff Depth = 3.99"
69.14% Pervious = 126,874 sf 30.86% Impervious = 56,618 sf

Summary for Subcatchment ES-1A:

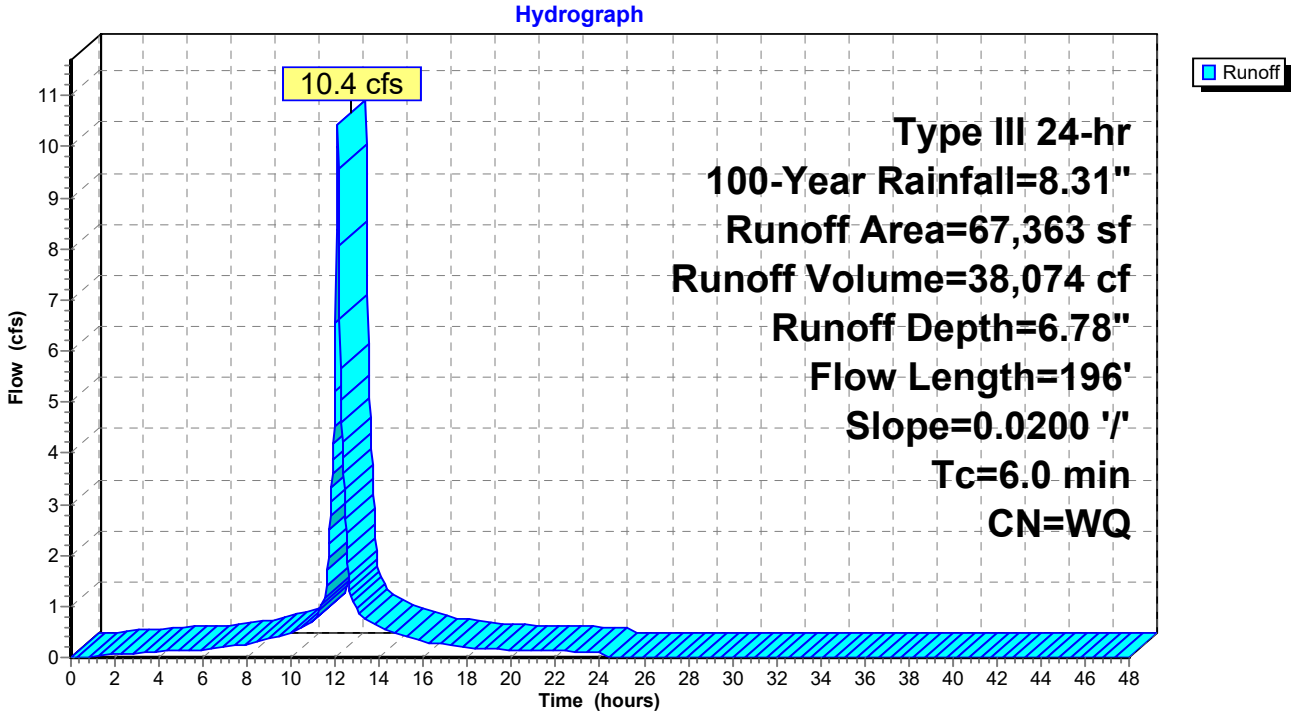
Runoff = 10.4 cfs @ 12.09 hrs, Volume= 38,074 cf, Depth= 6.78"
Routed to Pond 1P : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.31"

Area (sf)	CN	Description
12,775	39	>75% Grass cover, Good, HSG A
432	96	Gravel surface, HSG A
39,138	98	Paved parking, HSG A
15,017	98	Roofs, HSG A
67,363		Weighted Average
13,208	41	19.61% Pervious Area
54,155	98	80.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.33		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.6	96	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.9	196	Total, Increased to minimum Tc = 6.0 min			

Subcatchment ES-1A:



Summary for Subcatchment ES-1B:

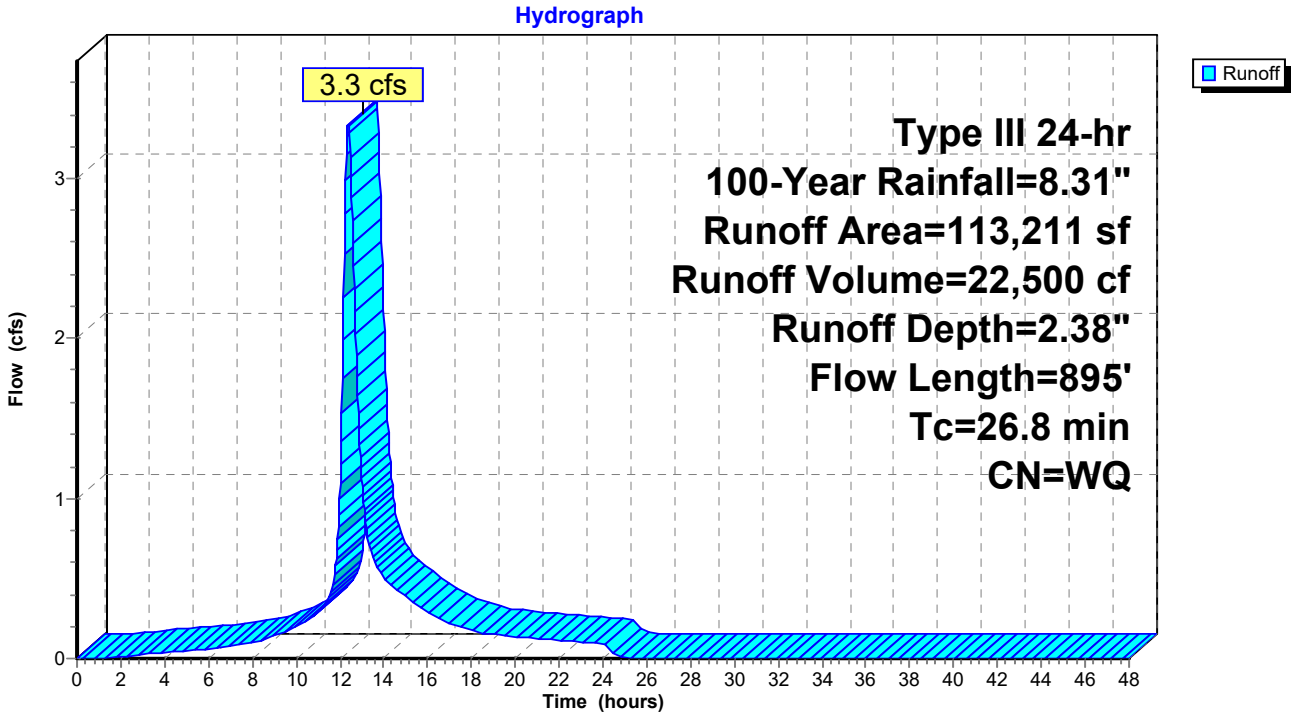
Runoff = 3.3 cfs @ 12.38 hrs, Volume= 22,500 cf, Depth= 2.38"
Routed to Link DP-1 : Offsite Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.31"

Area (sf)	CN	Description
40,547	39	>75% Grass cover, Good, HSG A
22,366	96	Gravel surface, HSG A
2,354	98	Paved parking, HSG A
47,944	30	Woods, Good, HSG A
113,211		Weighted Average
110,857	47	97.92% Pervious Area
2,354	98	2.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0200	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
12.9	382	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	226	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.4	187	0.0700	1.32		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.8	895	Total			

Subcatchment ES-1B:



Summary for Subcatchment ES-2:

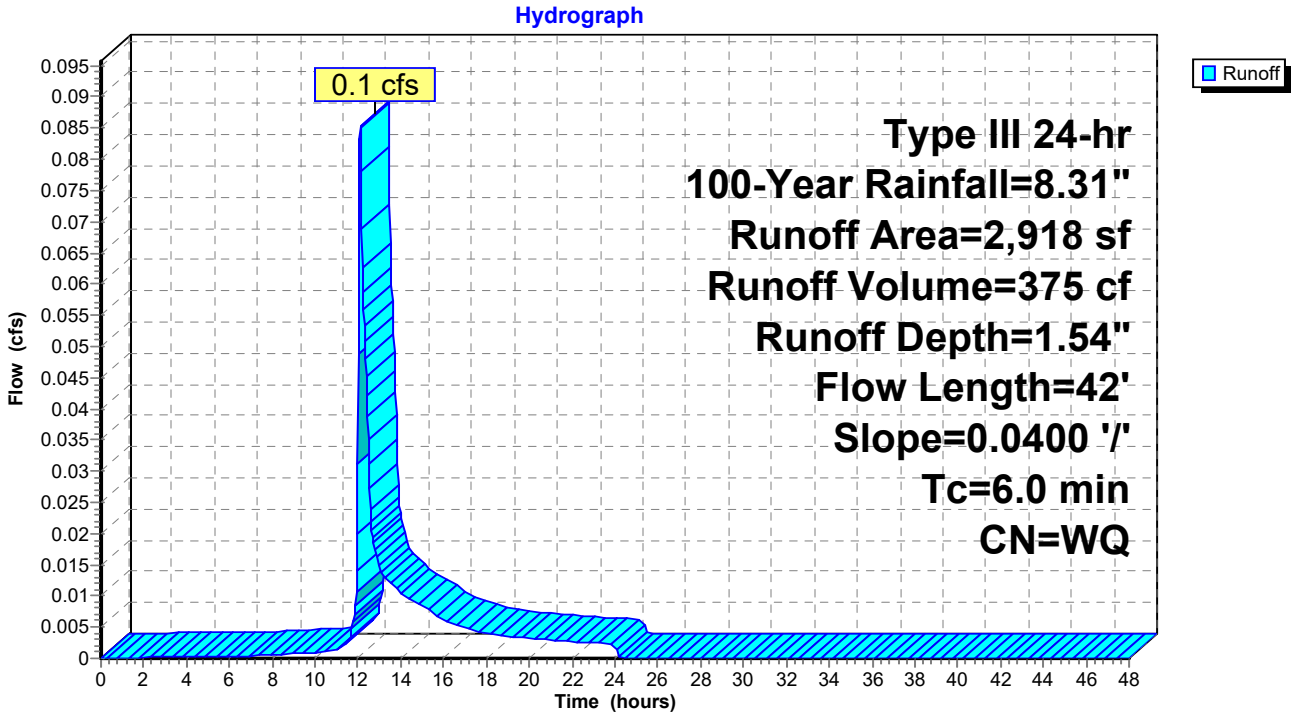
Runoff = 0.1 cfs @ 12.11 hrs, Volume= 375 cf, Depth= 1.54"
Routed to Link DP-2 : Silver Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.31"

Area (sf)	CN	Description
2,810	39	>75% Grass cover, Good, HSG A
108	98	Paved parking, HSG A
2,918		Weighted Average
2,810	39	96.30% Pervious Area
108	98	3.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	42	0.0400	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
3.8	42	Total, Increased to minimum Tc = 6.0 min			

Subcatchment ES-2:



Summary for Pond 1P: Existing Basin

Inflow Area = 67,363 sf, 80.39% Impervious, Inflow Depth = 6.78" for 100-Year event
Inflow = 10.4 cfs @ 12.09 hrs, Volume= 38,074 cf
Outflow = 5.1 cfs @ 12.24 hrs, Volume= 37,914 cf, Atten= 52%, Lag= 9.4 min
Primary = 5.1 cfs @ 12.24 hrs, Volume= 37,914 cf
Routed to Link DP-1 : Offsite Wetland

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 186.88' @ 12.24 hrs Surf.Area= 3,649 sf Storage= 5,839 cf

Plug-Flow detention time= 24.0 min calculated for 37,914 cf (100% of inflow)
Center-of-Mass det. time= 20.9 min (767.7 - 746.8)

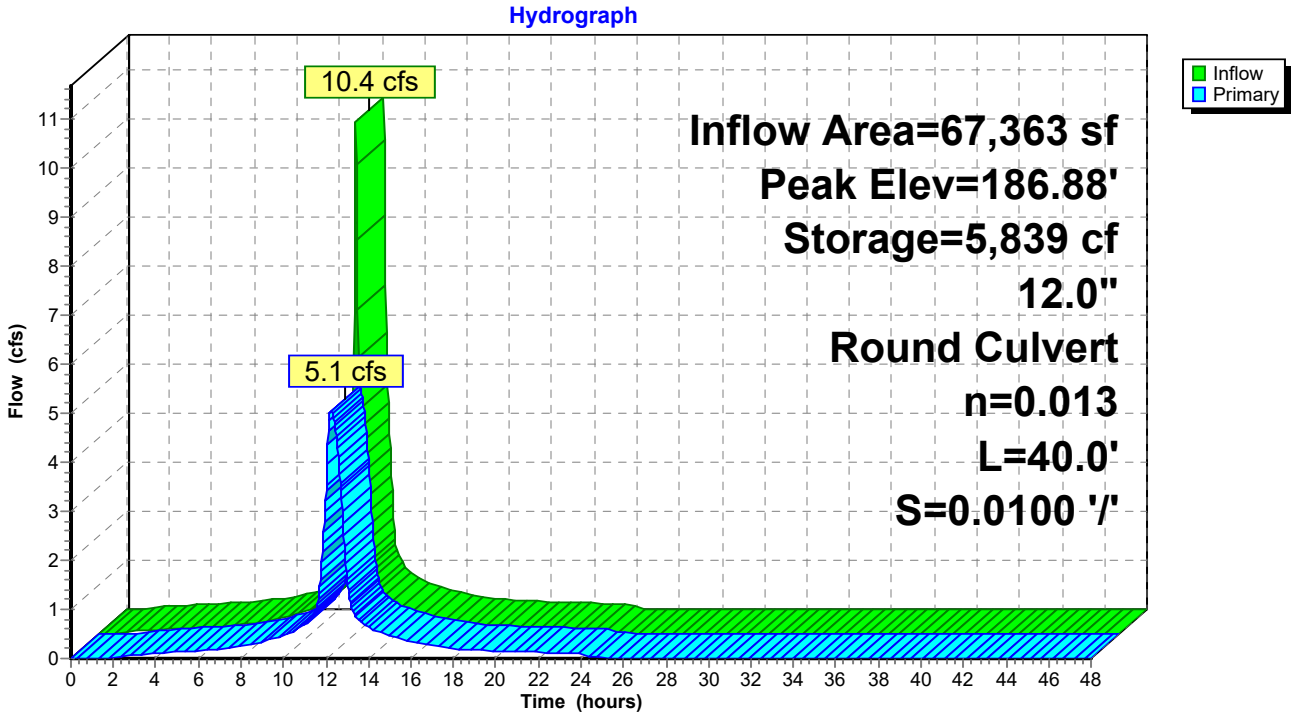
Volume	Invert	Avail.Storage	Storage Description
#1	184.50'	10,389 cf	**Existing Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.50	604	168.0	0	0	604
185.00	1,790	222.0	572	572	2,283
186.00	2,963	257.0	2,352	2,924	3,638
187.00	3,745	275.0	3,346	6,271	4,445
188.00	4,504	293.0	4,119	10,389	5,307

Device	Routing	Invert	Outlet Devices
#1	Primary	184.70'	**12.0" Round Culvert** L= 40.0' Ke= 0.200 Inlet / Outlet Invert= 184.70' / 184.30' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=5.1 cfs @ 12.24 hrs HW=186.88' (Free Discharge)
1=Culvert (Barrel Controls 5.1 cfs @ 6.44 fps)

Pond 1P: Existing Basin

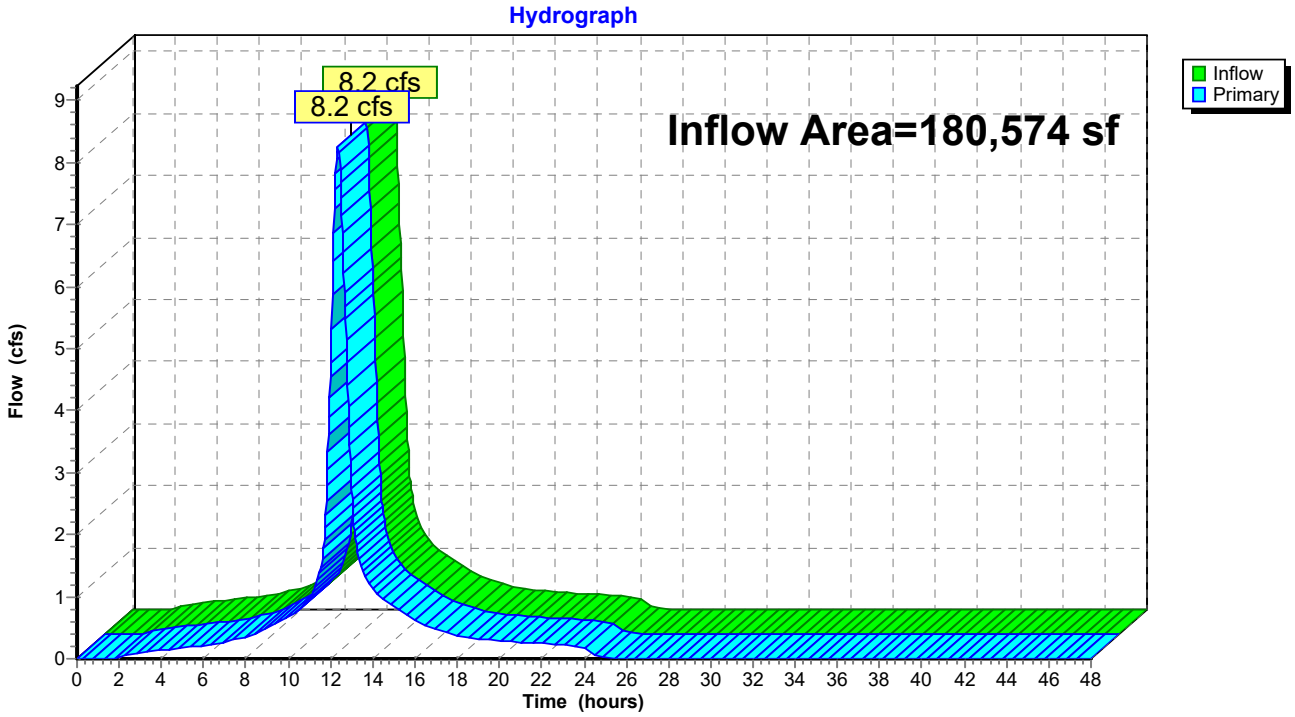


Summary for Link DP-1: Offsite Wetland

Inflow Area = 180,574 sf, 31.29% Impervious, Inflow Depth = 4.01" for 100-Year event
Inflow = 8.2 cfs @ 12.35 hrs, Volume= 60,414 cf
Primary = 8.2 cfs @ 12.35 hrs, Volume= 60,414 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link DP-1: Offsite Wetland

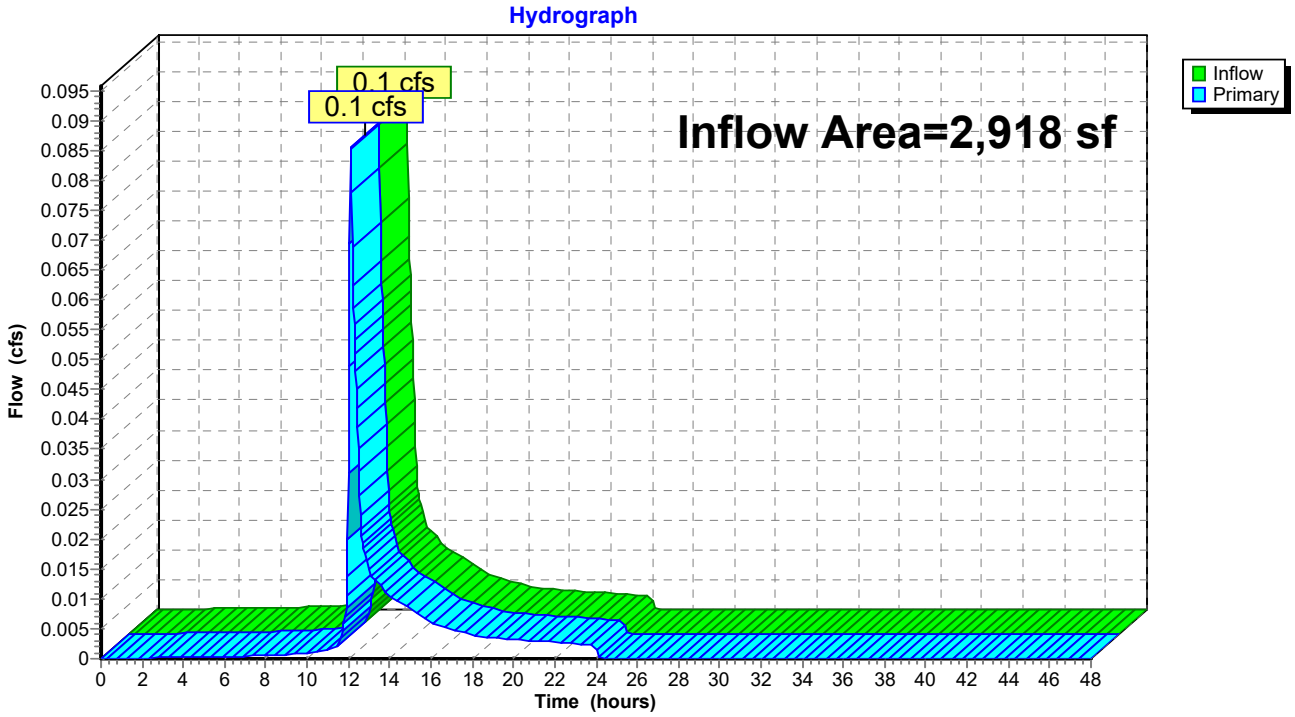


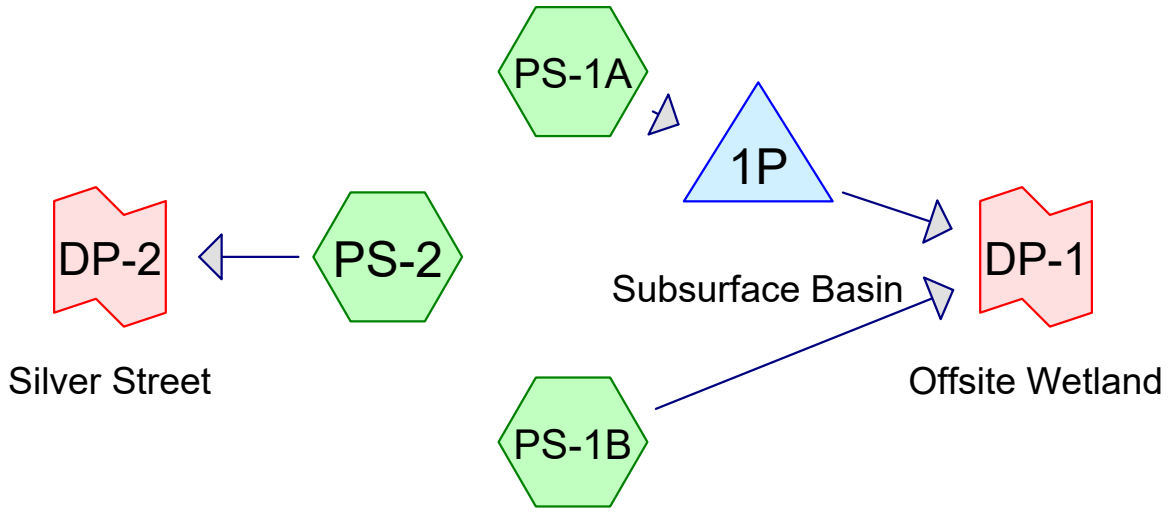
Summary for Link DP-2: Silver Street

Inflow Area = 2,918 sf, 3.70% Impervious, Inflow Depth = 1.54" for 100-Year event
Inflow = 0.1 cfs @ 12.11 hrs, Volume= 375 cf
Primary = 0.1 cfs @ 12.11 hrs, Volume= 375 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link DP-2: Silver Street





Subcat Reach Pond Link

Routing Diagram for 250903 - POST
Prepared by R Levesque Associates, Printed 3/4/2026
HydroCAD® 10.20-7a s/n 13073 © 2025 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.22	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.18	2
3	100-Year	Type III 24-hr		Default	24.00	1	8.31	2

Time span=0.00-48.00 hrs, dt=0.03 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS-1A: Runoff Area=107,978 sf 96.08% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=WQ Runoff=7.4 cfs 25,828 cf

Subcatchment PS-1B: Runoff Area=72,596 sf 0.17% Impervious Runoff Depth=0.01"
Flow Length=944' Tc=31.9 min CN=WQ Runoff=0.0 cfs 32 cf

Subcatchment PS-2: Runoff Area=2,918 sf 3.87% Impervious Runoff Depth=0.12"
Flow Length=42' Slope=0.0400 '/' Tc=6.0 min CN=WQ Runoff=0.0 cfs 28 cf

Pond 1P: Subsurface Basin Peak Elev=183.02' Storage=7,740 cf Inflow=7.4 cfs 25,828 cf
Discarded=0.3 cfs 16,160 cf Primary=3.3 cfs 9,669 cf Outflow=3.5 cfs 25,828 cf

Link DP-1: Offsite Wetland Inflow=3.3 cfs 9,701 cf
Primary=3.3 cfs 9,701 cf

Link DP-2: Silver Street Inflow=0.0 cfs 28 cf
Primary=0.0 cfs 28 cf

Total Runoff Area = 183,492 sf Runoff Volume = 25,889 cf Average Runoff Depth = 1.69"
43.33% Pervious = 79,507 sf 56.67% Impervious = 103,985 sf

Summary for Subcatchment PS-1A:

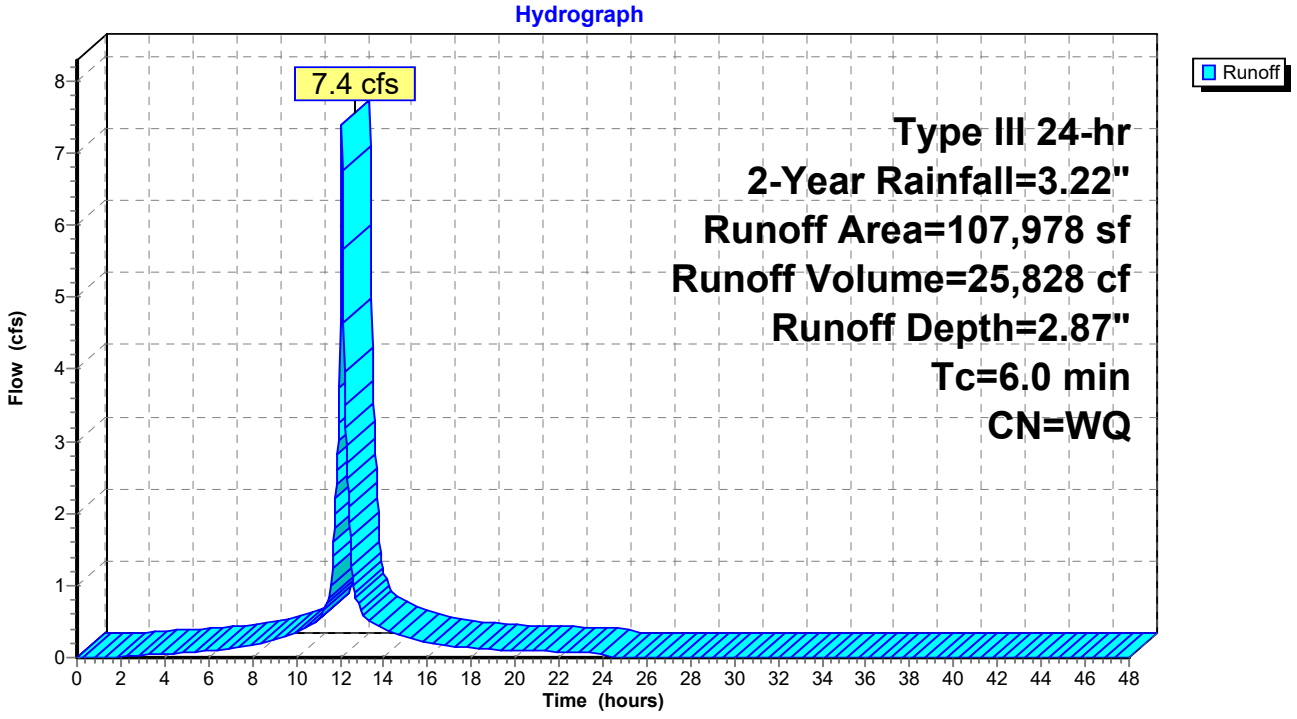
Runoff = 7.4 cfs @ 12.08 hrs, Volume= 25,828 cf, Depth= 2.87"
Routed to Pond 1P : Subsurface Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
4,230	39	>75% Grass cover, Good, HSG A
81,290	98	Paved parking, HSG A
22,457	98	Roofs, HSG A
107,978		Weighted Average
4,230	39	3.92% Pervious Area
103,748	98	96.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PS-1A:



Summary for Subcatchment PS-1B:

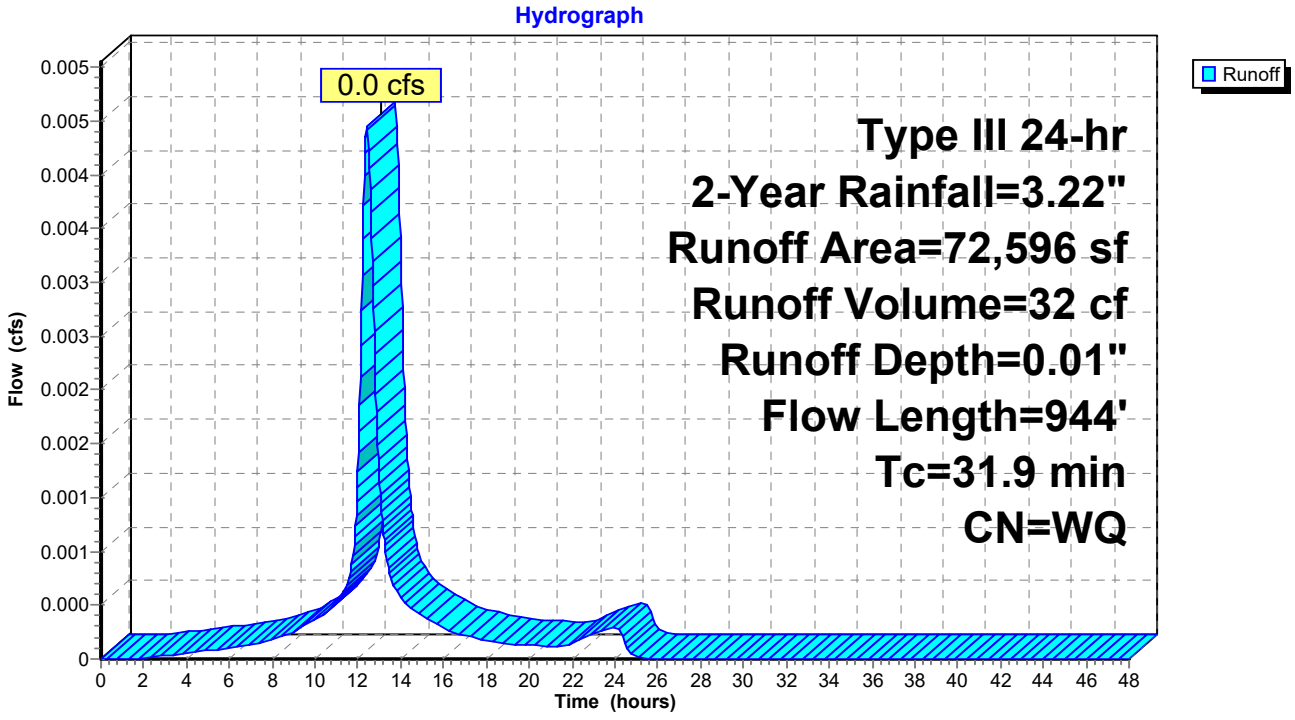
Runoff = 0.0 cfs @ 12.42 hrs, Volume= 32 cf, Depth= 0.01"
Routed to Link DP-1 : Offsite Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
31,982	39	>75% Grass cover, Good, HSG A
124	98	Paved parking, HSG A
40,491	30	Woods, Good, HSG A
72,596		Weighted Average
72,472	34	99.83% Pervious Area
124	98	0.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
16.3	685	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.2	159	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
31.9	944	Total			

Subcatchment PS-1B:



Summary for Subcatchment PS-2:

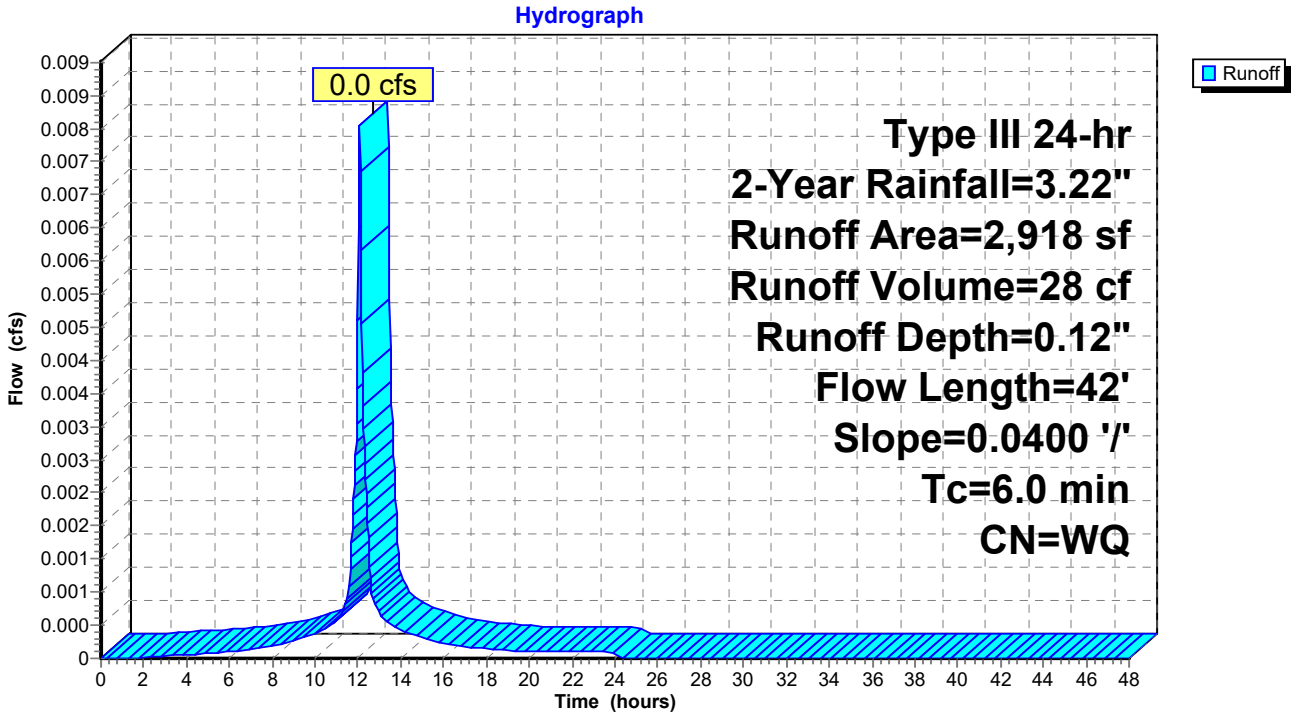
Runoff = 0.0 cfs @ 12.08 hrs, Volume= 28 cf, Depth= 0.12"
Routed to Link DP-2 : Silver Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
2,805	39	>75% Grass cover, Good, HSG A
113	98	Paved parking, HSG A
2,918		Weighted Average
2,805	39	96.13% Pervious Area
113	98	3.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	42	0.0400	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
3.8	42	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PS-2:



Summary for Pond 1P: Subsurface Basin

Inflow Area = 107,978 sf, 96.08% Impervious, Inflow Depth = 2.87" for 2-Year event
Inflow = 7.4 cfs @ 12.08 hrs, Volume= 25,828 cf
Outflow = 3.5 cfs @ 12.24 hrs, Volume= 25,828 cf, Atten= 52%, Lag= 9.5 min
Discarded = 0.3 cfs @ 9.42 hrs, Volume= 16,160 cf
Primary = 3.3 cfs @ 12.24 hrs, Volume= 9,669 cf
Routed to Link DP-1 : Offsite Wetland

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 183.02' @ 12.24 hrs Surf.Area= 4,992 sf Storage= 7,740 cf

Plug-Flow detention time= 83.8 min calculated for 25,812 cf (100% of inflow)
Center-of-Mass det. time= 83.8 min (840.1 - 756.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.00'	998 cf	**48.00'W x 104.00'L x 5.17'H Field A** 25,792 cf Overall - 23,296 cf Embedded = 2,496 cf x 40.0% Voids
#2A	181.50'	17,726 cf	**retain_it retain_it 4.0'** x 78 Inside #1 Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf 6 Rows adjusted for 286.9 cf perimeter wall
		18,725 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	181.30'	**12.0" Round Culvert** L= 79.0' Ke= 0.200 Inlet / Outlet Invert= 181.30' / 180.50' S= 0.0101 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	182.00'	**6.0" W x 9.0" H Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	182.75'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Discarded	181.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.3 cfs @ 9.42 hrs HW=181.05' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.3 cfs)

Primary OutFlow Max=3.2 cfs @ 12.24 hrs HW=183.02' (Free Discharge)
└**1=Culvert** (Passes 3.2 cfs of 4.1 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 1.4 cfs @ 3.81 fps)
  └**3=Sharp-Crested Rectangular Weir** (Weir Controls 1.8 cfs @ 1.70 fps)

Pond 1P: Subsurface Basin - Chamber Wizard Field A

Chamber Model = retain_it retain_it 4.0' (retain-it®)
Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf
Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf
6 Rows adjusted for 286.9 cf perimeter wall

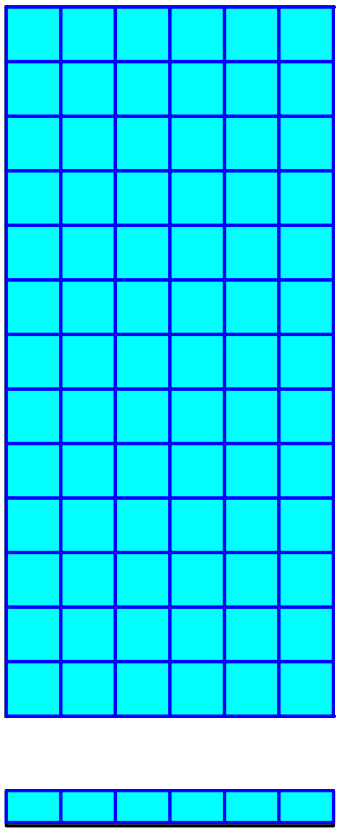
13 Chambers/Row x 8.00' Long = 104.00' Row Length
6 Rows x 96.0" Wide = 48.00' Base Width
6.0" Stone Base + 56.0" Chamber Height = 5.17' Field Height

7.5 cf Sidewall x 13 x 2 + 7.5 cf Endwall x 6 x 2 = 286.9 cf Perimeter Wall
78 Chambers x 230.9 cf - 286.9 cf Perimeter wall = 17,726.4 cf Chamber Storage
78 Chambers x 298.7 cf = 23,296.0 cf Displacement

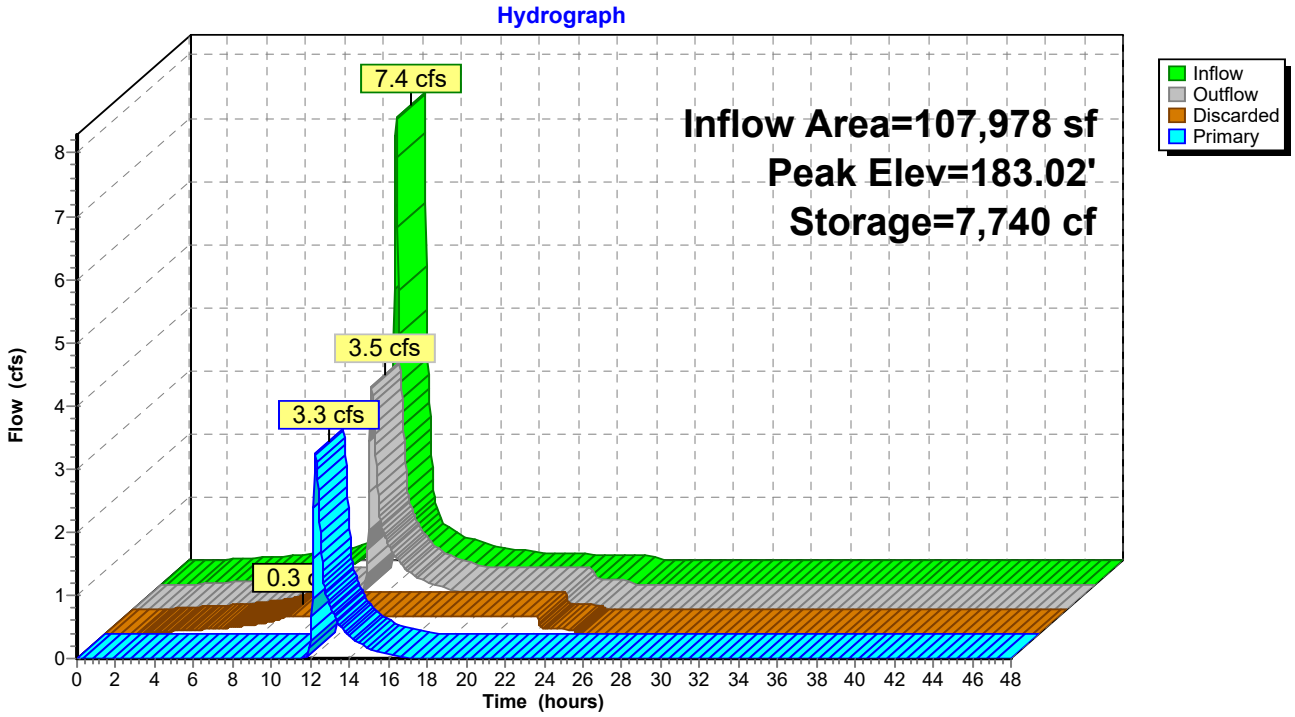
25,792.0 cf Field - 23,296.0 cf Chambers = 2,496.0 cf Stone x 40.0% Voids = 998.4 cf Stone Storage

Chamber Storage + Stone Storage = 18,724.8 cf = 0.430 af
Overall Storage Efficiency = 72.6%
Overall System Size = 104.00' x 48.00' x 5.17'

78 Chambers
955.3 cy Field
92.4 cy Stone



Pond 1P: Subsurface Basin

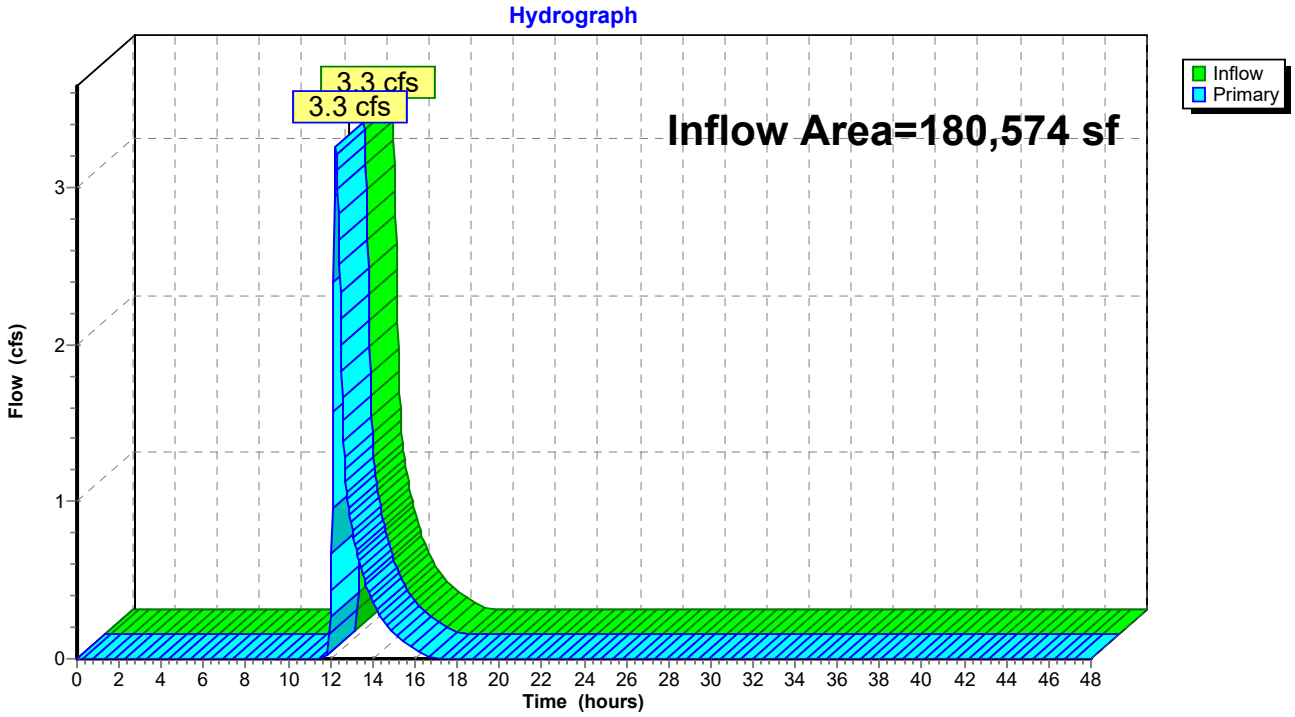


Summary for Link DP-1: Offsite Wetland

Inflow Area = 180,574 sf, 57.52% Impervious, Inflow Depth = 0.64" for 2-Year event
Inflow = 3.3 cfs @ 12.24 hrs, Volume= 9,701 cf
Primary = 3.3 cfs @ 12.24 hrs, Volume= 9,701 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link DP-1: Offsite Wetland

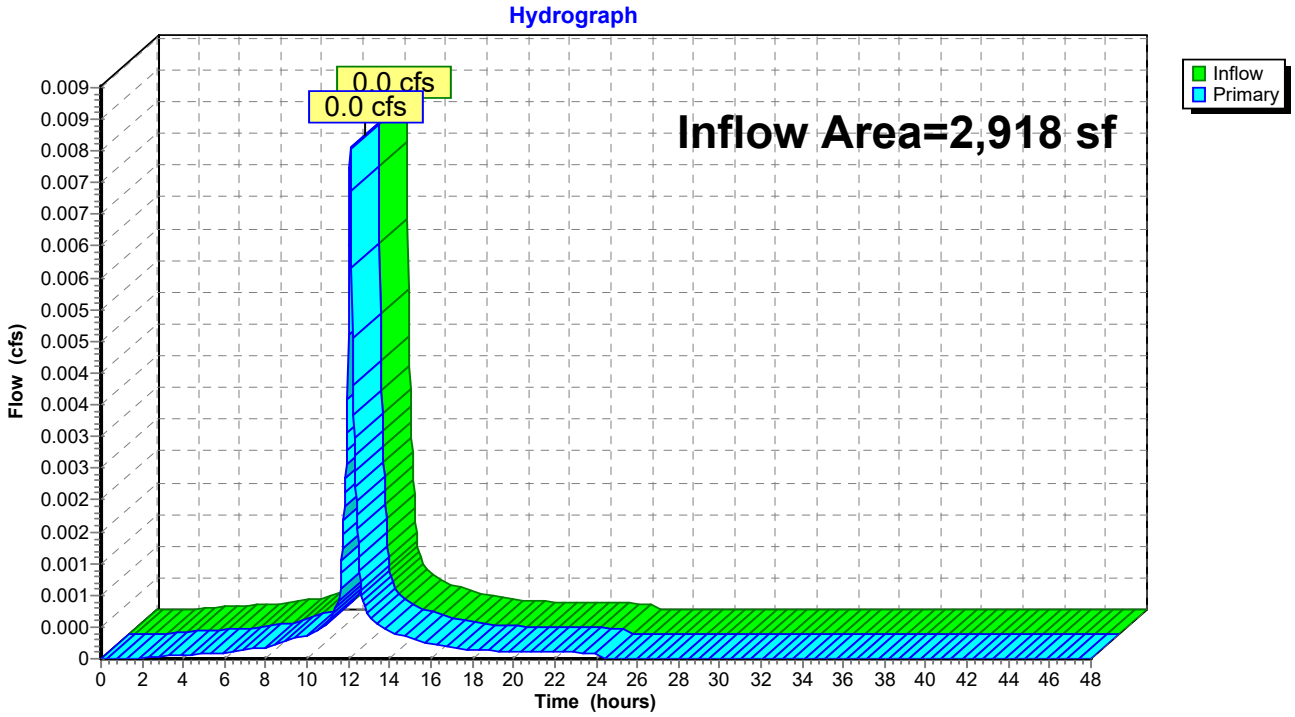


Summary for Link DP-2: Silver Street

Inflow Area = 2,918 sf, 3.87% Impervious, Inflow Depth = 0.12" for 2-Year event
Inflow = 0.0 cfs @ 12.08 hrs, Volume= 28 cf
Primary = 0.0 cfs @ 12.08 hrs, Volume= 28 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link DP-2: Silver Street



Time span=0.00-48.00 hrs, dt=0.03 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS-1A: Runoff Area=107,978 sf 96.08% Impervious Runoff Depth=4.76"
Tc=6.0 min CN=WQ Runoff=12.0 cfs 42,818 cf

Subcatchment PS-1B: Runoff Area=72,596 sf 0.17% Impervious Runoff Depth=0.12"
Flow Length=944' Tc=31.9 min CN=WQ Runoff=0.0 cfs 723 cf

Subcatchment PS-2: Runoff Area=2,918 sf 3.87% Impervious Runoff Depth=0.42"
Flow Length=42' Slope=0.0400 '/' Tc=6.0 min CN=WQ Runoff=0.0 cfs 102 cf

Pond 1P: Subsurface Basin Peak Elev=183.91' Storage=11,659 cf Inflow=12.0 cfs 42,818 cf
Discarded=0.3 cfs 20,079 cf Primary=5.1 cfs 22,739 cf Outflow=5.4 cfs 42,818 cf

Link DP-1: Offsite Wetland Inflow=5.1 cfs 23,462 cf
Primary=5.1 cfs 23,462 cf

Link DP-2: Silver Street Inflow=0.0 cfs 102 cf
Primary=0.0 cfs 102 cf

Total Runoff Area = 183,492 sf Runoff Volume = 43,643 cf Average Runoff Depth = 2.85"
43.33% Pervious = 79,507 sf 56.67% Impervious = 103,985 sf

Summary for Subcatchment PS-1A:

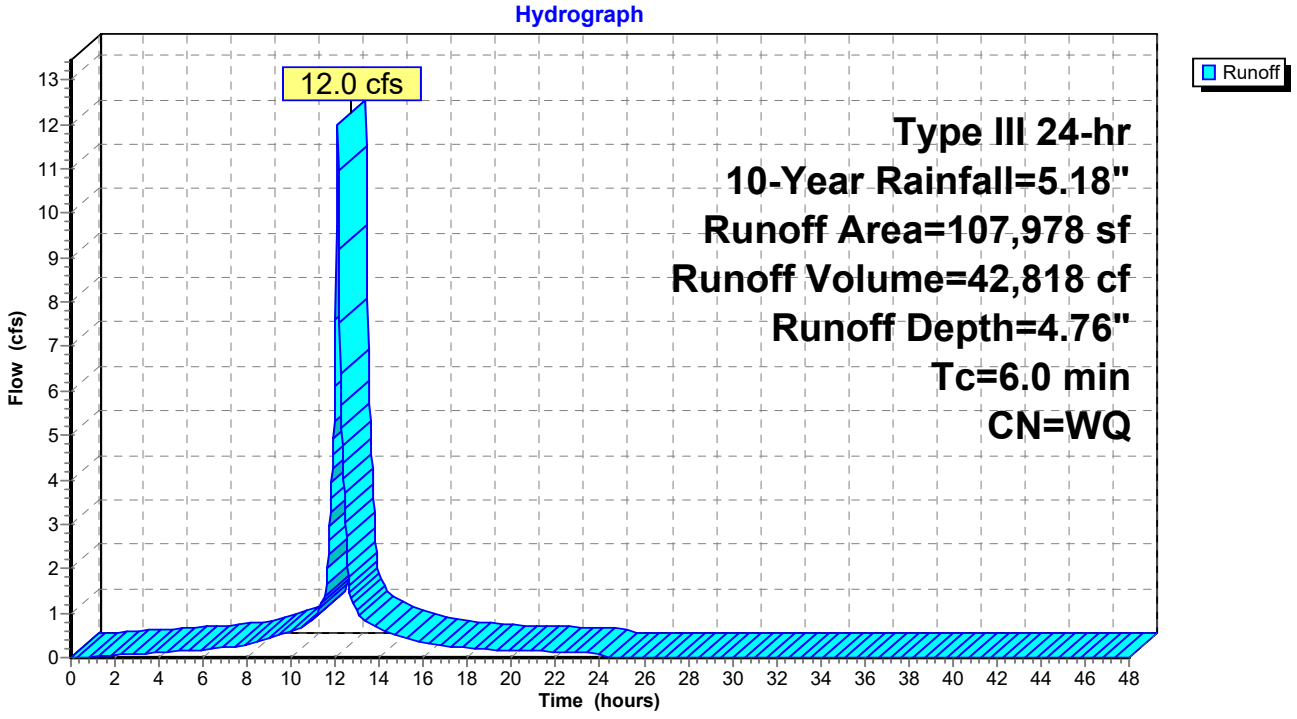
Runoff = 12.0 cfs @ 12.08 hrs, Volume= 42,818 cf, Depth= 4.76"
Routed to Pond 1P : Subsurface Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (sf)	CN	Description
4,230	39	>75% Grass cover, Good, HSG A
81,290	98	Paved parking, HSG A
22,457	98	Roofs, HSG A
107,978		Weighted Average
4,230	39	3.92% Pervious Area
103,748	98	96.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PS-1A:



Summary for Subcatchment PS-1B:

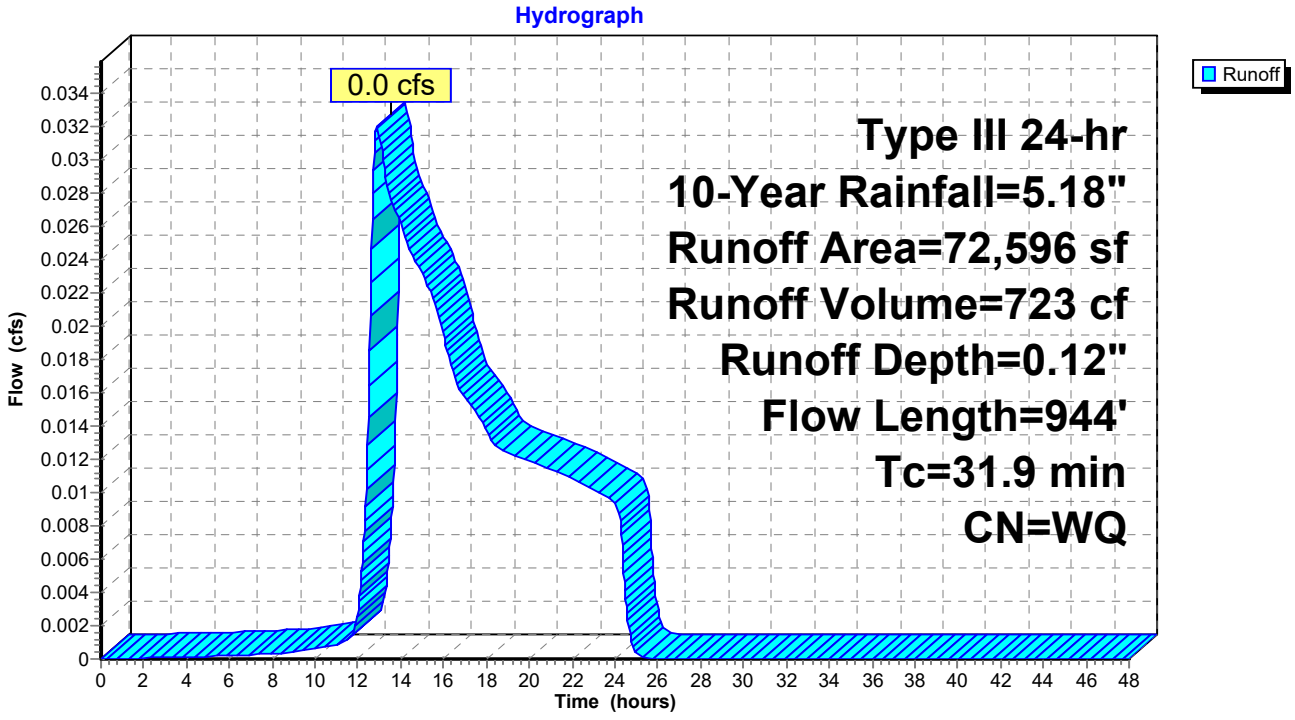
Runoff = 0.0 cfs @ 12.88 hrs, Volume= 723 cf, Depth= 0.12"
Routed to Link DP-1 : Offsite Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (sf)	CN	Description
31,982	39	>75% Grass cover, Good, HSG A
124	98	Paved parking, HSG A
40,491	30	Woods, Good, HSG A
72,596		Weighted Average
72,472	34	99.83% Pervious Area
124	98	0.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
16.3	685	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.2	159	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
31.9	944	Total			

Subcatchment PS-1B:



Summary for Subcatchment PS-2:

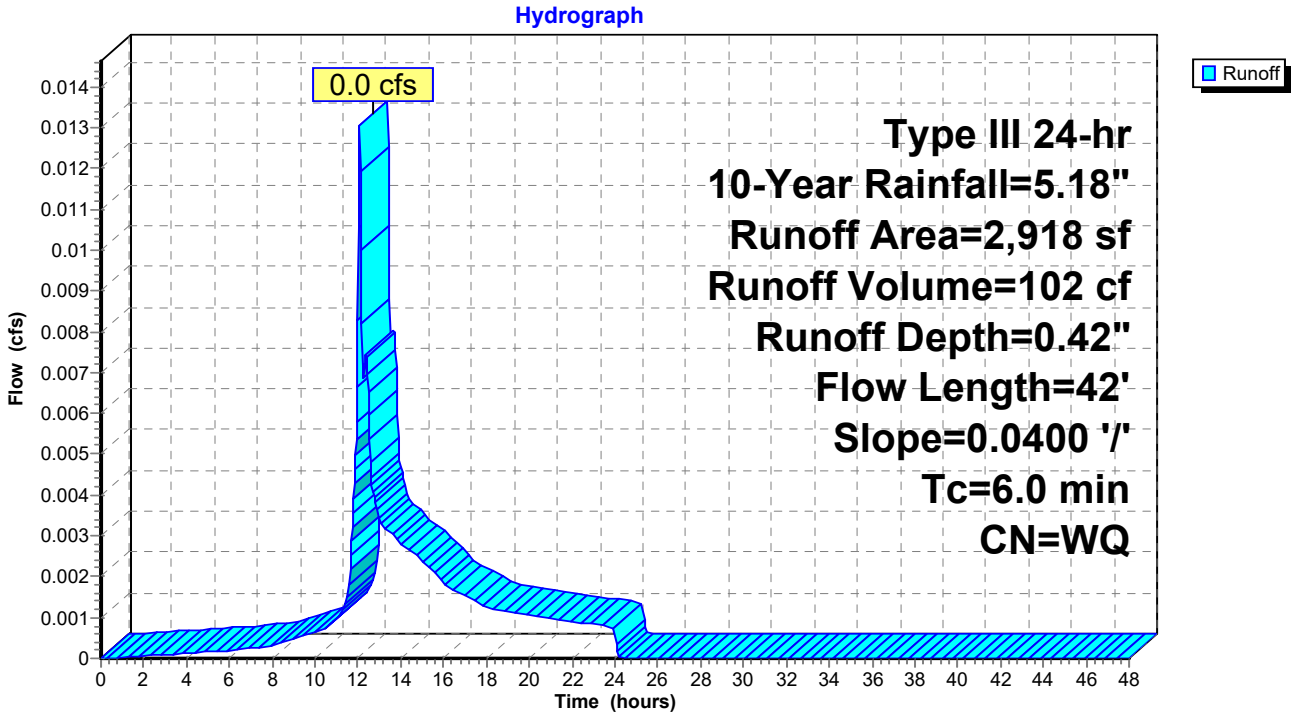
Runoff = 0.0 cfs @ 12.08 hrs, Volume= 102 cf, Depth= 0.42"
Routed to Link DP-2 : Silver Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (sf)	CN	Description
2,805	39	>75% Grass cover, Good, HSG A
113	98	Paved parking, HSG A
2,918		Weighted Average
2,805	39	96.13% Pervious Area
113	98	3.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	42	0.0400	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
3.8	42	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PS-2:



Summary for Pond 1P: Subsurface Basin

Inflow Area = 107,978 sf, 96.08% Impervious, Inflow Depth = 4.76" for 10-Year event
Inflow = 12.0 cfs @ 12.08 hrs, Volume= 42,818 cf
Outflow = 5.4 cfs @ 12.26 hrs, Volume= 42,818 cf, Atten= 55%, Lag= 10.5 min
Discarded = 0.3 cfs @ 7.89 hrs, Volume= 20,079 cf
Primary = 5.1 cfs @ 12.26 hrs, Volume= 22,739 cf
Routed to Link DP-1 : Offsite Wetland

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 183.91' @ 12.26 hrs Surf.Area= 4,992 sf Storage= 11,659 cf

Plug-Flow detention time= 76.8 min calculated for 42,792 cf (100% of inflow)
Center-of-Mass det. time= 76.8 min (824.7 - 747.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.00'	998 cf	**48.00'W x 104.00'L x 5.17'H Field A** 25,792 cf Overall - 23,296 cf Embedded = 2,496 cf x 40.0% Voids
#2A	181.50'	17,726 cf	**retain_it retain_it 4.0'** x 78 Inside #1 Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf 6 Rows adjusted for 286.9 cf perimeter wall
		18,725 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	181.30'	**12.0" Round Culvert** L= 79.0' Ke= 0.200 Inlet / Outlet Invert= 181.30' / 180.50' S= 0.0101 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	182.00'	**6.0" W x 9.0" H Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	182.75'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Discarded	181.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.3 cfs @ 7.89 hrs HW=181.05' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.3 cfs)

Primary OutFlow Max=5.1 cfs @ 12.26 hrs HW=183.90' (Free Discharge)
└**1=Culvert** (Barrel Controls 5.1 cfs @ 6.49 fps)
  ├**2=Orifice** (Passes < 2.2 cfs potential flow)
  └**3=Sharp-Crested Rectangular Weir** (Passes < 15.3 cfs potential flow)

Pond 1P: Subsurface Basin - Chamber Wizard Field A

Chamber Model = retain_it retain_it 4.0' (retain-it®)
Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf
Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf
6 Rows adjusted for 286.9 cf perimeter wall

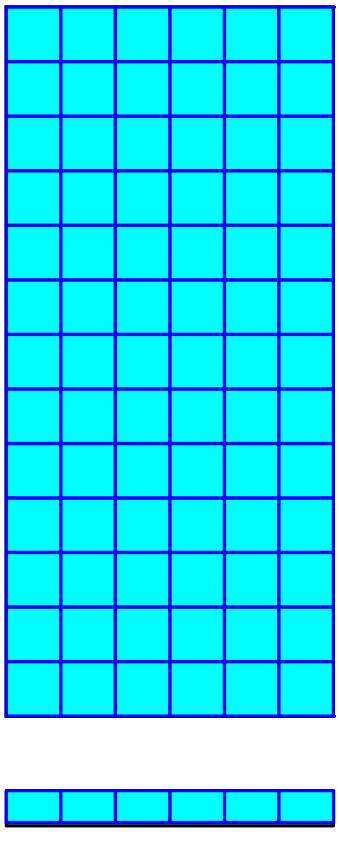
13 Chambers/Row x 8.00' Long = 104.00' Row Length
6 Rows x 96.0" Wide = 48.00' Base Width
6.0" Stone Base + 56.0" Chamber Height = 5.17' Field Height

7.5 cf Sidewall x 13 x 2 + 7.5 cf Endwall x 6 x 2 = 286.9 cf Perimeter Wall
78 Chambers x 230.9 cf - 286.9 cf Perimeter wall = 17,726.4 cf Chamber Storage
78 Chambers x 298.7 cf = 23,296.0 cf Displacement

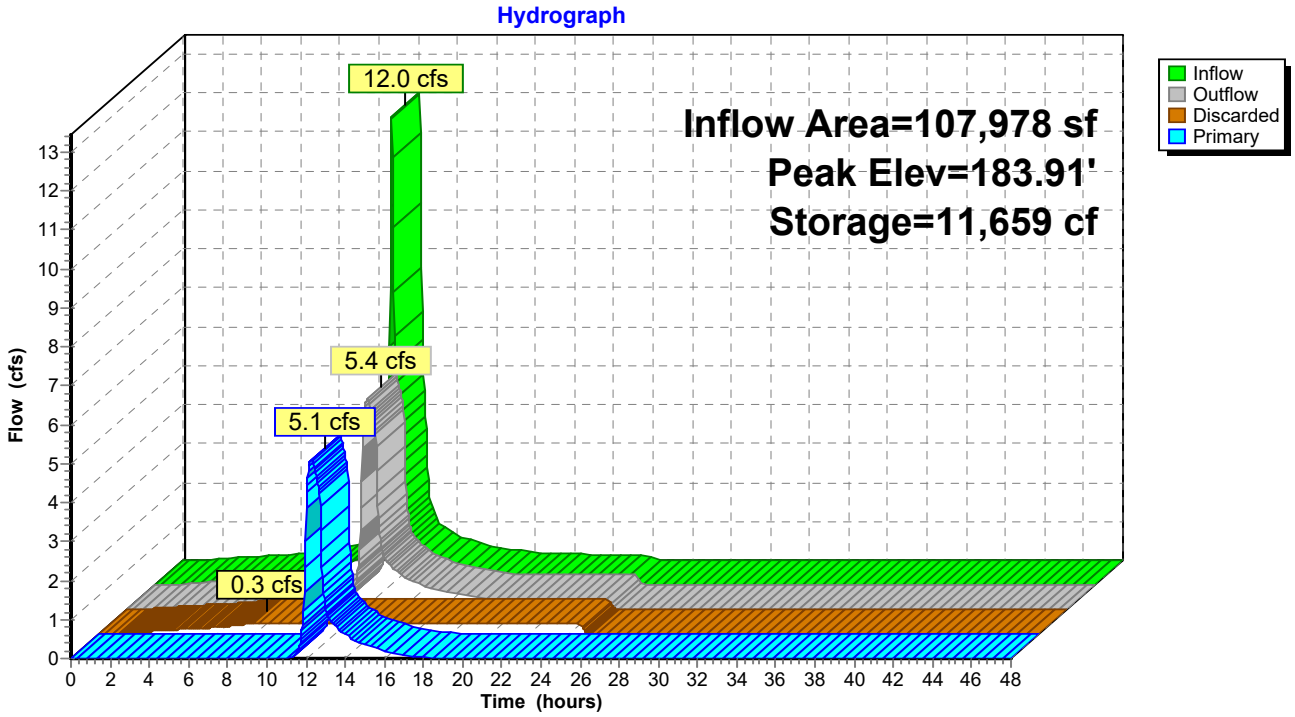
25,792.0 cf Field - 23,296.0 cf Chambers = 2,496.0 cf Stone x 40.0% Voids = 998.4 cf Stone Storage

Chamber Storage + Stone Storage = 18,724.8 cf = 0.430 af
Overall Storage Efficiency = 72.6%
Overall System Size = 104.00' x 48.00' x 5.17'

78 Chambers
955.3 cy Field
92.4 cy Stone



Pond 1P: Subsurface Basin

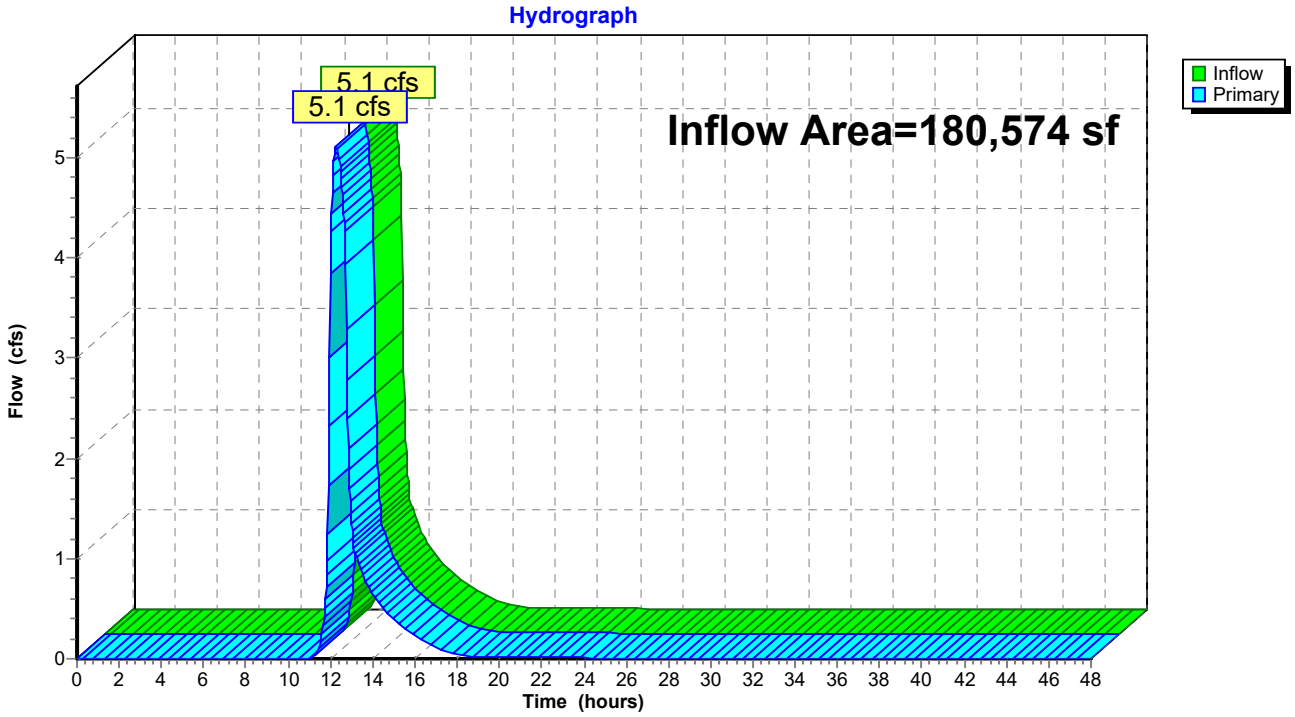


Summary for Link DP-1: Offsite Wetland

Inflow Area = 180,574 sf, 57.52% Impervious, Inflow Depth = 1.56" for 10-Year event
Inflow = 5.1 cfs @ 12.26 hrs, Volume= 23,462 cf
Primary = 5.1 cfs @ 12.26 hrs, Volume= 23,462 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link DP-1: Offsite Wetland

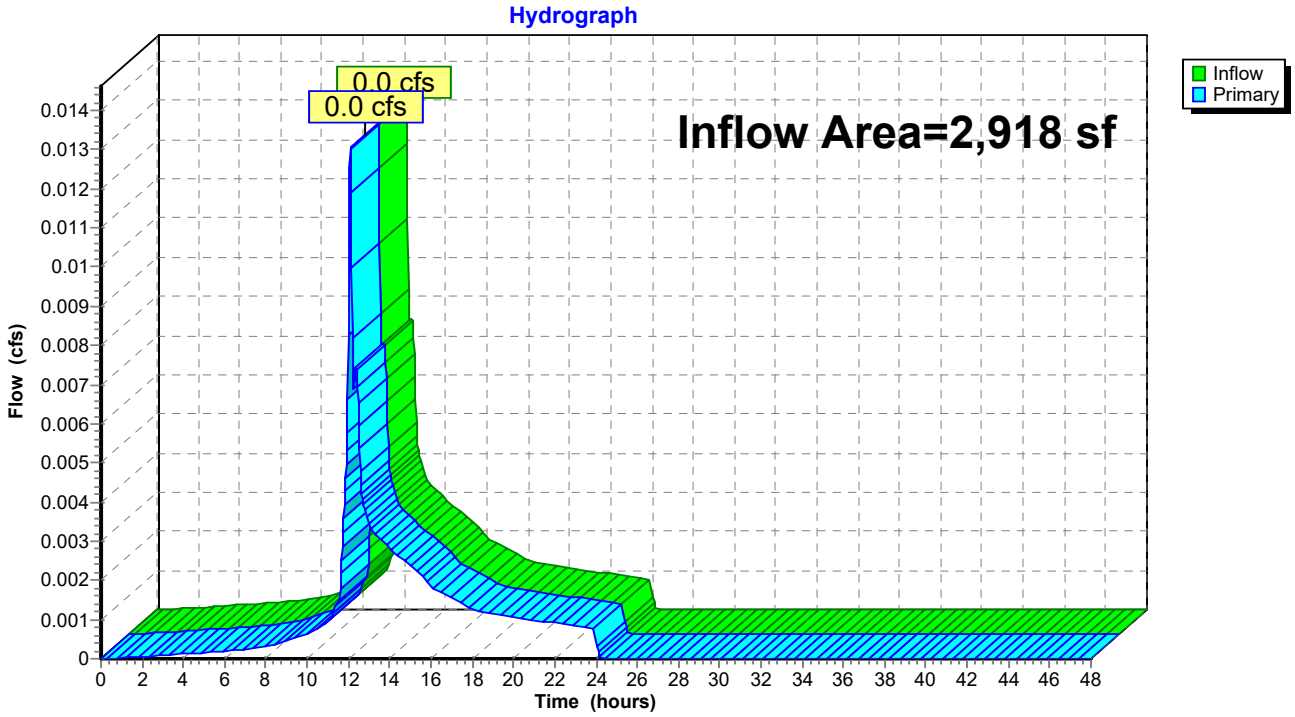


Summary for Link DP-2: Silver Street

Inflow Area = 2,918 sf, 3.87% Impervious, Inflow Depth = 0.42" for 10-Year event
Inflow = 0.0 cfs @ 12.08 hrs, Volume= 102 cf
Primary = 0.0 cfs @ 12.08 hrs, Volume= 102 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link DP-2: Silver Street



Time span=0.00-48.00 hrs, dt=0.03 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS-1A: Runoff Area=107,978 sf 96.08% Impervious Runoff Depth=7.80"
Tc=6.0 min CN=WQ Runoff=19.4 cfs 70,225 cf

Subcatchment PS-1B: Runoff Area=72,596 sf 0.17% Impervious Runoff Depth=0.86"
Flow Length=944' Tc=31.9 min CN=WQ Runoff=0.5 cfs 5,180 cf

Subcatchment PS-2: Runoff Area=2,918 sf 3.87% Impervious Runoff Depth=1.55"
Flow Length=42' Slope=0.0400 '/' Tc=6.0 min CN=WQ Runoff=0.1 cfs 377 cf

Pond 1P: Subsurface Basin Peak Elev=185.46' Storage=18,562 cf Inflow=19.4 cfs 70,225 cf
Discarded=0.3 cfs 24,067 cf Primary=6.5 cfs 46,158 cf Outflow=6.8 cfs 70,225 cf

Link DP-1: Offsite Wetland Inflow=6.9 cfs 51,338 cf
Primary=6.9 cfs 51,338 cf

Link DP-2: Silver Street Inflow=0.1 cfs 377 cf
Primary=0.1 cfs 377 cf

Total Runoff Area = 183,492 sf Runoff Volume = 75,783 cf Average Runoff Depth = 4.96"
43.33% Pervious = 79,507 sf 56.67% Impervious = 103,985 sf

Summary for Subcatchment PS-1A:

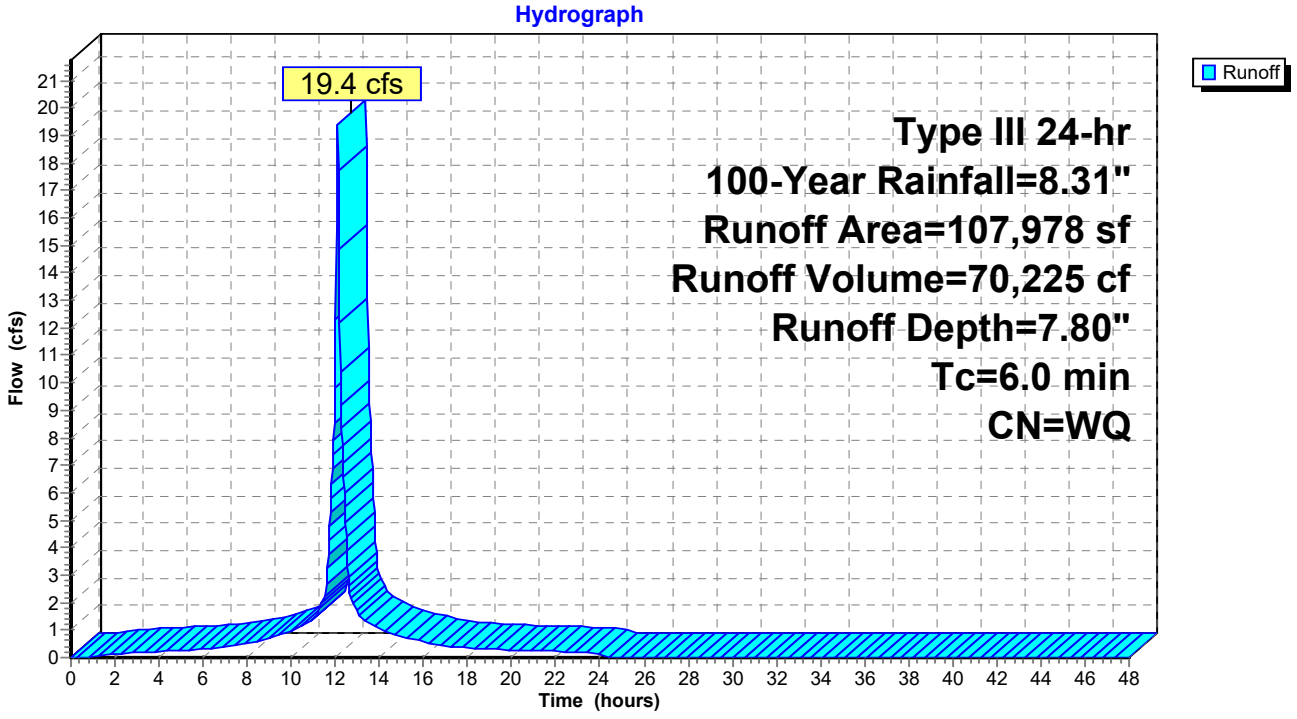
Runoff = 19.4 cfs @ 12.08 hrs, Volume= 70,225 cf, Depth= 7.80"
Routed to Pond 1P : Subsurface Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.31"

Area (sf)	CN	Description
4,230	39	>75% Grass cover, Good, HSG A
81,290	98	Paved parking, HSG A
22,457	98	Roofs, HSG A
107,978		Weighted Average
4,230	39	3.92% Pervious Area
103,748	98	96.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PS-1A:



Summary for Subcatchment PS-1B:

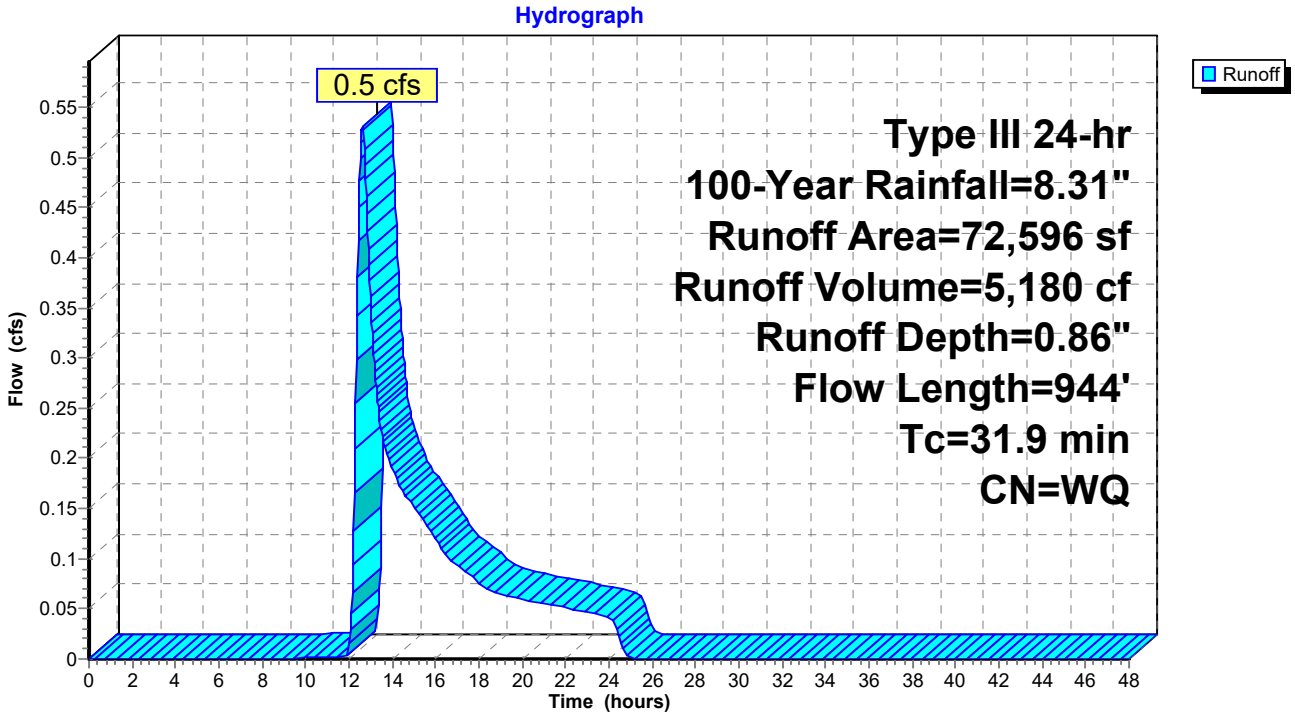
Runoff = 0.5 cfs @ 12.61 hrs, Volume= 5,180 cf, Depth= 0.86"
Routed to Link DP-1 : Offsite Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.31"

Area (sf)	CN	Description
31,982	39	>75% Grass cover, Good, HSG A
124	98	Paved parking, HSG A
40,491	30	Woods, Good, HSG A
72,596		Weighted Average
72,472	34	99.83% Pervious Area
124	98	0.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
16.3	685	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.2	159	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
31.9	944	Total			

Subcatchment PS-1B:



Summary for Subcatchment PS-2:

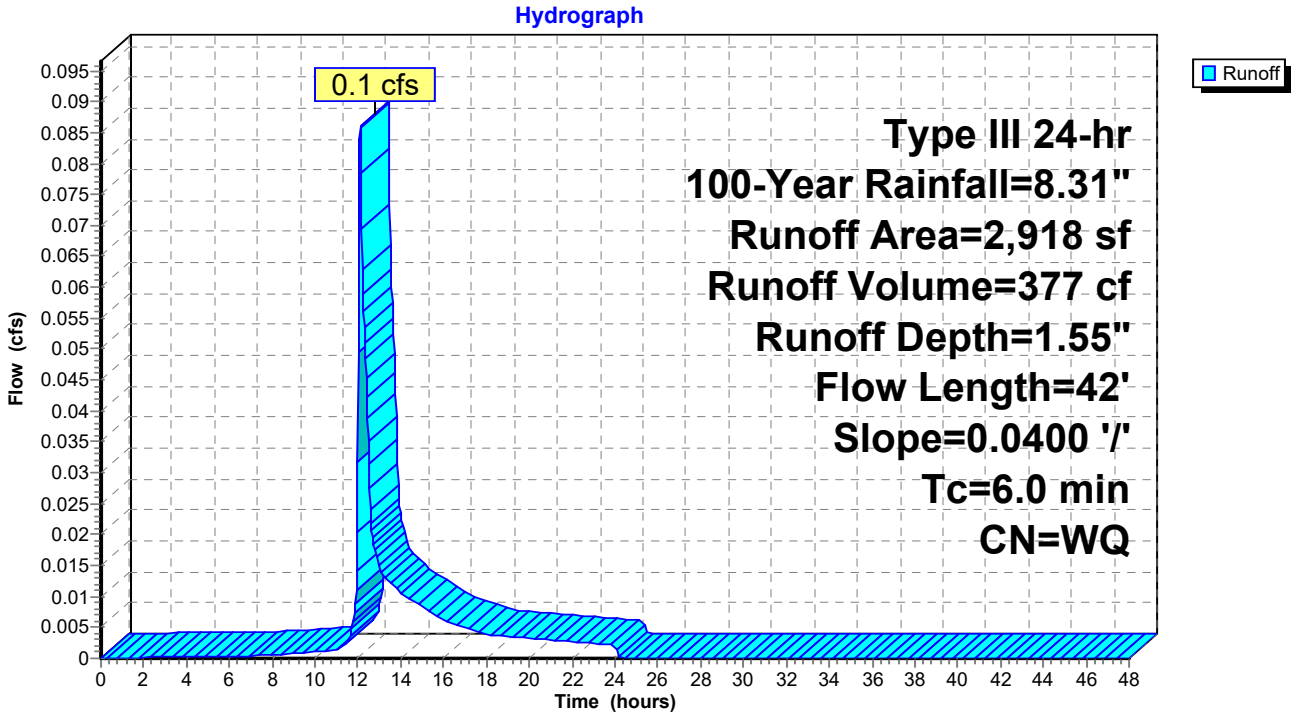
Runoff = 0.1 cfs @ 12.11 hrs, Volume= 377 cf, Depth= 1.55"
Routed to Link DP-2 : Silver Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.31"

Area (sf)	CN	Description
2,805	39	>75% Grass cover, Good, HSG A
113	98	Paved parking, HSG A
2,918		Weighted Average
2,805	39	96.13% Pervious Area
113	98	3.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	42	0.0400	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
3.8	42	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PS-2:



Summary for Pond 1P: Subsurface Basin

Inflow Area = 107,978 sf, 96.08% Impervious, Inflow Depth = 7.80" for 100-Year event
Inflow = 19.4 cfs @ 12.08 hrs, Volume= 70,225 cf
Outflow = 6.8 cfs @ 12.35 hrs, Volume= 70,225 cf, Atten= 65%, Lag= 15.6 min
Discarded = 0.3 cfs @ 5.73 hrs, Volume= 24,067 cf
Primary = 6.5 cfs @ 12.35 hrs, Volume= 46,158 cf
Routed to Link DP-1 : Offsite Wetland

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 185.46' @ 12.35 hrs Surf.Area= 4,992 sf Storage= 18,562 cf

Plug-Flow detention time= 72.9 min calculated for 70,181 cf (100% of inflow)
Center-of-Mass det. time= 73.0 min (814.8 - 741.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.00'	998 cf	**48.00'W x 104.00'L x 5.17'H Field A** 25,792 cf Overall - 23,296 cf Embedded = 2,496 cf x 40.0% Voids
#2A	181.50'	17,726 cf	**retain_it retain_it 4.0'** x 78 Inside #1 Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf 6 Rows adjusted for 286.9 cf perimeter wall
		18,725 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	181.30'	**12.0" Round Culvert** L= 79.0' Ke= 0.200 Inlet / Outlet Invert= 181.30' / 180.50' S= 0.0101 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	182.00'	**6.0" W x 9.0" H Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	182.75'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Discarded	181.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.3 cfs @ 5.73 hrs HW=181.05' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.3 cfs)

Primary OutFlow Max=6.5 cfs @ 12.35 hrs HW=185.46' (Free Discharge)
└**1=Culvert** (Barrel Controls 6.5 cfs @ 8.33 fps)
  ├**2=Orifice** (Passes < 3.2 cfs potential flow)
  └**3=Sharp-Crested Rectangular Weir** (Passes < 50.5 cfs potential flow)

Pond 1P: Subsurface Basin - Chamber Wizard Field A

Chamber Model = retain_it retain_it 4.0' (retain-it®)
Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf
Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf
6 Rows adjusted for 286.9 cf perimeter wall

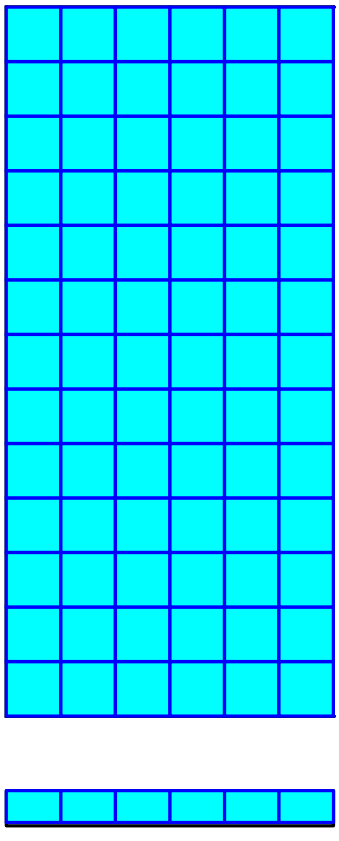
13 Chambers/Row x 8.00' Long = 104.00' Row Length
6 Rows x 96.0" Wide = 48.00' Base Width
6.0" Stone Base + 56.0" Chamber Height = 5.17' Field Height

7.5 cf Sidewall x 13 x 2 + 7.5 cf Endwall x 6 x 2 = 286.9 cf Perimeter Wall
78 Chambers x 230.9 cf - 286.9 cf Perimeter wall = 17,726.4 cf Chamber Storage
78 Chambers x 298.7 cf = 23,296.0 cf Displacement

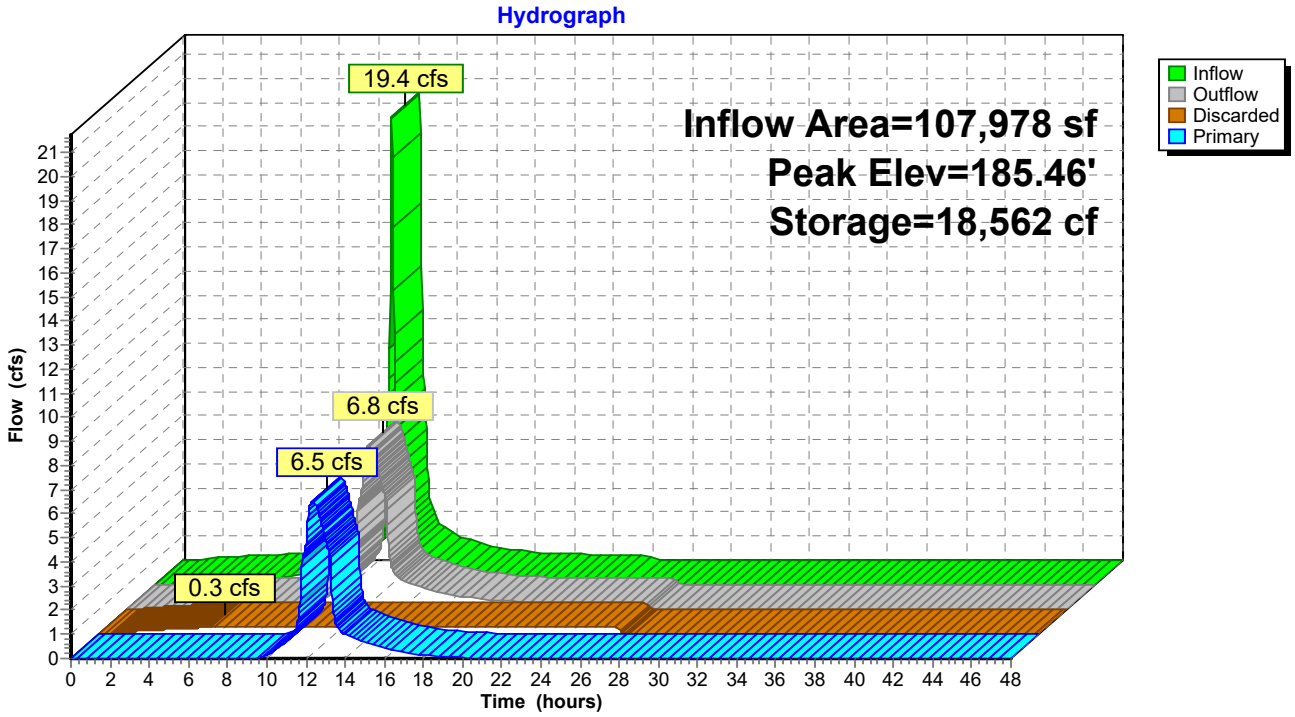
25,792.0 cf Field - 23,296.0 cf Chambers = 2,496.0 cf Stone x 40.0% Voids = 998.4 cf Stone Storage

Chamber Storage + Stone Storage = 18,724.8 cf = 0.430 af
Overall Storage Efficiency = 72.6%
Overall System Size = 104.00' x 48.00' x 5.17'

78 Chambers
955.3 cy Field
92.4 cy Stone



Pond 1P: Subsurface Basin

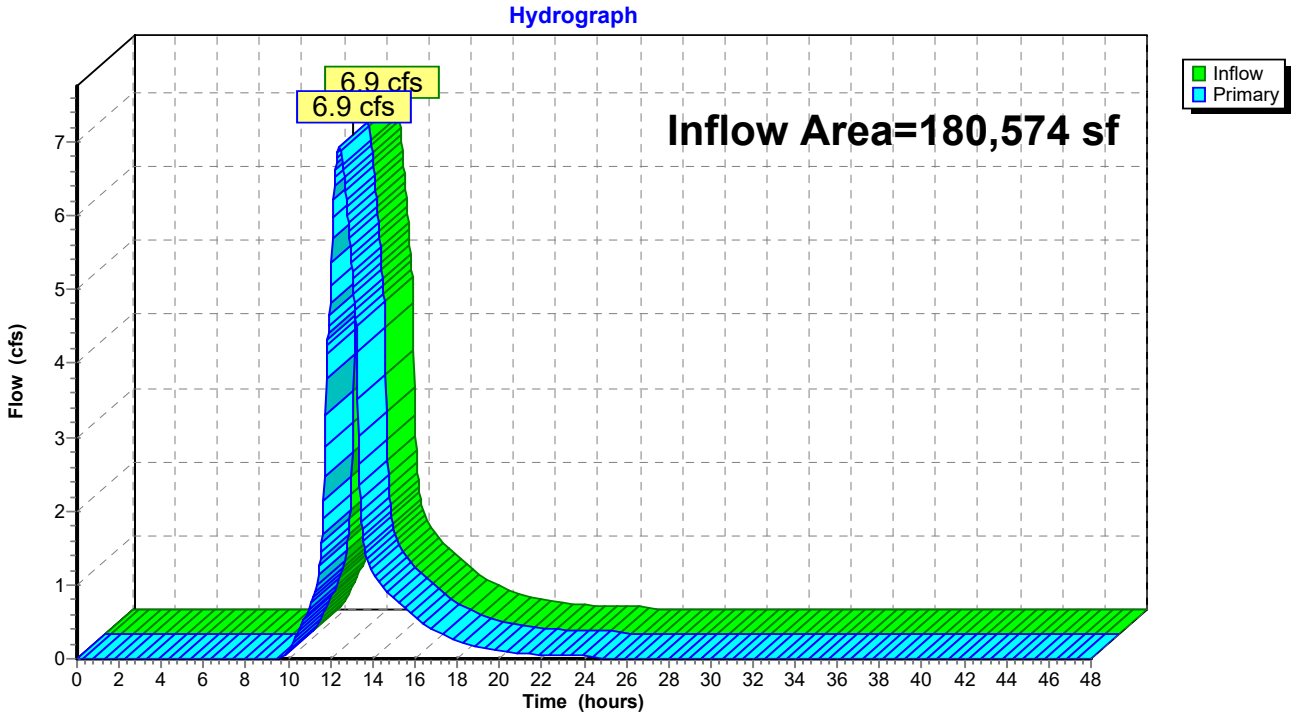


Summary for Link DP-1: Offsite Wetland

Inflow Area = 180,574 sf, 57.52% Impervious, Inflow Depth = 3.41" for 100-Year event
Inflow = 6.9 cfs @ 12.44 hrs, Volume= 51,338 cf
Primary = 6.9 cfs @ 12.44 hrs, Volume= 51,338 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link DP-1: Offsite Wetland

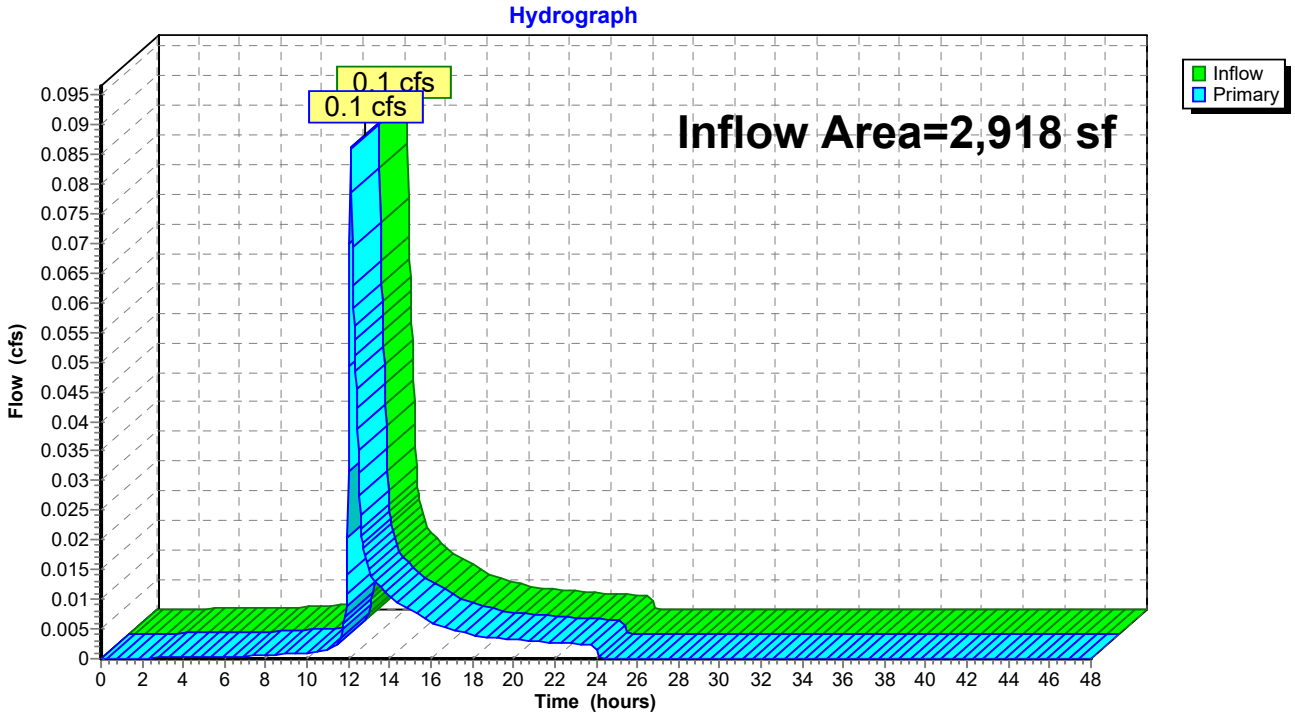


Summary for Link DP-2: Silver Street

Inflow Area = 2,918 sf, 3.87% Impervious, Inflow Depth = 1.55" for 100-Year event
Inflow = 0.1 cfs @ 12.11 hrs, Volume= 377 cf
Primary = 0.1 cfs @ 12.11 hrs, Volume= 377 cf, Atten= 0%, Lag= 0.0 min

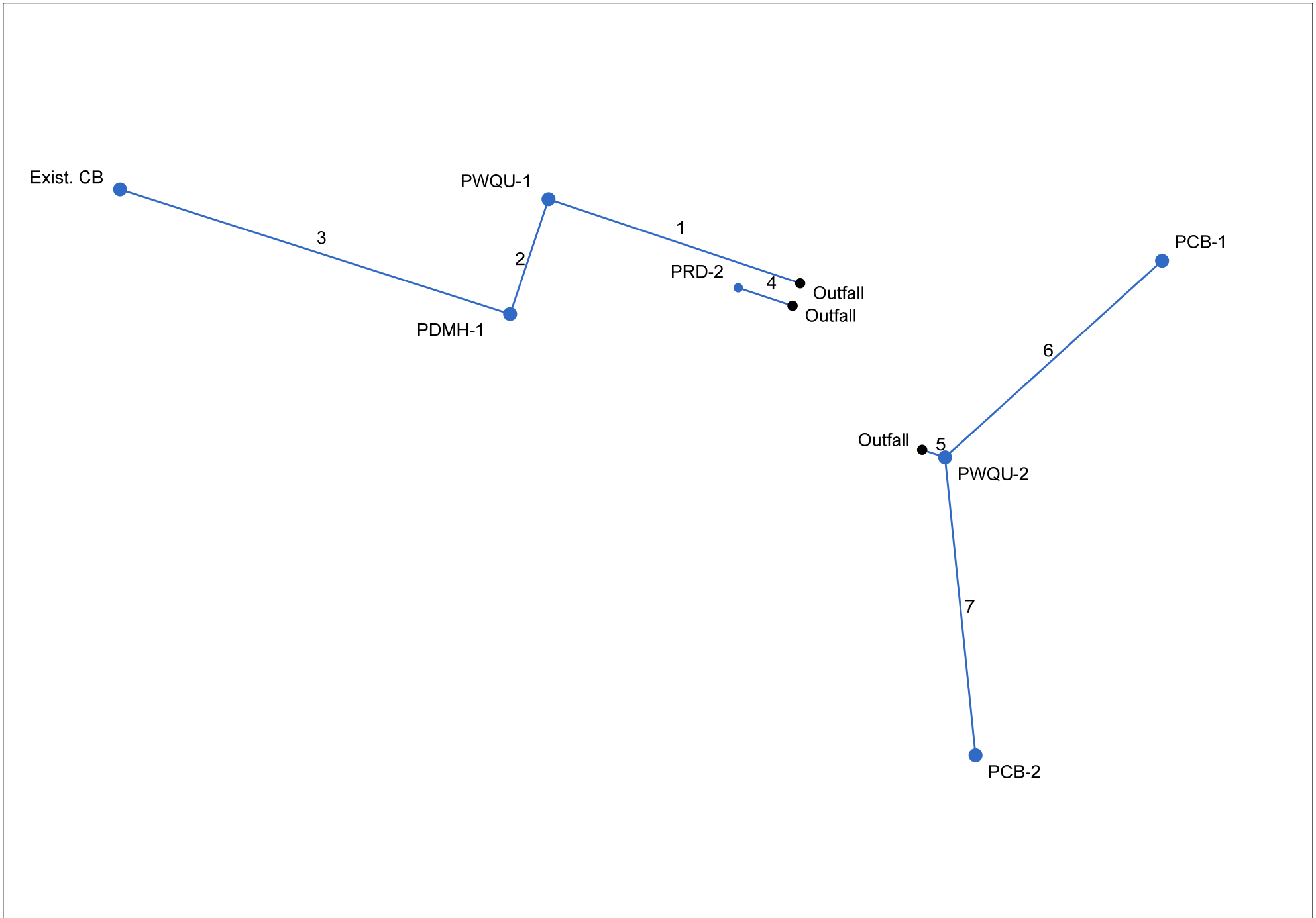
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link DP-2: Silver Street



Appendix D: Hydraulic Analysis

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



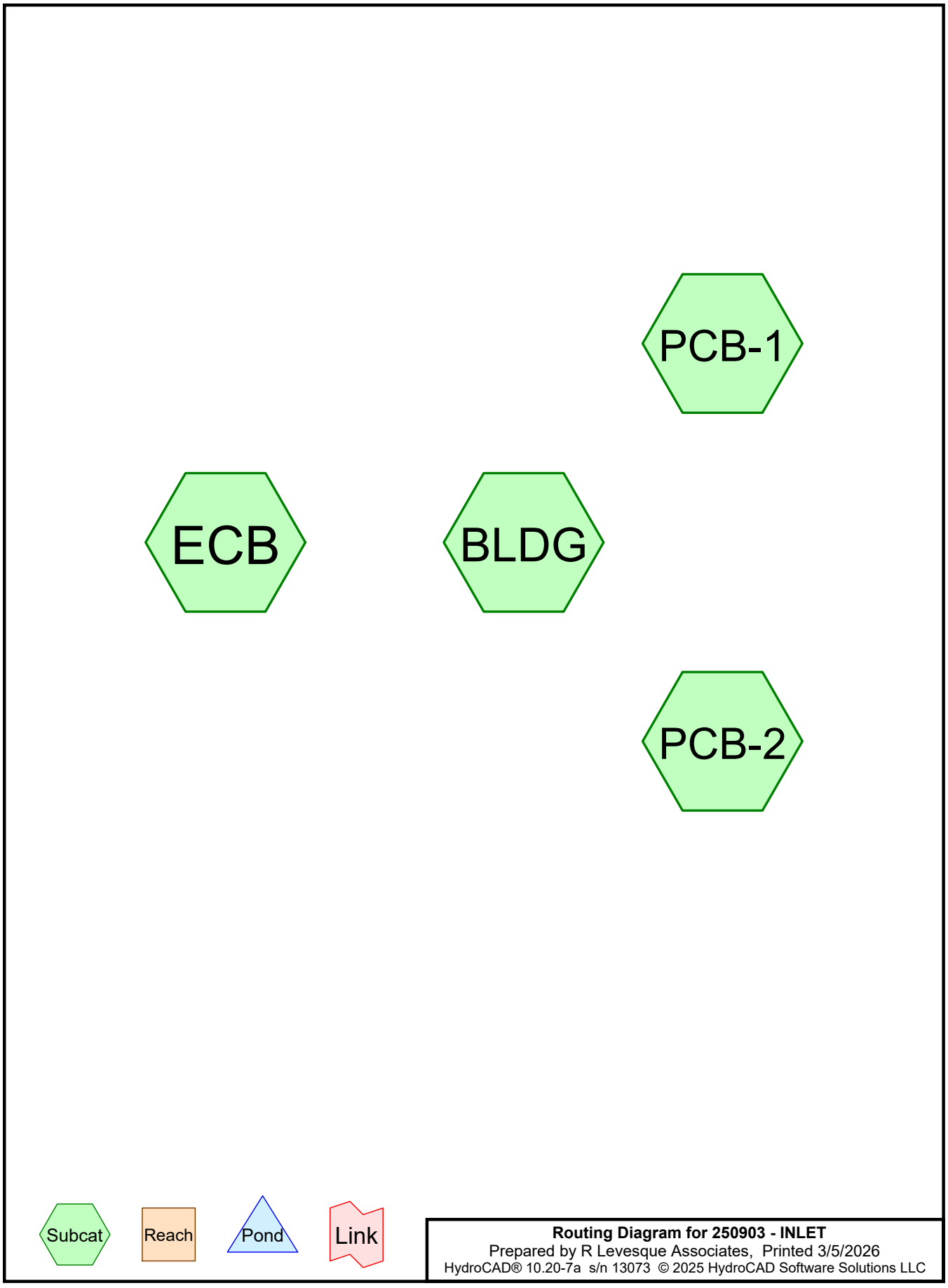
Project File: 250903 - Hydraflow.stm	Number of lines: 7	Date: 3/5/2026

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	88.018	0.00	0.00	0.00	0.00	0.00	0.0	0.5	0.0	4.60	3.56	5.91	12	1.00	181.50	182.38	182.45	183.84	190.00	190.93	P-D-PIPE-(4)
2	1	40.175	0.00	0.00	0.00	0.00	0.00	0.0	0.4	0.0	4.60	9.06	6.04	12	6.47	182.40	185.00	184.37	185.89	190.93	191.08	P-D-PIPE-(3)
3	2	135.901	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.60	3.59	5.86	12	0.87	185.48	186.66	186.48	188.41	191.08	189.31	P-D-PIPE-(11)
4	End	19.018	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.90	1.21	3.24	8	1.00	182.00	182.19	182.56	182.64	191.00	191.18	P-D-PIPE-(10)
5	End	8.000	0.00	0.00	0.00	0.00	0.00	0.0	0.4	0.0	6.60	3.98	8.42	12	1.25	181.50	181.60	182.48	182.75	188.00	187.97	P-D-PIPE-(6)
6	5	97.397	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.40	2.53	4.33	12	0.50	181.70	182.19	183.77	184.66	187.97	185.50	P-D-PIPE-(1)
7	5	99.664	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.20	3.57	4.07	12	1.00	181.70	182.70	183.77	184.58	187.97	185.90	P-D-PIPE-(2)

Project File: 250903 - Hydraflow.stm | Number of lines: 7 | Run Date: 3/5/2026

NOTES:Known Qs only ; c = cir e = ellip b = box



Routing Diagram for 250903 - INLET
Prepared by R Levesque Associates, Printed 3/5/2026
HydroCAD® 10.20-7a s/n 13073 © 2025 HydroCAD Software Solutions LLC

Summary for Subcatchment BLDG:

Runoff = 0.9 cfs @ 12.08 hrs, Volume= 3,065 cf, Depth= 4.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (sf)	CN	Description
7,440	98	Roofs, HSG A
7,440	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment ECB:

Runoff = 4.6 cfs @ 12.08 hrs, Volume= 16,495 cf, Depth= 4.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (sf)	CN	Description
4,230	39	>75% Grass cover, Good, HSG A
24,824	98	Paved parking, HSG A
15,017	98	Roofs, HSG A
44,072		Weighted Average
4,230	39	9.60% Pervious Area
39,842	98	90.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment PCB-1:

Runoff = 3.4 cfs @ 12.08 hrs, Volume= 12,011 cf, Depth= 4.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (sf)	CN	Description
29,160	98	Paved parking, HSG A
29,160	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment PCB-2:

Runoff = 3.2 cfs @ 12.08 hrs, Volume= 11,248 cf, Depth= 4.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (sf)	CN	Description
27,306	98	Paved parking, HSG A
27,306	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Appendix E: MassDEP Calculations

- Impervious Area Calculations
- Recharge Calculation
- Stage Storage Chart – Subsurface Infiltration Basin
- Water Quality Flow Rate Calculations – PWQU-1
- Water Quality Flow Rate Calculations – PWQU-2
- Tc Table
- TSS Removal Worksheet – Subsurface Infiltration Basin
- Drawdown Calculation
- Barracuda Max Info Sheet
- NJDEP Barracuda Max Certification
- Barracuda Max Maintenance Guide

Standard 3: Recharge Calculations

Impervious Area Calculations

Existing Total Impervious Area

Sub-Catchment	Roof (sf)	Other Impervious (sf)	Sum (sf)
ES-1A	15017	39138	54,155
ES-1B	0	2354	2,354
ES-2	0	108	108
			56,617

Proposed Total Impervious Area

Sub-Catchment	Roof (sf)	Other Impervious (sf)	Sum (sf)	
PS-1A	22457	81291	103748	Tributary to subsurface basin
PS-1B	0	124	124	
PS-2	0	113	113	
			103,985	

Summary Table

Total Existing Impervious Area	56,617	SF
Total Proposed Impervious Area	103,985	SF
Total New Impervious Area	47,368	SF
Total Impervious Area Tributary to Basin	103,748	SF

Standard 3: Recharge Calculations - Subsurface Infiltration Basin

R_V (required) = F x Impervious Area

where: R_V = Required Recharge Volume (cu. ft.)

F = Target Depth Factor

0.60 inch (A-soils)
0.35 inch (B-soils)
0.25 inch (C-soils)
0.10 inch (D-soils)

New Impervious Area by Hydrologic Soil Type

Impervious Area (A-soils)	47,368 sq. ft.	100.0%
Impervious Area (B-soils)	0 sq. ft.	0.0%
Impervious Area (C-soils)	0 sq. ft.	0.0%
Impervious Area (D-soils)	0 sq. ft.	0.0%
Total Impervious area	47,368 sq. ft.	100.0%

Required Recharge Volume Sizing (R_V)

R_v (required) = $\sum$ [$F_{Soil\ Type}$ x Impervious $Area_{Soil\ Type}$] x 1 ft./12 in.

R_v (required) = 2,368 cu. ft.

Capture Area Adjustment

Total Imperv. To Recharge Facilities =	103,748	sq. ft.
Percent Imperv. To Recharge Facilities* =	100%	
Adjustment Factor =	1.00	
Adjusted R_V (required) =	2,368	cu. ft.

*Impervious Area tributary to recharge facilities must be greater than 65%

Storage Volume Provided

Recharge Facility	Volume Provided
Subsurface Infiltration Basin	3,214 cu. ft.**
	3,214 cu. ft. > 2,368 cu. ft.

**Volume represents the available storage in the subsurface infiltration basin below the orifice (El. 182.00')

Stage-Area-Storage for Pond 1P: Subsurface Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
181.00	**4,992**	0
181.05	4,992	100
181.10	4,992	200
181.15	4,992	300
181.20	4,992	399
181.25	4,992	499
181.30	4,992	599
181.35	4,992	699
181.40	4,992	799
181.45	4,992	899
181.50	4,992	998
181.55	4,992	1,220
181.60	4,992	1,442
181.65	4,992	1,663
181.70	4,992	1,885
181.75	4,992	2,106
181.80	4,992	2,328
181.85	4,992	2,549
181.90	4,992	2,771
181.95	4,992	2,993
182.00	4,992	3,214
182.05	4,992	3,436
182.10	4,992	3,657
182.15	4,992	3,879
182.20	4,992	4,101
182.25	4,992	4,322
182.30	4,992	4,544
182.35	4,992	4,765
182.40	4,992	4,987
182.45	4,992	5,208
182.50	4,992	5,430
182.55	4,992	5,652
182.60	4,992	5,873
182.65	4,992	6,095
182.70	4,992	6,316
182.75	4,992	6,538
182.80	4,992	6,759
182.85	4,992	6,981
182.90	4,992	7,203
182.95	4,992	7,424
183.00	4,992	7,646
183.05	4,992	7,867
183.10	4,992	8,089
183.15	4,992	8,311
183.20	4,992	8,532
183.25	4,992	8,754
183.30	4,992	8,975
183.35	4,992	9,197
183.40	4,992	9,418
183.45	4,992	9,640
183.50	4,992	9,862
183.55	4,992	10,083
183.60	4,992	10,305
183.65	4,992	10,526
183.70	4,992	10,748
183.75	4,992	10,970
183.80	4,992	11,191
183.85	4,992	11,413
183.90	4,992	11,634
183.95	4,992	11,856
184.00	4,992	12,077
184.05	4,992	12,299
184.10	4,992	12,521
184.15	4,992	12,742
184.20	4,992	12,964
184.25	4,992	13,185
184.30	4,992	13,407
184.35	4,992	13,628
184.40	4,992	13,850
184.45	4,992	14,072
184.50	4,992	14,293
184.55	4,992	14,515
184.60	4,992	14,736
184.65	4,992	14,958
184.70	4,992	15,180
184.75	4,992	15,401
184.80	4,992	15,623
184.85	4,992	15,844
184.90	4,992	16,066
184.95	4,992	16,287
185.00	4,992	16,509
185.05	4,992	16,731
185.10	4,992	16,952
185.15	4,992	17,174
185.20	4,992	17,395
185.25	4,992	17,617
185.30	4,992	17,838
185.35	4,992	18,060
185.40	4,992	18,282
185.45	4,992	18,503
185.50	4,992	18,725
185.55	4,992	18,725
185.60	4,992	18,725
185.65	4,992	18,725
185.70	4,992	18,725
185.75	4,992	18,725
185.80	4,992	18,725
185.85	4,992	18,725
185.90	4,992	18,725
185.95	4,992	18,725
186.00	4,992	18,725
186.05	4,992	18,725
186.10	4,992	18,725
186.15	4,992	**18,725**

Standard 4: Water Quality - PWQU-I

Water Quality Volume Conversion to Flow Rate

Note: Required water quality volume based on 1.0-inch of runoff

$Q = (qu)\ (A)\ (WQV)$

where: Q = peak flow rate (c.f.s.)

qu = unit peak discharge (csm/in) - value taken from table based on t_c

A = impervious surface drainage area (sq. mi.)

WQV = water quality volume in watershed inches

· Proposed Water Quality Unit (PWQU-1)

t_c =	0.100	hrs	
qu =	774	csm/in	(from table)
A =	0.00143	sq. mi.*	
WQV =	1.0	inch **	

$Q_{1.0}$ = 1.11 c.f.s

The Baracuda Max Model S4 provides treatment of flows up to 2.94 c.f.s.

* Only inlcudes impervious area tributary to PWQU-1

** Water quality depth shall equal 1-inch for discharges within a Zone II or Interim Wellhead Protection Area, to or near another critical area, runoff from a LUHPPL, or exfiltration to soils with infiltration rate greater than 2.4-inches/hour or greater; 1/2-inch for discharges near to other areas

Standard 4: Water Quality - PWQU-2

Water Quality Volume Conversion to Flow Rate

Note: Required water quality volume based on 1.0-inch of runoff

$Q = (qu)\ (A)\ (WQV)$

where: Q = peak flow rate (c.f.s.)

qu = unit peak discharge (csm/in) - value taken from table based on t_c

A = impervious surface drainage area (sq. mi.)

WQV = water quality volume in watershed inches

· Proposed Water Quality Unit (PWQU-2)

t_c =	0.100	hrs	
qu =	774	csm/in	(from table)
A =	0.00203	sq. mi.*	
WQV =	1.0	inch **	

$Q_{1.0}$ = 1.57 c.f.s

The Baracuda Max Model S4 provides treatment of flows up to 2.94 c.f.s.

* Only inlcudes impervious area tributary to PWQU-2

** Water quality depth shall equal 1-inch for discharges within a Zone II or Interim Wellhead Protection Area, to or near another critical area, runoff from a LUHPPL, or exfiltration to soils with infiltration rate greater than 2.4-inches/hour or greater; 1/2-inch for discharges near to other areas

Figure 4: for First 1-inch Runoff, Table of qu values for Ia/P Curve = 0.034, listed by tc, for Type III Storm Distribution

Tc (Hours)	qu (csm/in)
0.01	835
0.03	835
0.05	831
0.067	814
0.083	795
0.1	774
0.116	755
0.133	736
0.15	717
0.167	700
0.183	685
0.2	669
0.217	654
0.233	641
0.25	628
0.3	593
0.333	572
0.35	563
0.4	536
0.416	528
0.5	491
0.583	460
0.6	454
0.667	433
0.7	424
0.8	398
0.9	376
1	356
1.1	339
1.2	323
1.3	309
1.4	296
1.5	285
1.6	274
1.7	264
1.8	255
1.9	247
2	239
2.1	232
2.2	225
2.3	219
2.4	213
2.5	207
2.6	202
2.7	197
2.8	192
2.9	187
3	183
3.1	179
3.2	175
3.3	171
3.4	168
3.5	164
3.6	161
3.7	158
3.8	155
3.9	152
4	149
4.1	146
4.2	144
4.3	141
4.4	139
4.5	137
4.6	134
4.7	132
4.8	130
4.9	128
5	126
5.1	124
5.2	122
5.3	120
5.4	119
5.5	117
5.6	115
5.7	114
5.8	112
5.9	111
6	109
6.1	108
6.2	106
6.3	105
6.4	104
6.5	102
6.6	101
6.7	100
6.8	99
6.9	98
7	96
7.1	95
7.2	94
7.3	93
7.4	92
7.5	91
7.6	90
7.7	89
7.8	88
7.9	87
8	86
8.1	85
8.2	84
8.3	84
8.4	83
8.5	82
8.6	81
8.7	80
8.8	79
8.9	79
9	78
9.1	77
9.2	76
9.3	76
9.4	75
9.5	74
9.6	74
9.7	73
9.8	72
9.9	72
10	71

TSS Removal Form - Subsurface Infiltration Basin

Pre-Treatment

BMP	TSS Removal Rate	Starting TSS Load	Amount Removed	Remaining Load
Deep-Sump Hooded Catch Basins	0.25	1.00	0.25	0.75
Proprietary Sedimentation Device	0.50	0.75	0.38	0.38

Pre-Treatment TSS Removal = 63%

Total Removal

BMP	TSS Removal Rate	Starting TSS Load	Amount Removed	Remaining Load
Subsurface Infiltration Basin	0.8	1.00	0.80	0.20

Total TSS Removal = 80%

Drawdown Analysis

$$T_{DRAWDOWN} = \frac{R_V}{KA}$$

where: $T_{DRAWDOWN}$ = time in hours

R_V = required recharge volume (cu. ft.)

K = Rawls rate
- 2.41 inches/hour (A-soils)**
- 0.52 inches/hour (B-soils)**
- 0.27 inches/hour (C-soils)**

A = bottom area of recharge facility (sq. ft.)

** Most conservative Rawls rate values for given soil type used for analysis purposes

Subsurface Infiltration Basin

R_V*= 3,214 cu. ft.

A = 4,992 sq. ft.

$T_{DRAWDOWN}$ = 3.2 hours < 72 hours (A-soils)

*Volume represents the available storage in the subsurface infiltration basin below the orifice (El. 182.00')

Barracuda® Max

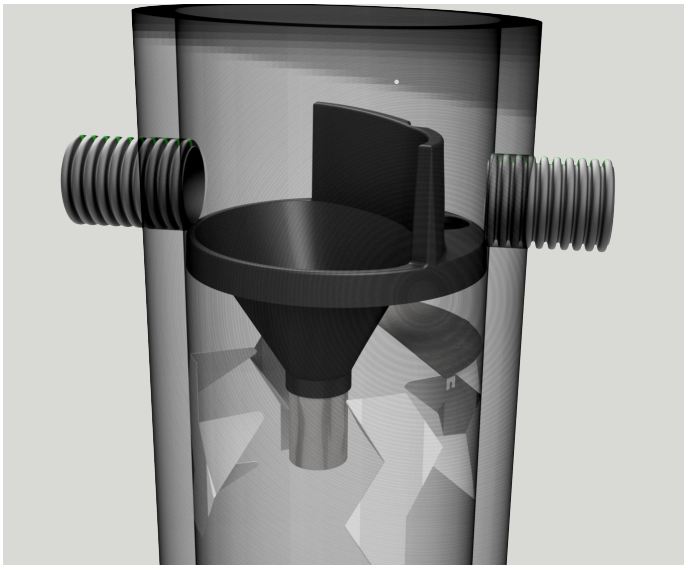
The Barracuda Max is market-changing stormwater quality technology. This high-performance vortex hydrodynamic separator is designed to remove total suspended solids in order to protect our precious receiving waters. The Barracuda Max is also an outstanding value that offers multiple pipe configurations, and quick installation. The “Max” version of the Barracuda is built on the base platform of the original ADS Barracuda with improved removal efficiencies and installation components.

Features

- Single manhole design
- No elevation loss between the inlet and outlet
- Variable inlet/outlet angle configurations (not just 180 degree orientation)
- Internal bypass for inline installation (where applicable)
- Revolutionary, patent pending “teeth” mitigate turbulence in the sump area to prevent resuspension of captured contaminants
- Available with grated drop inlet configuration
- Available with trash and/or oil capture add-ons

Benefits

- Internal components are in stock for quick delivery
- The S3, S4, S6, and S8 can be installed in a standard 36” (900 mm), 48” (1200 m), 72” (1800 m), and 96” (2400 m) precast manhole, respectively
- The S3 & S4 can be provided factory installed within a 36” (900 mm) and 48” (1200 mm) ADS HP manhole and delivered to the jobsite
- The Barracuda Max “teeth” and deflector plate apparatus are fabricated and designed for quick and easy field assembly
- Designed for easy maintenance using a vacuum truck or similar equipment.
- Inspection and maintenance are performed from the surface with no confined space entry





ADS™

Barrucuda Specification

Materials and Design

- Concrete Structures: Designed for H-20 traffic loading and applicable soil loads or as otherwise determined by a Licensed Professional Engineer. The materials and structural design of the devices shall be per ASTM C857 and ASTM C858.
- 36” (900 mm) and 48” (1200 mm) HP Manhole Structures: Made from an impact modified copolymer polypropylene meeting the material requirements of ASTM F2764. The eccentric cone reducer shall be manufactured from polyethylene material meeting ASTM D3350 cell class 213320C. Gaskets shall be made of material meeting the requirements of ASTM F477.
- Separator internals shall be substantially constructed of stainless steel, polyethylene or other thermoplastic material approved by the manufacturer.

Performance

- The stormwater treatment unit shall be an inline unit capable of conveying 100% of the design peak flow. If peak flow rates exceed maximum hydraulic rate, the unit shall be installed offline.
- The Barracuda Max unit shall be designed to remove at least 80% of the suspended solids on an annual aggregate removal basis. Said removal shall be based on full-scale third party testing using OK-110 media gradation or equivalent and 300 mg/L influent concentration. Said full scale testing shall have included sediment capture based on actual total mass collected by the stormwater treatment unit.

  - OR -

  The Barracuda Max unit shall be designed to remove at least 50% of TSS using a media mix with d_{50}=75 micron and 200 mg/L influent concentration.

  - OR -

  The Barracuda Max unit shall be designed to remove at least 50% of TSS per current NJDEP/NJCAT HDS protocol.
- The stormwater treatment unit internals shall consist of (1) separator cone assembly, and (1) sump assembly, which includes the “teeth”.

Barracuda Max Model	Manhole Diameter	OK-110 (80% removal)	Pretreatment for Infiltration[1]
S3	36” (900 mm)	0.86 CFS (24.1 L/s)	1.65 CFS (46.7 L/s)
S4	48” (1200 mm)	1.52 CFS (43.0 L/s)	2.94 CFS (83.3 L/s)
S6	72” (1800 mm)	3.42 CFS (96.8 L/s)	6.62 CFS (187.5 L/s)
S8	96” (2400 mm)	6.08 CFS (172.2 L/s)	11.76 CFS (333.0 L/s)

* Peak bypass flows are dependent on final design

[1] 50% removal of OK-110.

Installation

Installation of the stormwater treatment unit(s) shall be performed per manufacturer’s installation instructions. Such instructions can be obtained by calling Advanced Drainage Systems at 800-821-6710 or by logging on to www.adspipe.com.

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State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

Bureau of NJPDES Stormwater Permitting & Water Quality Management
Division of Watershed Protection and Restoration
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432

SHAWN M. LATOURETTE
Acting Commissioner

April 28, 2021

Daniel J. Figola, P.E.
Director of Sustainability Development
Advanced Drainage Systems, Inc.
1030 Deer Hollow Drive
Mt. Airy, MD 21771

Re: MTD Lab Certification
Barracuda™ MAX Hydrodynamic Separator Stormwater Treatment Device
On-line Installation

TSS Removal Rate 50%

Dear Mr. Figola:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Advanced Drainage Systems, Inc. (ADS) has requested an MTD Laboratory Certification for the Barracuda™ MAX Hydrodynamic Separator stormwater treatment system (Barracuda™ MAX).

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated April 2021) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

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The NJDEP certifies the use of the Barracuda™ MAX stormwater treatment system at a TSS removal rate of 50% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The Barracuda™ MAX shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This Barracuda™ MAX cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 11.3 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Barracuda™ MAX. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at https://assets.ads-pipe.com/m/2c834056a5a22888/original/Barracuda-Maintenance-Guide-MG1-01.pdf for any changes to the maintenance requirements.

6. Sizing Requirement:

   The example on the following page demonstrates the sizing procedure for the Barracuda™ MAX:

Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using an Barracuda™ MAX treatment unit. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was based on the following:
time of concentration = 10 minutes
i = 3.2 in/hr (page 74, Fig. 5-16 of the NJ Stormwater BMP Manual)
c = 0.99 (runoff coefficient for impervious)
Q = ciA = 0.99 x 3.2 x 0.25 = 0.79 cfs

Given the site runoff is 0.79 cfs and based on Table A-1 below, the Barracuda™ MAX Model S3 with an MTFR of 0.85 cfs would be the smallest model that could be used for this site to remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the NJCAT Technology Verification Appendix under Tables A-1 and A-2.

Table A-1 Barracuda™ MAX HDS Models and Associated MTFRs

Model	Manhole Diameter (ft)	Maximum Treatment Flow Rate (cfs)	50% Maximum Sediment Storage Area Volume (ft^3)
Barracuda MAX S3	3	0.85	5.89
Barracuda MAX S4	4	1.52	10.47
Barracuda MAX S5	5	2.37	16.36
Barracuda MAX S6	6	3.40	23.56
Barracuda MAX S8	8	6.08	41.89
Barracuda MAX S10	10	9.48	65.45

A detailed maintenance plan is mandatory for any project with a stormwater BMP subject to the Stormwater Management rules under N.J.A.C. 7:8. The plan must include all of the items identified in the Maintenance requirements section of the Stormwater Management rules under N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Lisa Schaefer of my office at lisa.schaefer@dep.nj.gov.

Sincerely,



Gabriel Mahon, Chief
Bureau of NJPDES Stormwater Permitting & Water Quality Management

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Changi Wu, NJDEP-BFHSE
Madhu Guru, NJDEP - BFHSE

Barracuda® Max™ & Barracuda Maintenance Guide

One of Barracuda's advantages is the ease of maintenance. Like any system that collects pollutants, the Barracuda must be maintained for continued effectiveness. Maintenance is a simple procedure performed using a vacuum truck or similar equipment. The systems were designed to minimize the volume of water removed during routine maintenance, reducing disposal costs.

Contractors can access the pollutants stored in the manhole through the manhole cover. This allows them to gain vacuum hose access to the bottom of the manhole to remove sediment and trash. There is no confined space entry necessary for inspection or maintenance.

The entire maintenance procedure typically takes 2 to 4 hours, depending on the system's size, the captured material, and the vacuum truck's capacity.

Local regulations may apply to the maintenance procedure. Safe and legal disposal of pollutants is the responsibility of the maintenance contractor. Maintenance should be performed only by a qualified contractor.

Inspection and Cleaning Cycle

Periodic inspection is needed to determine the need for and frequency of maintenance. You should begin inspecting as soon as construction is complete and then on an annual basis. Typically, the system needs to be cleaned every 1-3 years.

Excessive oils, fuels or sediments may reduce the maintenance cycle. Periodic inspection is important.

Determining When to Clean

To determine the sediment depth, the maintenance contractor should lower a stadia rod into the manhole until it contacts the top of the captured sediment and mark that spot on the rod. Then push the probe through to the bottom of the sump and mark that spot to determine sediment depth.

Maintenance should occur when the sediment has reached the levels indicated in the Storage Capacity Chart.

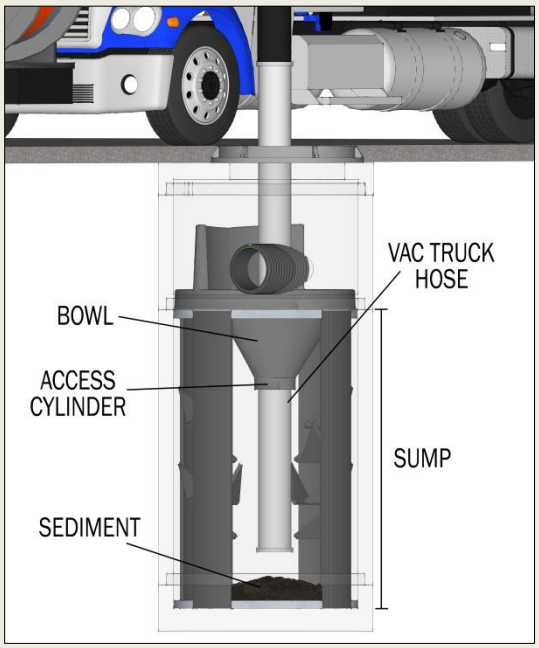
Barracuda Storage Capacities

Model	Manhole Diameter in. (mm)	Total System Volume Gallons (Liters)	Treatment Chamber Capacity Gallons (Liters)	Standard Sediment Capacity (20" depth) Yards^3 (meters^3)	NJDEP Sediment Capacity (50% of standard depth) Yards^3 (meters^3)
S3	36 (900)	264 (999)	212 (803)	0.44 (0.34)	0.22 (0.17)
S4	48 (1200)	665 (2517)	564 (2135)	0.78 (0.60)	0.39 (0.30)
S5	60 (1500)	1040 (3937)	881 (3335)	1.21 (0.93)	0.61 (0.47)
S6	72 (1800)	1497 (5667)	1269 (4804)	1.75 (1.34)	0.88 (0.67)
S8	96 (2400)	4196 (15884)	3835 (14517)	3.10 (2.37)	1.55 (1.19)
S10	120 (3000)	7976 (30192)	7496 (28375)	4.85 (3.71)	2.43 (1.86)

Maintenance Instructions

1. Remove the manhole cover to provide access to the pollutant storage. Pollutants are stored in the sump, below the bowl assembly visible from the surface. Access this area through the 8" (200 mm), 10" (250 mm), 15" (375 mm) or 20" (500 mm) diameter access cylinder.
2. Use a vacuum truck or other similar equipment to remove all water, debris, oils and sediment. See figure 1.
3. Use a high pressure hose to clean the manhole of all the remaining sediment and debris. Then, use the vacuum truck to remove the water.
4. Fill the cleaned manhole with water until the level reaches the invert of the outlet pipe.
5. Replace the manhole cover.
6. Dispose of the polluted water, oils, sediment and trash at an approved facility.
   a. Local regulations prohibit the discharge of solid material into the sanitary system. Check with the local sewer authority for authority to discharge the liquid.
   b. Some localities treat the pollutants as leachate. Check with local regulators about disposal requirements.
   c. Additional local regulations may apply to the maintenance procedure.

Figure 1



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Maintenance Guide

BaySaver Barracuda™

July 2017

One of the advantages of the BaySaver Barracuda is the ease of maintenance. Like any system that collects pollutants, the BaySaver Barracuda must be maintained for continued effectiveness. Maintenance is a simple procedure performed using a vacuum truck or similar equipment. The systems were designed to minimize the volume of water removed during routine maintenance, reducing disposal costs.

Contractors can access the pollutants stored in the manhole through the manhole cover. This allows them to gain vacuum hose access to the bottom of the manhole to remove sediment and trash. There is no confined space entry necessary for inspection or maintenance.

The entire maintenance procedure typically takes from 2 to 4 hours, depending on the size of the system, the captured material, and the capacity of the vacuum truck.

Local regulations may apply to the maintenance procedure. Safe and legal disposal of pollutants is the responsibility of the maintenance contractor. Maintenance should be performed only by a qualified contractor.

Inspection and Cleaning Cycle

Periodic inspection is needed to determine the need for and frequency of maintenance. You should begin inspecting as soon as construction is complete and thereafter on an annual basis. Typically, the system needs to be cleaned every 1-3 years.

Excessive oils, fuels or sediments may reduce the maintenance cycle. Periodic inspection is important.

Determining When to Clean

To determine the sediment depth, the maintenance contractor should lower a stadia rod into the manhole until it contacts the top of the captured sediment and mark that spot on the rod. Then push the probe through to the bottom of the sump and mark that spot to determine sediment depth.

Maintenance should occur when the sediment has reached the levels indicated in the Storage Capacity Chart.

BaySaver Barracuda Storage Capacities

Model	Manhole Diameter	Treatment Chamber Capacity	Standard Sediment Capacity (20" depth)	NJDEP Sediment Capacity (50% of standard depth)
S3	36"	212 gallons	0.44 cubic yards	0.22 cubic yards
S4	48"	564 gallons	0.78 cubic yards	0.39 cubic yards
S5	60"	881 gallons	1.21 cubic yards	0.61 cubic yards
S6	72"	1269 gallons	1.75 cubic yards	0.88 cubic yards
S8	96"	3835 gallons	3.10 cubic yards	1.55 cubic yards
S10	120"	7496 gallons	4.85 cubic yards	2.43 cubic yards

Maintenance Instructions

1. Remove the manhole cover to provide access to the pollutant storage. Pollutants are stored in the sump, below the bowl assembly visible from the surface. You'll access this area through the 10" diameter access cylinder.

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2. Use a vacuum truck or other similar equipment to remove all water, debris, oils and sediment. See figure 1.
3. Use a high pressure hose to clean the manhole of all the remaining sediment and debris. Then, use the vacuum truck to remove the water.
4. Fill the cleaned manhole with water until the level reaches the invert of the outlet pipe.
5. Replace the manhole cover.
6. Dispose of the polluted water, oils, sediment and trash at an approved facility.
   - Local regulations prohibit the discharge of solid material into the sanitary system. Check with the local sewer authority for authority to discharge the liquid.
   - Some localities treat the pollutants as leachate. Check with local regulators about disposal requirements.
   - Additional local regulations may apply to the maintenance procedure.

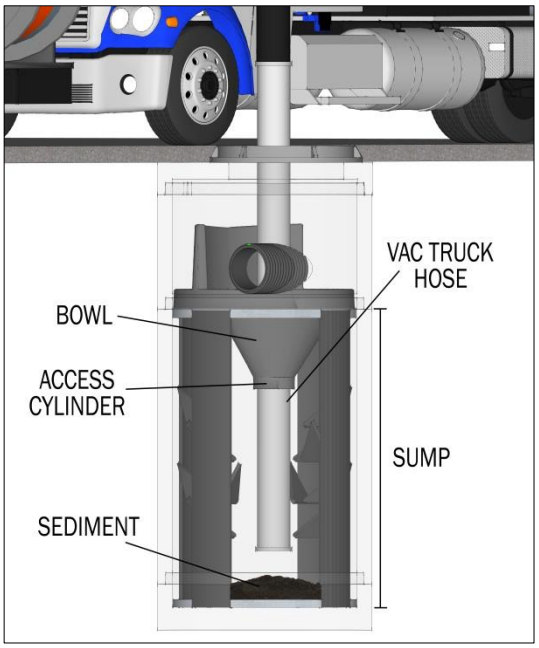

Figure 1

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Barracuda® Max & Barracuda Maintenance Guide

One of Barracuda's advantages is the ease of maintenance. Like any system that collects pollutants, the Barracuda must be maintained for continued effectiveness. Maintenance is a simple procedure performed using a vacuum truck or similar equipment. The systems were designed to minimize the volume of water removed during routine maintenance, reducing disposal costs.

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Local regulations may apply to the maintenance procedure. Safe and legal disposal of pollutants is the responsibility of the maintenance contractor. Maintenance should be performed only by a qualified contractor.

Inspection and Cleaning Cycle

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Excessive oils, fuels or sediments may reduce the maintenance cycle. Periodic inspection is important.

Determining When to Clean

To determine the sediment depth, the maintenance contractor should lower a stadia rod into the manhole until it contacts the top of the captured sediment and mark that spot on the rod. Then push the probe through to the bottom of the sump and mark that spot to determine sediment depth.

Maintenance should occur when the sediment has reached the levels indicated in the Storage Capacity Chart.

Barracuda Storage Capacities

Model	Manhole Diameter in. (mm)	Total System Volume Gallons (Liters)	Treatment Chamber Capacity Gallons (Liters)	Standard Sediment Capacity (20" depth) Yards^3 (meters^3)	NJDEP Sediment Capacity (50% of standard depth) Yards^3 (meters^3)
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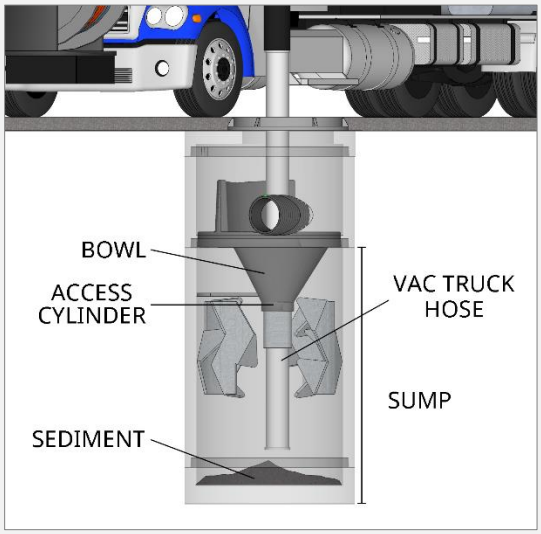
S6	72 (1800)	1497 (5667)	1269 (4804)	1.75 (1.34)	0.88 (0.67)
S8	96 (2400)	4196 (15884)	3835 (14517)	3.10 (2.37)	1.55 (1.19)

Maintenance Instructions

1. Remove the manhole cover to provide access to the pollutant storage. Pollutants are stored in the sump, below the bowl assembly visible from the surface. Access this area through the 8" (200 mm), 10" (250 mm), 15" (375 mm) or 20" (500 mm) diameter access cylinder.
2. Use a vacuum truck or other similar equipment to remove all water, debris, oils and sediment. See figure 1.
3. Use a high pressure hose to clean the manhole of all the remaining sediment and debris. Then, use the vacuum truck to remove the water.
4. Fill the cleaned manhole with water until the level reaches the invert of the outlet pipe.
5. Replace the manhole cover.
6. Dispose of the polluted water, oils, sediment and trash at an approved facility.
   a. Local regulations prohibit the discharge of solid material into the sanitary system. Check with the local sewer authority for authority to discharge the liquid.
   b. Some localities treat the pollutants as leachate. Check with local regulators about disposal requirements.
   c. Additional local regulations may apply to the maintenance procedure.

Figure 1



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Appendix F: Construction Period Erosion Control Plan

Construction Period Erosion Control Plan

Proposed Storage Building

699 Silver Street
Agawam, MA 01001
(Parcel ID: G6-2-12)

Applicant/Property Owner:

MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

RLA Project File: 250903

March 5, 2026

R LEVESQUE ASSOCIATES, INC
A LAND PLANNING SERVICES COMPANY
40 School Street · Westfield, MA 01085
p 413.568.0985 · f 413.568.0986 · www.rlaland.com

The project shall implement a construction period erosion control plan. The following provides descriptions and guidelines to ensure that the areas surrounding the project site will be protected from excessive sedimentation and runoff during construction.

1.1 Construction Period Pollution Prevention And Erosion Control Measures

1.1.1 Preconstruction Notifications And Meetings

Prior to the start of construction, the contractor shall call together a pre-construction meeting including a representative from the City, the design engineer, contractor, and any pertinent persons that should be in attendance. These requirements shall be the responsibility of the Contractor to arrange, attend, and document.

1.1.2 Sediment Barrier And Work Limit

Before installation of the sediment barriers, the location shall be staked in the field for review and approval by the owner or their representative. To facilitate sediment barrier installation, woody vegetation may then be removed and any required trench may be cut by machine, provided all other ground cover is left intact. No excavation, grading, filling, or removal of vegetative ground cover shall begin until sediment barriers have been installed as shown on the plans and have been inspected by the owner or their representative.

1.1.3 Silt Fence

The bottom of the fence shall be trenched into the ground a minimum of 6" and back-filled with compacted soil. Where trenching is not feasible, silt fence skirt shall be covered with compacted soil or crushed stone. The top of the fabric shall be stretched as tightly as is practical, with intermediate stakes added to correct excessive sags. Stakes shall be driven at least 12" into the ground. Splices between sections shall be made by rolling end stakes together one complete turn and driving into the ground together.

1.1.4 Straw Bales

Straw bales may be used as temporary and moveable control measures, temporary check dams, or as reinforcement for silt fence in areas of concentrated runoff or high fills. Bales shall be tightly butted and staked 12" into the ground. Where used without silt fence in front, the bales shall be trenched 4" into the ground, back-filled with compacted soil, and the spaces between bales shall be chinked with loose straw.

1.1.5 Filter Sock (Filtrexx Or Equivalent)

In areas of expected sheet flow, filter sock may be placed directly on the ground without trenching or stakes. In areas of expected concentrated flow, mulch or crushed stone shall be placed along the up-slope face to control and filter underflow. Additional layers of Filter Sock may be required for adequate freeboard. The filter sock shall be staked at 10 feet on-center or in cases where they cannot be staked, utilize heavy concrete blocks to hold in place.

1.1.6 Temporary Sedimentation Basins

Temporary sediment basins may be excavations or bermed stormwater detention structures (depending on grading) that will retain runoff for a sufficient period of time to allow suspended soil particles to settle out prior to discharge. These temporary basins will be located based on construction needs as determined by the contractor and outlet devices will be designed to control velocity and sediment. Points of discharge from sediment basins will be stabilized to minimize erosion. If the temporary basin is to be located within an area of future infiltration as part of the stormwater management system, the excavation for the temporary sedimentation basin shall be limited to one foot above final grade of the infiltration structure.

1.1.7 Stocking Additional Materials

A stock of additional erosion control materials shall be available on the site for emergency repairs and temporary measures. Stock shall be replenished when decreased to 50% of the numbers below. Stock shall include:

Straw Bales – 10 (kept dry) with 20 oak stakes

Or

Silt Fence – 30 Linear feet.

Or

Filter Sock – 4 – 8 foot sections (kept dry)

Washed Stone – One (1) cubic yard, ¾" to 2" diameter

1.1.8 Trench Protection

Open trenches shall be protected from accumulation of surface water or groundwater that could result in erosion of the trench and discharge of sediment. Where feasible, spoil shall be stockpiled on the up-slope side of the trench to prevent entrance of surface runoff. Backfill shall be crowned to allow for settlement and to avoid concentration of runoff on top of the trench.

1.1.9 Site Stabilization – Temporary

Where a portion of the site will not be subject to construction activity for over 14 days, measures shall be taken to provide temporary stabilization of that inactive portion of the site, within 14 days of the cessation of construction activity. Stabilization measures may include seeding for temporary cover, mulching, or other measures to protect exposed soil from erosion and prevent sediment movement.

1.1.10 Site Stabilization – Permanent

Within 14 days of completion of loaming and finish grading on any portion of the site, that area shall be seeded or planted for permanent cover (season permitting) in accordance with USDA NRCS guidelines or equivalent.

1.1.11 Roadway Sweeping

The entrance to the site and affected portions of the access drive or paved project areas shall be swept as needed to control sediment runoff into storm drains or waterways and to control blowing dust.

1.2 Short-Term Erosion Control Maintenance

The following provides short-term erosion control maintenance guidelines and requirements.

1. The contractor or subcontractor will be responsible for implementing each control shown on the sedimentation and erosion control plan.
2. All erosion and sediment control devices shall be properly maintained during all phases of construction until the completion of all construction activities and all disturbed areas have been stabilized. Additional control measures will be installed during construction in order to control erosion and/or off-site sedimentation if deemed necessary by on-site inspection.
3. Effective erosion control measures shall be initiated prior to the commencement of clearing, grading, excavation, or other operations that will disturb the natural protection.
4. All sediment and erosion control devices shall be inspected at least once every seven (7) calendar days and after any storm event greater than 0.5 inches of precipitation during any 24-hour period, and the inspection shall be documented in writing. Damaged or ineffective devices shall be repaired or replaced, as necessary.
5. The contractor shall take all reasonable precautions to avoid excess erosion of the site due to the construction of this project.
6. Silt shall be removed from behind barriers if greater than 6-inches deep or as needed. Sediment that is collected in structures shall be disposed of properly and covered if stored on-site
7. Damaged or deteriorated items will be repaired immediately after identification.
8. All ditches shall be stabilized as soon as is practicable to minimize erosion.
9. The contractor shall maintain all erosion control devices in a good, working state of repair. Upon complete stabilization of any tributary areas, the erosion control devices shall be removed and disposed of so as to cause no off-site siltation.
10. Inspect and maintain construction entrance stone such that sediment does not track onto the street. Any sediment tracked onto the street shall be swept daily.
11. After catch basins have been constructed, the contractor shall protect the inlets by constructing inlet protection as shown on the plans.
12. Once the site has been paved, all catch basin inlets shall receive a silt sack type protection.

13. Erosion control measures shall remain in place until all disturbed earth has been substantially stabilized. After removal of structures, disturbed areas shall be regraded and stabilized as necessary.

Appendix G: Long-Term Operation and Maintenance Plan

- Long-Term Operation & Maintenance Plan Narrative
- Barracuda Concrete Installation Guide
- Barracuda Max Maintenance Guide
- O&M Checklist

Long-Term Operation & Maintenance Plan

Proposed Storage Building

699 Silver Street
Agawam, MA 01001
(Parcel ID: G6-2-12)

Applicant/Property Owner:

MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

RLA Project File: 250903

March 5, 2026

R LEVESQUE ASSOCIATES, INC
A LAND PLANNING SERVICES COMPANY
40 School Street · Westfield, MA 01085
p 413.568.0985 · f 413.568.0986 · www.rlaland.com

I. Long-Term Stormwater Maintenance Program:

This Long-Term Operation and Maintenance Plan (O&M) identifies inspection and maintenance requirements for the proposed stormwater management system. The O&M references guidelines set forth by the Stormwater Management Handbook developed by the Massachusetts Department of Environmental Protection.

Responsible Party*:

MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

*The party listed shall be responsible for implementation and record keeping of the requirements listed in this operation and maintenance plan. Upon sale of property or any other transition of ownership, the responsible party shall be reinstated as the new owner or any other group created as determined by the owner.

Signature of Responsible Party Representative

Date

2. Inspection and Maintenance Program:

Regular inspection and routine maintenance are necessary to ensure that the stormwater management system continues to control and treat runoff. The following lists the inspection schedule and maintenance procedures for the proposed stormwater Best Management Practices:

BMP	Inspection Schedule	Maintenance Schedule	Maintenance Procedures
Bituminous Concrete Pavement	Four times per year	Twice per year	• Roadway to be swept in March or April following snow melt and again in late November or early December to remove fallen leaves and debris
Deep-Sump Catch Basins	Four times per year	Four times per year	• Remove sediment once deposits reach one half the depth from the bottom sump to the lowest invert.
Stormwater Piping	Once per year	Once per year	• Inspect pipe entrances in catch basins and manholes and remove any blockages
Water Quality Unit*	As specified by the manufacturer	As specified by the manufacturer	• Clean the unit using the method specified by the manufacturer. Vactor trucks are typically used to clean these units.
Subsurface Infiltration Basin	Twice per year	Four times per year	• Verify that the inlet structure has no accumulation of sediment
Flared End Section	Four times per year	As Needed	• Remove any debris or vegetation around the flared end section such that flow out of the structure is not impeded.
Roof Leaders	Once per year	Once per year	• Inspect downspout connections at grade and remove any blockages • Open and inspect cleanout locations and remove any blockages
Level Spreader	After major storm events	As needed	• Repair any erosion or low spots

*See attached Device Operation and Maintenance Guides

See the attached Long-Term O&M Inspection Checklist for record keeping purposes.

3. Additional Long-Term Operation and Maintenance Items

The following is a list of additional operation and maintenance items to be implemented by the owner/governing group to maintain the features proposed in this project.

A. Proper storage, use, and disposal of hazardous chemicals, including automobile fluids, pesticides, paints, solvents, etc. shall be required. Information should be provided on chemicals of concern, proper use, and disposal options. Recycling programs for used motor oil, antifreeze, and other products should be developed.

B. Vehicle Washing. This management measure involves educating the owner on the water quality impacts of the outdoor washing of vehicles and how to avoid allowing polluted runoff to enter the storm drain system. Outdoor vehicle washing has the potential to result in high loads of nutrients, metals, and hydrocarbons which is conveyed by the detergent-rich water into storm drains.

C. Recycling, spill prevention and response plans, and proper material storage and disposal of potentially hazardous materials shall be implemented. It will be the responsibility of the owner to contain and legally remove any materials that are spilled onsite. The use of dry floor cleaners and absorbent materials and limiting the use of water to clean pavement is encouraged. Care should be taken to avoid accidental disposal of hazardous materials.

D. Provisions for storing trash and waste products shall be implemented. The waste materials shall be collected by the owner and all materials shall be properly disposed of.

E. Requirements for routine inspections and maintenance of stormwater best management practices. Routine inspections shall be performed to ensure the correct functioning of stormwater best management practices. See the specific maintenance criteria for detail regarding inspections and maintenance frequency.

F. Requirements for Storage and Use of Fertilizers, Herbicides, and Pesticides. Fertilizers, pesticides, herbicides, lawn care chemicals, or other leachable materials shall be used in accordance with the Lawn Care Regulations of the Massachusetts Pesticide Board, 33 CMR 10.03 (30,31), as amended, with manufacturer's label instructions and all other necessary precautions to minimize adverse impacts on surface and groundwater. The storage of any such materials shall be within structures designed to prevent the escape of contaminated runoff or leachate.

G. Provisions for prevention of illicit discharges to the stormwater management system shall be implemented. Any illicit discharges to the stormwater management system shall be prohibited. It will be the owner's responsibility to ensure compliance with the legal disposal of all materials and containment/cleanup of any illicit discharges.

H. Training for staff or personnel involved with implementation of the Long-Term Pollution Prevention Plan shall be required. The owner/governing group will be responsible for the implementation of the measures set forth in the Long-Term Pollution Prevention Plan. Documentation that personnel and owners involved with the implementation of the Long-Term Pollution Prevention Plan have been trained to conduct such tasks shall be documented.

4. Winter and Snow Conditions

The following is a list of additional operation and maintenance items to be implemented by the owner during winter and snow conditions.

A. Snowfall shall be stored on the grassed areas surrounding the pavement areas, excluding any areas utilized for stormwater management practices. As needed, any snow that cannot be stored on site shall be trucked off site and disposed of properly.

B. Winter road salt and/or sand use and storage restrictions shall be implemented based on any restrictions issued for the project. Sodium chloride for ice control shall be used at the minimum salt to sand ratio which is consistent with the Massachusetts Department of Environmental Protections guidelines. Sodium chloride, calcium chloride, chemically treated abrasives or other chemicals used for the removal of ice and snow on roads/drives shall not be stored on site.

5. Public Safety Features

The proposed site design utilizes the following features which have been incorporated to ensure the safety of the public:

A. Control and collection of stormwater runoff through positive drainage and curbing directing it towards the drainage inlets;

B. Heavy-duty stormwater drain manhole covers and catch basin grates have been designed to withstand H20 loading;

C. Reduction of peak discharge rates from the site in the post-development condition as compared to the pre-developed conditions;

D. Development and implementation of an Operations & Maintenance Plan to ensure the stormwater management system continues to function as designed.

6. Estimated Cost of Maintenance

The following budget was prepared as an estimate of inspection and maintenance costs for the stormwater management system. The budget is an estimate only as the costs may vary depending on the level of sediment accumulation and frequency of maintenance tasks required.

BMP Inspections	Number of Occurrences	Inspection Cost*	Number of Structures	Sum*
Catch Basin	4/year	$50	4	$800
Water Quality Unit	2/year	$100	2	$400
Surface Infiltration Basin	2/year	$100	1	$200
Total Estimated Annual Cost of Inspections				$1,400

BMP Maintenance	Number of Occurrences	Maintenance Cost*	Number of Structures	Sum*
Catch Basin	4/year	$100	4	$1,600
Water Quality Unit	2/year	$500	2	$2,000
Surface Infiltration Basin	2/year	$300	1	$600
Total Estimated Annual Cost of Maintenance				$4,200

*All above costs are estimates to be used for permitting purposes only. Actual maintenance costs are to be ascertained by the responsible party.

ADS® Barracuda® Concrete

Installation Guide

ADS Barracuda Max & Barracuda S4, S6, S8 Concrete Installation Guide

This installation guide is reference for installing the Barracuda Max S4, S6, S8 Water Quality Units into a precast concrete structure in the field.



(1) Deflector Plate



(1) Center Funnel Extender



(2) A/C Stainless Steel Tooth Set



(2) B/D Stainless Steel Tooth Set



(1) Barracuda Max Plastic Funnel

S4	 (4) Stainless Steel Funnel Mounting Flanges	 (1) Roll of Conseal®	 (16) Concrete Anchor ¼ x 2¼"
S6	 (4) Stainless Steel Funnel Mounting Flanges	 (3) Roll of Conseal®	 (16) Concrete Anchor ¼ x 2¼"
S8	 (8) Stainless Steel Funnel Mounting Flanges	 (4) Roll of Conseal®	 (22) Concrete Anchor ¼ x 2¼"

Please check that all components are on site. Below is a list of tools that may be required for installation.

- □ 1/4" Diameter Carbide Tipped Concrete Bit
- □ Standard Electrical or Battery Operated Drill
- □ Adjustable Wrench
- □ Marker for writing on the concrete wall
- □ Hammer Drill for Concrete (Fits the 1/4" Diameter Concrete Drill Bit)
- □ 7/16" Driver or deep socket for installation of provided ¼" Concrete Wedge Anchors
- □ Hammer
- □ Level
- □ Ladder that will extend to bottom of the structure
- □ Safety Glasses
- □ Hard Hat
- □ Protective Gloves
- □ Site Drawings
- □ ADS Design Layout

Installation Instructions (These directions assume the manhole base and riser have been assembled, but that the top slab/cone has not been set).

*Do not insert the inlet or outlet pipes until after the Barracuda Max internals have been installed. If pipes must be inserted in advance, the pipes should not protrude into the structure as they will interfere with installation of the bowl.

1. Install mounting flanges for the Barracuda Max plastic funnel. These flanges need to be installed at the same height, as indicated by model in Table 1. For example, the anchor holes for S4 flanges should be drilled 77" (1925 mm) from the sump floor. S4 and S6 models have four flanges and they need to be evenly spaced at 12, 3, 6, and 9 o'clock positions. S8 funnels require eight flanges that also need to be evenly spaced (i.e., forty-five degrees on a circle) around the inside of the manhole. This flange points are typically located in the third manhole section from the sump and also contain the pipe openings for the Barracuda Max unit. Use the same anchor procedure as you will when mounting the teeth (see step #4 below), using the ¼" (6.25 mm) concrete drill bit to drill 1¼" (31.25 mm) deep holes. Do not over drill the depth of the anchors. Lightly hammer the anchors in place and use locking nuts to firmly secure the flanges (Figure 1).
2. Next, mount the four sets of teeth vertically inside the manhole sump. Using the engineer's plans or the ADS layout, determine the correct orientation for the plastic funnel outlet hole in relation to the outlet pipe (Figures 2 and 5). The first set of teeth (marked as "A" on the teeth part) will be mounted under the center of the outlet hole from the Bowl. Mark that location with a plumb vertical line, this will serve as the "12 o' clock" landmark in the manhole (Figure 3). Repeat this process to mark lines at the 3, 6, and 9 o' clock positions for a total of four.
3. Each kit includes four sets of teeth. Two of these sets are stamped with the letters A and C. The other two sets are stamped B and D. The ADS shop drawing layout will label the teeth letters and all designs will be the A/B configuration (Figure 5). You will install each set of teeth in the correct location, with the indicated letter facing up (Figure 4). See Table 1 for the correct elevation for the top anchor location of each tooth set, measured from the sump floor for each Barracuda Max Unit. The teeth anchors are all at the same elevation. For example, for an S4 Barracuda the top anchor of an A or B indicated set of teeth will be 60" (1500 mm) off the sump floor. Mark the top anchor elevations on each of your four vertical lines (Figure 3), noting that A and B sets of teeth will be at the same height.



Figure 1



Figure 2



Figure 3

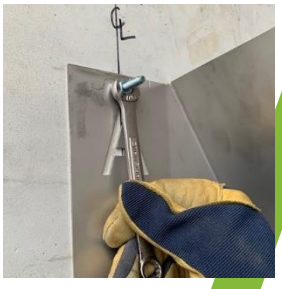
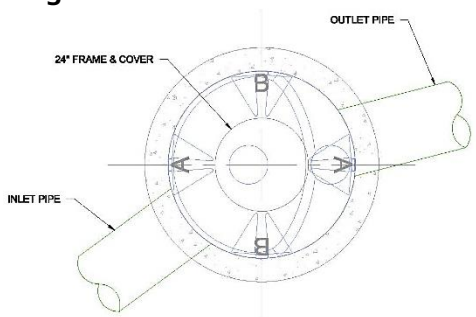


Figure 5

Figure 4



4. To fasten the sets of the teeth to the manhole, use the ¼" concrete drill bit and drill holes approximately 1¼" (31.25 mm) deep at your marked top anchor locations. Do not over drill into the concrete wall. Using a hammer, lightly tap the concrete anchors into the drilled holes (Figure 4). Hang the tooth set on the top anchor with the correct letter facing up and use a locking nut to loosely secure the tooth set to the wall (do not fully tighten the locking nut at this point). With the set of teeth hanging from the top anchor, line up and mark the bottom anchor location and drill the hole. Then hammer the bottom anchor in place and secure the teeth with a lock nut. Use an adjustable or socket wrench to tighten all the top and bottom locking nuts, except for the top nut on the outlet set of teeth (see step #5 below for the deflector plate installation, which will share the top anchor post), so that the teeth are firmly secured to the wall.
5. To attach the deflector plate to the concrete manhole you will use the exit tooth's top concrete anchor and share that linking point with the center tab of the deflector plate. Place the center tab of the deflector plate over the anchor bolt "post" on the outlet set of teeth and hand tighten the nut. Ideally, the plate will be held in place by this center point. Mark the location of the additional mounting tabs for the deflector plate while holding the plate relatively level. All deflector plate concrete anchors will be at the same elevation as the top tooth linking points and the anchors will be installed like the description in step #4. Once the two outer deflector plate linking points have been located, the installer can draw a vertical line and measure the exact location corresponding to the "high" teeth anchoring elevation. Once the deflector plate concrete anchors are installed tighten the nuts to complete the fastening of the deflector plate to the wall of the structure. See Figure 6 to show this more clearly.
6. Lower the plastic funnel into the structure (Figure 7), orienting the weir and outlet hole as depicted in the ADS layout (as identified in step 1). S6 and S8 units have eyebolts threaded holes on the top of the funnel to assist in lifting, and the eyebolts are provided in the equipment kit. If the eyebolts are misplaced, S6 units have ⅜" (9 mm) -16 threads and S8 units utilize ½" (12 mm) -13 threads. After the bowl is in place, install the center funnel extender through the hole and seat it until the tabs of the extender touch the bowl itself (Figure 8). This is a friction-based attachment and no fasteners are needed.
7. Next, you'll use Conseal to fill any gaps around the funnel. S6 and S8 units are provided with a metal funnel plug. This plug is placed in the funnel opening for worker safety and must be utilized ANYTIME SOMEONE ENTERS THE STRUCTURE. Unroll the Conseal and wedge it between the funnel and manhole to create a seal (Figure 9). Conseal should also be used to seal between the vertical edges of the weir wall and the manhole. The plastic funnel can expand with high temperature. Install the funnel during cooler parts of the day, or keep the funnel shaded until installation can mitigate fitment issues. Once the Conseal is installed, the internal component installation is complete. The funnel plug may be discarded (if applicable), and the top slab can be set. If the application calls for a grated inlet, orient the slab so the grate is above the inlet (large bowl) side of the plastic funnel.

For maintenance details, please refer to the Barracuda Max Maintenance Manual. If the application requires a trash rack or oil boom, reference the appropriate supplementary installation instructions.



Figure 6



Figure 7



Figure 8

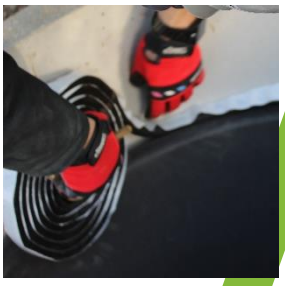


Figure 9

Table 1

	S4	S6	S8
Top Anchor Elevation from Sump Floor (A and B tooth indication)	60” (1270 mm)	68” (1475 mm)	90” (1880 mm)
Funnel Flange Anchor Elevation from Sump Floor	77” (1960 mm)	77” (1960 mm)	127” (3220 mm)

Note: Distances can be +/- 1-2 inches (25-50 mm) from these locations for the A, and B teeth, but flange elevations should be adhered to as much as possible and can only be lowered a maximum of 1 inch (25 mm) from these values listed above.
This guide is intended for field installations of Barracuda Max S4, S6, and S8 water quality units into precast manholes. For pre-casters installing internal components prior to job site delivery, contact ADS for possible modifications to component elevations.

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Barracuda® Max & Barracuda Maintenance Guide

One of Barracuda's advantages is the ease of maintenance. Like any system that collects pollutants, the Barracuda must be maintained for continued effectiveness. Maintenance is a simple procedure performed using a vacuum truck or similar equipment. The systems were designed to minimize the volume of water removed during routine maintenance, reducing disposal costs.

Contractors can access the pollutants stored in the manhole through the manhole cover. This allows them to gain vacuum hose access to the bottom of the manhole to remove sediment and trash. There is no confined space entry necessary for inspection or maintenance.

The entire maintenance procedure typically takes 2 to 4 hours, depending on the system's size, the captured material, and the vacuum truck's capacity.

Local regulations may apply to the maintenance procedure. Safe and legal disposal of pollutants is the responsibility of the maintenance contractor. Maintenance should be performed only by a qualified contractor.

Inspection and Cleaning Cycle

Periodic inspection is needed to determine the need for and frequency of maintenance. You should begin inspecting as soon as construction is complete and then on an annual basis. Typically, the system needs to be cleaned every 1-3 years.

Excessive oils, fuels or sediments may reduce the maintenance cycle. Periodic inspection is important.

Determining When to Clean

To determine the sediment depth, the maintenance contractor should lower a stadia rod into the manhole until it contacts the top of the captured sediment and mark that spot on the rod. Then push the probe through to the bottom of the sump and mark that spot to determine sediment depth.

Maintenance should occur when the sediment has reached the levels indicated in the Storage Capacity Chart.

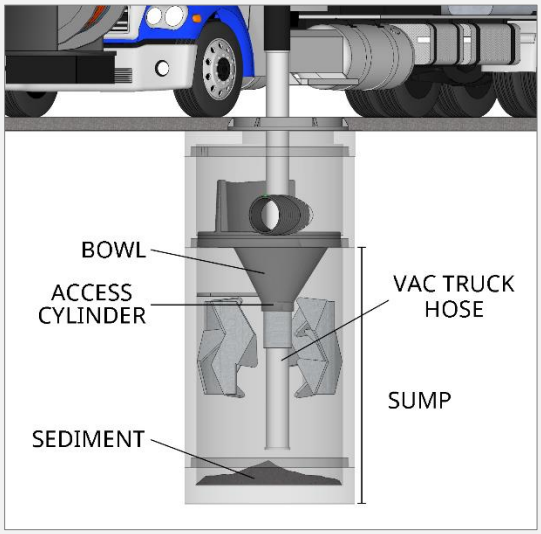
Barracuda Storage Capacities

Model	Manhole Diameter in. (mm)	Total System Volume Gallons (Liters)	Treatment Chamber Capacity Gallons (Liters)	Standard Sediment Capacity (20" depth) Yards^3 (meters^3)	NJDEP Sediment Capacity (50% of standard depth) Yards^3 (meters^3)
S3	36 (900)	264 (999)	212 (803)	0.44 (0.34)	0.22 (0.17)
S4	48 (1200)	665 (2517)	564 (2135)	0.78 (0.60)	0.39 (0.30)
S6	72 (1800)	1497 (5667)	1269 (4804)	1.75 (1.34)	0.88 (0.67)
S8	96 (2400)	4196 (15884)	3835 (14517)	3.10 (2.37)	1.55 (1.19)

Maintenance Instructions

1. Remove the manhole cover to provide access to the pollutant storage. Pollutants are stored in the sump, below the bowl assembly visible from the surface. Access this area through the 8" (200 mm), 10" (250 mm), 15" (375 mm) or 20" (500 mm) diameter access cylinder.
2. Use a vacuum truck or other similar equipment to remove all water, debris, oils and sediment. See figure 1.
3. Use a high pressure hose to clean the manhole of all the remaining sediment and debris. Then, use the vacuum truck to remove the water.
4. Fill the cleaned manhole with water until the level reaches the invert of the outlet pipe.
5. Replace the manhole cover.
6. Dispose of the polluted water, oils, sediment and trash at an approved facility.
   a. Local regulations prohibit the discharge of solid material into the sanitary system. Check with the local sewer authority for authority to discharge the liquid.
   b. Some localities treat the pollutants as leachate. Check with local regulators about disposal requirements.
   c. Additional local regulations may apply to the maintenance procedure.

Figure 1



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Project: Proposed Storage Building

Address: 699 Silver Street, Agawam, MA

BPM Name:

Responsible Party:

Date:

Page: 1 of 1

Operation & Maintenance Inspection Checklist

BMP Element:	Potential Problem:	Resolution:	Pass	Fail	Recommended Remediation
Bituminous Concrete Roadway	Build-up of sediment over the winter months and collection of leaves during the fall months.	Sweep roadway using a high-efficiency street sweeper.			
Deep-Sump Catch Basin	Sediment has accumulated to a depth greater than the original design depth for sediment storage, approximately 2-ft of sediment.	Remove the sediment and dispose of in accordance with local and state regulations.			
Stormwater Piping	Blockage of inlet/outlet pipes due to debris or sediment accumulation.	Remove any debris and sediment via proper means. Dispose of debris/sediment in accordance with local & state regulations			
Flared End Sections	Vegetation has started to grow within the riprap area.	Remove vegetation immediately.			
	Accumulation of sediment/debris at the culvert inlet.	Remove sediment or debris such that the culvert has free flow.			
	Erosion is occuring where riprap has been dislodged.	Remedy scoured area and replace riprap immediately.			
Subsurface Infiltration Basin	Accumulation of sediment at the inlet structure above maintenance level.	Remove the sediment and conduct proper maintanence to the up-gradient pretreatment devices.			
Roof Leaders	Downspout connections have been damaged or disconnected.	Repair and reconnect downspout connections			
Water Quality Units	Sediment has accumulated to a depth greater that the original design depth for sediment storage.	Remove sediment and disposed of in accordance with local and state regulations.			
Level Spreader	Downgradient low spots have formed due to sheet flow concentration	Fill low spots with native backfill, No. 6 pea-stone, topsoil and erosion contol blanket. Sod or re-seed with stabilized erosion control grass mix			

Inspector's Signature

Date

Appendix H: Illicit Discharge Compliance Statement

Illicit Discharge Compliance Statement

The owners of the land/responsible party will be responsible for prohibiting illicit discharges to the stormwater management system during construction and during its life of operation. The stormwater management system is comprised of the components for conveying, treating, and infiltrating stormwater runoff on-site, including stormwater best management practices and any pipes intended to transport stormwater to the groundwater, a surface water, or municipal separate storm sewer system. An illicit discharge shall constitute any connection or discharge to the stormwater management system including, but not limited to, wastewater discharges, discharge of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease.

Responsible Party*:
MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

*The party listed shall be responsible for implementation and record keeping of the requirements listed in this operation and maintenance plan. Upon sale of property or any other transition of ownership, the responsible party shall be reinstated as the new owner or any other group created as determined by the owner.

_____ _____

Signature of Responsible Party Representative Date

Appendix I: Low Impact Development Considerations

Low Impact Development Considerations

Proposed Storage Building

699 Silver Street
Agawam, MA 01001
(Parcel ID: G6-2-12)

Applicant/Property Owner:

MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

RLA Project File: 250903

March 5, 2026

R LEVESQUE ASSOCIATES, INC
A LAND PLANNING SERVICES COMPANY
40 School Street · Westfield, MA 01085
p 413.568.0985 · f 413.568.0986 · www.rlaland.com

Introduction

Per the Massachusetts Stormwater Handbook, project proponents must consider environmentally sensitive site design and low impact development techniques to effectively manage stormwater. As a part of the proposed project, the proponent has considered a number of environmentally sensitive, low impact development techniques to prevent the generation of stormwater and non-point source pollution.

The following is a detailed description of the considerations for each low impact development measure. For ease of review, RLA has provided the consideration of each measure as detailed in the Massachusetts Stormwater Report Checklist.

Low Impact Development (Lid) Measures

1. Environmentally Sensitive Project Approach
   The applicant is proposing to develop the locus property by constructing a storage building and expanding the existing parking areas. A stormwater management system is being utilized to mitigate the impacts of the proposed project utilizing several LID techniques that have been incorporated into the design.

2. No disturbance to any Wetland Resource Areas
   Wetland resource areas are located adjacent to the subject property. All proposed site improvements are located outside of existing wetland resource areas. Portions of the proposed site improvements are located within wetland buffer zones. Disturbance to existing wetland buffer zones has been reduced to functional minimums for applicant needs and city requirements.

3. Site Design Practices (e.g. clustered development, reduced frontage setbacks)
   This LID is not applicable for this project. The proposed project does not include any changes to existing property lines therefore no cluster or reduced frontage options are available.

4. Reduced Impervious Area (Redevelopment Only)
   The proposed project is not part of a redevelopment project. Impervious areas have been reduced to functional minimums required for applicant needs.

5. Minimizing disturbance to existing trees and shrubs
   The demolition of trees and shrubs has been reduced to functional minimums required for applicant needs.

6. LID Site Design Credit Requested
   No LID Site Design Credit is requested for the proposed project.

7. Use of "country drainage" versus curb and gutter conveyance and pipe
   Country drainage conveyance requires a larger footprint than curb and gutter conveyance and creates areas with undulating terrain. Due pre-existing constraints and limitations of the project site, country drainage was not utilized.

8. Bioretention Cells (includes Rain Gardens)
   Due to stormwater burdens from the 100-year storm event, an infiltration basin was determined to be the only BMP capable of meeting required city regulations.

9. Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
   Constructed stormwater wetlands require very specific design scenarios such as large tributary areas to support wetland characteristics and high groundwater elevations among others. No evidence of groundwater was encountered within the project site, so a constructed stormwater wetland is not feasible.

10. Treebox Filter
    The extensive costs associated with treebox filters, along with the climatic conditions of the area over the winter, present unique circumstances that would only provide a maintenance problem and a potential hazard for the owner. Due to the commercial nature of this project, treebox filters are not an applicable stormwater BMP.

11. Water Quality Swale
    Water quality swales are best management practices that require a greater footprint of development in order to facilitate the grading of the swale. Due to the limited available pervious areas within the project site, water quality swales were not utilized.

12. Grass Channel
    Grassed channels are best management practices that require a greater footprint of development in order to facilitate the grading of the swale. Due to the limited available pervious areas within the project site, water quality swales were not utilized.

13. Green Roof
    Based on project size and scope, green roofs were not selected as a cost-effective BMP for this project.

14. Other
    Please see the Stormwater Report for more information.

Site Plans

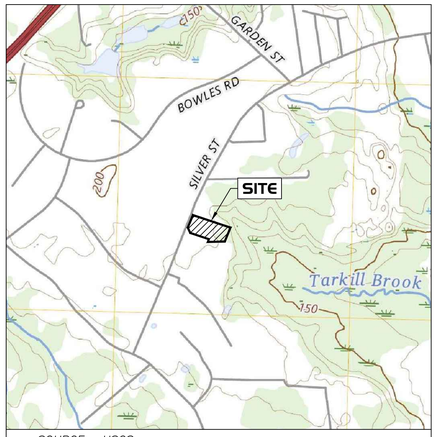
Proposed Storage Building

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

AS PREPARED FOR

MSR Properties, LLC
c/o Rick Mahan

699 Silver Street
Agawam, MA 01001



SOURCE: USGS

NORTH

March 5, 2026

DRAWING INDEX

SHEET NO.	SHEET NAME	ISSUE DATE	REVISION DATE
T-1	TITLE SHEET	3/5/26	
EX-1	EXISTING CONDITIONS PLAN	3/4/26	
C-1	NOTES, SYMBOL & LINE LEGEND, AND ABBREVIATIONS	3/5/26	
C-2	CONSTRUCTION NOTES	3/5/26	
C-3	DEMOLITION AND REMOVALS PLAN	3/5/26	
C-4	LAYOUT AND MATERIALS PLAN	3/5/26	
C-5	GRADING, EROSION & SEDIMENTATION CONTROL PLAN	3/5/26	
C-6	DRAINAGE AND UTILITIES PLAN	3/5/26	
C-7	LANDSCAPING PLAN	3/5/26	
D-1	DETAILS	3/5/26	
D-2	DETAILS	3/5/26	
D-3	DETAILS	3/5/26	

BY

R LEVESQUE ASSOCIATES INC
A LAND PLANNING SERVICES COMPANY

40 School Street · Westfield, MA · 01085
ph 413.568.0985 · fax 413.568.0986
www.rlaland.com

RLA Project Number: 250903

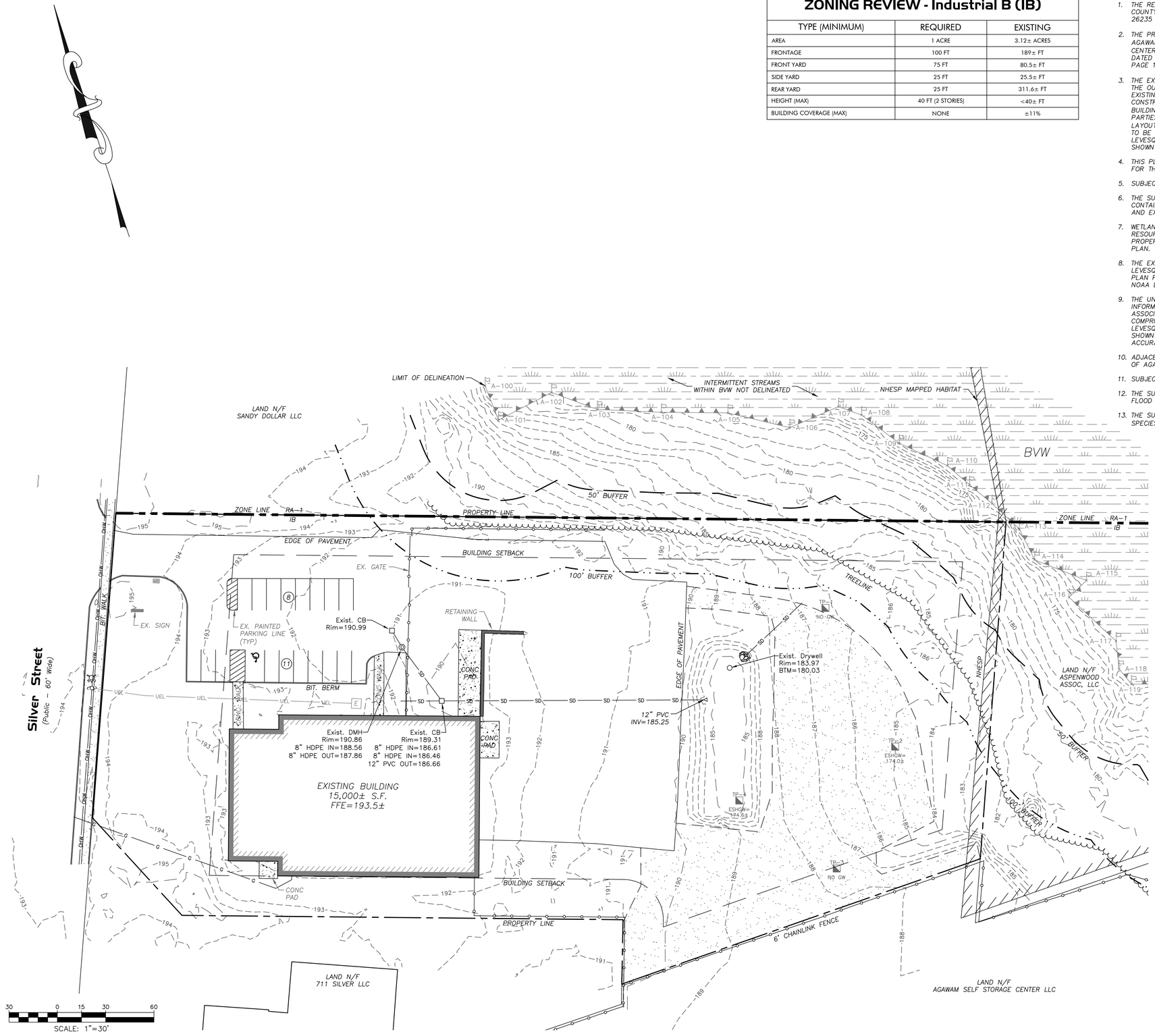
PERMITTING
NOT FOR CONSTRUCTION

ZONING REVIEW - Industrial B (IB)

TYPE (MINIMUM)	REQUIRED	EXISTING
AREA	1 ACRE	3.12± ACRES
FRONTAGE	100 FT	189± FT
FRONT YARD	75 FT	80.5± FT
SIDE YARD	25 FT	25.5± FT
REAR YARD	25 FT	311.6± FT
HEIGHT (MAX)	40 FT (2 STORIES)	<40± FT
BUILDING COVERAGE (MAX)	NONE	±11%

NOTES

1. THE RECORD OWNER OF THE SUBJECT PARCEL IS MSR PROPERTIES, LLC. SEE HAMPDEN COUNTY REGISTRY OF DEEDS BOOK 22411 PAGE 254, BOOK 20869 PAGE 318, AND BOOK 26235 PAGE 356.
2. THE PROPERTY LINES SHOWN HEREON ARE BASED UPON A PLAN TITLED, "PLAN OF LAND IN AGAWAM, MASSACHUSETTS SURVEYED AND MAPPED FOR (OWNERS) AGAWAM SELF STORAGE CENTER, LLC., 711 SILVER, LLC., AND MSR PROPERTIES, LLC." PREPARED BY THIS OFFICE, DATED AUGUST 19, 2025. SEE HAMPDEN COUNTY REGISTRY OF DEEDS BOOK OF PLANS 403 PAGE 110.
3. THE EXISTING BUILDING(S) SHOWN HEREON ARE BASED ON AN APPROXIMATE MEASUREMENT OF THE OUTSIDE PERIMETER OF THE EXISTING STRUCTURES. THE ACTUAL LOCATION OF THE EXISTING BUILDING WALLS AND CORNERS SHOULD BE VERIFIED IN THE FIELD PRIOR TO ANY CONSTRUCTION WORK THAT WOULD ABUT OR TAKE PLACE ADJACENT TO THE EXISTING BUILDING(S). IF THE PLAN HEREON IS USED FOR CONSTRUCTION LAYOUT PURPOSES, THE PARTIES CONDUCTING LAYOUT SHALL CONTACT R. LEVESQUE ASSOCIATES INC. PRIOR TO SAID LAYOUT TO DETERMINE PROPER CONTROL. PLEASE NOTE WHILE THE BUILDING(S) ARE SHOWN TO BE SQUARE, IT SHOULD NOT BE ASSUMED THAT THE WALLS ARE SQUARE OR PLUMB. R. LEVESQUE ASSOCIATES TAKES NO RESPONSIBILITY FOR THIRD PARTY LAYOUT OF THE PLAN SHOWN HEREON.
4. THIS PLAN HAS BEEN PREPARED FOR SITE PLANNING PURPOSES AND SHALL NOT BE USED FOR THE CONVEYANCE OF LAND OR FOR ANY OTHER USE.
5. SUBJECT PARCEL CONTAINS 136,158.9± S.F. OR 3.12± ACRES.
6. THE SUBJECT PROPERTIES SHOWN HEREON MAY BE SUBJECT TO RIGHTS AND EASEMENTS AS CONTAINED IN THE VARIOUS DEEDS OF RECORD DESCRIBING SAID PROPERTIES. THE LOCATION AND EXTENT OF ANY SUCH RIGHTS AND EASEMENTS IS NOT THE SUBJECT OF THIS PLAN.
7. WETLANDS DELINEATED BY R LEVESQUE ASSOCIATES, INC. ON 09–12–2025. OFFSITE WETLAND RESOURCE AREAS HAVE BEEN SHOWN TO ACCURATELY SHOW BUFFER ZONES ON THE SUBJECT PROPERTY. THE DETERMINATION OF WETLAND RESOURCE AREAS IS THE THE SUBJECT OF THIS PLAN.
8. THE EXISTING CONDITIONS INFORMATION SHOWN IS BASED UPON A SURVEY PERFORMED BY R LEVESQUE ASSOCIATES, INC. ON 09–15–2025, AN UNRECORDED EXISTING CONDITIONS SITE PLAN PREPARED BY SMITH ASSOCIATES SURVEYORS, INC., DATED DECEMBER 11, 2015, AND NOAA LIDAR.
9. THE UNDERGROUND UTILITIES SHOWN HEREON HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION, AVAILABLE RECORD DATA, AND THE TOWN OF AGAWAM WEB GIS. R LEVESQUE ASSOCIATES, INC. MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN HEREON COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. R LEVESQUE ASSOCIATES, INC. FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN HERE ARE IN THE EXACT LOCATION INDICATED, ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM AVAILABLE INFORMATION.
10. ADJACENT PROPERTY LINES AND ABUTTERS SHOWN HEREON ARE REFERENCED FROM THE TOWN OF AGAWAM WEB GIS.
11. SUBJECT PARCEL IS ZONED INDUSTRIAL B ACCORDING TO THE TOWN OF AGAWAM ZONING MAP.
12. THE SUBJECT PARCEL IS NOT LOCATED WITHIN A SPECIAL FLOOD ZONE AREA ACCORDING TO FLOOD INSURANCE RATE MAP NUMBER 25013C0392E – EFFECTIVE DATE: 07–16–2013.
13. THE SUBJECT PROPERTY IS PARTIALLY LOCATED WITHIN NATURAL HERITAGE & ENDANGERED SPECIES PROGRAM (NHESP) JURISDICTION.



RLA

R LEVESQUE ASSOCIATES INC

Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants

ph: 413.568.0985 fax: 413.568.0986

40 School Street
Westfield, MA 01085

rlaland.com

EXISTING CONDITIONS PLAN

699 Silver Street
Agawam, MA 01001
Parcel ID# G6 2 12

COMMONWEALTH OF MASSACHUSETTS
MARC E. SHUTE
No. 33610
PROFESSIONAL LAND SURVEYOR

PREPARED FOR:

Mr. Rick Mahan
699 Silver Street
Agawam, MA 01001

ISSUANCE DATE: March 4, 2026

REVISIONS:	DATE:

DRAFTED BY: J.L.

UNAUTHORIZED ALTERATION OF THIS DOCUMENT IS A VIOLATION OF MASSACHUSETTS STATE LAW

SCALE: As Noted

RLA PROJ. NUMBER: 250903

DRAWING#	REV.
EX-1	-

S:\Projects\2025\250903 - Mahan - 699 Silver S., Agawam\05 Civil 3D\250903 - EXIST.dwg

SYMBOL & LINE LEGEND

- IRON PIPE FOUND
- IRON PIPE TO BE SET
- CONCRETE BOUND FOUND
- CONCRETE BOUND TO BE SET
- COMPUTED POINT
- EXISTING SIGN
- EXISTING MAILBOX
- MW EXISTING MONITORING WELL
- EXISTING LIGHT POLE
- UTILITY POLE
- GUY ANCHOR
- E EXISTING ELECTRIC MANHOLE
- T EXISTING TELEPHONE MANHOLE
- EXISTING CABLE TV BOX
- W EXISTING WELL LOCATION
- WV EXISTING WATER VALVE
- EXISTING WATER SHUT-OFF
- EXISTING HYDRANT
- PROPOSED WATER VALVE
- PROPOSED HYDRANT
- GV EXISTING GAS VALVE
- S EXISTING SANITARY SEWER MANHOLE
- EXISTING CATCH BASIN
- D EXISTING DRAIN MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED MANHOLE
- SB-1 SOIL BORING LOCATION
- TP-1 TEST PIT LOCATION
- P-1 PERC TEST LOCATION
- WF-1 WETLAND FLAG LOCATION
- R-1 M.A.H.W. FLAG LOCATION
- EXISTING STONE WALL
- TREE LINE
- × 102.4 EXISTING SPOT GRADE
- 219 EXISTING CONTOUR
- × 94.7 PROPOSED SPOT GRADE
- 214 PROPOSED CONTOUR
- EDGE OF WETLAND
- FENCE LINE
- GUARDRAIL
- OHW OHW EXISTING OVERHEAD WIRES
- UEL UEL EXISTING UNDERGROUND ELECTRIC
- TEL TEL EXISTING TELEPHONE LINE
- G G EXISTING GAS LINE
- W W EXISTING WATER LINE
- SD SD EXISTING STORM DRAIN
- SS SS EXISTING SANITARY SEWER
- LOW LOW LIMIT OF WORK LINE
- SF SF SF SILT FENCE LINE

ABBREVIATIONS

A.F.F.	–	ABOVE FINISHED FLOOR
A.F.S.	–	ABOVE FINISHED SLAB
APPROX.	–	APPROXIMATE
A.T.F.	–	ABOVE TOP OF FOUNDATION
BLDG.	–	BUILDING
BLK.	–	BLOCK
BOT.	–	BOTTOM
B.O.W.	–	BOTTOM OF WALL
BRG.	–	BEARING
CB.	–	CATCH BASIN
CL	–	CENTERLINE
C.I.	–	CAST IRON
CLR.	–	CLEAR
CONC.	–	CONCRETE
CONT.	–	CONTINUOUS
CONTR.	–	CONTRACTOR
DBL.	–	DOUBLE
DET.	–	DETAIL
D.I.	–	DUCTILE IRON
DIA.	–	DIAMETER
DIM.	–	DIMENSION
DT'L.	–	DETAIL
DWG.	–	DRAWING
EA.	–	EACH
ELEC.	–	ELECTRIC
ELEV.	–	ELEVATION
EXIST.	–	EXISTING
EXT.	–	EXTERIOR
FFE	–	FINISH FLOOR ELEVATION
FIN.	–	FINISH
FLR.	–	FLOOR
FOUND.	–	FOUNDATION
FT.	–	FOOT OR FEET
INSTL.	–	INSTALLED
LT.	–	LIGHT
MAX.	–	MAXIMUM
M.A.H.W.	–	MEAN ANNUAL HIGH WATER
MH.	–	MANHOLE
MIN.	–	MINIMUM
MISC.	–	MISCELLANEOUS
N.T.S.	–	NOT TO SCALE
O.A.	–	OVERALL
O.C.	–	ON CENTER
PCB	–	PROPOSED CATCH BASIN
PDMH	–	PROPOSED DRAIN MANHOLE
PFES	–	PROP. FLARED END SECTION
POCS	–	PROP. OUTLET CONTROL STRUCT.
PROP.	–	PROPOSED
PSMH	–	PROP. SANITARY SEWER MANHOLE
PWQU	–	PROP. WATER QUALITY UNIT
P.S.I.	–	POUNDS PER SQUARE INCH
REINF.	–	REINFORCING
R.H.	–	RIGHT HAND
SHT.	–	SHEET
SPEC.	–	SPECIAL OR SPECIFICATIONS
SQ.	–	SQUARE
ST.	–	STEEL
STA.	–	STATION
T.O.F.	–	TOP OF FOUNDATION
T.O.W.	–	TOP OF WALL
T.S.	–	TOP OF STEEL
TYP.	–	TYPICAL
W/	–	WITH
WTR.	–	WATER
W.W.M.	–	WELDED WIRE MESH

EROSION & SEDIMENT CONTROL NOTES

MANAGEMENT STRATEGIES

1. CONSTRUCTION TRAFFIC SHALL BE LIMITED TO THE CONSTRUCTION ENTRANCE.
2. CONSTRUCTION SEQUENCE SHALL BE PHASED TO AVOID LEAVING LARGE AREAS EXPOSED FOR LONG PERIODS OF TIME.
3. TEMPORARY SEED AND MULCH SHALL BE APPLIED IMMEDIATELY FOLLOWING ROUGH GRADING.
4. SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED CONTINUOUSLY, ESPECIALLY FOLLOWING STORM EVENTS TO LOCATE FAILING CONTROL MEASURES AND CONDUCT ROUTINE MAINTENANCE OPERATIONS.
5. THE CONSTRUCTION SUPERINTENDENT SHALL INFORM ALL ON-SITE WORKERS OF THE SEDIMENTATION CONTROL PROGRAM.

VEGETATIVE CONTROL PRACTICES

1. TOPSOIL STOCKPILING: TOPSOIL SHALL BE STRIPPED FROM AREAS TO BE DISTURBED AND STOCKPILED FOR LATER USE. STOCKPILE LOCATION SHALL BE APPROVED BY THE OWNER AND ENGINEER AND BE WITHIN LIMIT OF WORK.
2. TEMPORARY SEEDING: THE TEMPORARY SEDIMENT BASIN, TOPSOIL STOCKPILE AND ROUGH GRADED AREAS SHALL BE SEEDED WITH WINTER RYE AT A RATE OF 30 LBS. PER ACRE ANY SOILS THAT ARE LEFT EXPOSED AND UNDISTURBED FOR MORE THAN 30 DAYS SHALL BE TEMPORARILY SEEDED.

A. SITE PREPARATION
- COMPLETE ALL ROUGH GRADING ACTIVITIES
- REMOVE ALL ROCKS AND DEBRIS LARGER THAN 3" IN DIAMETER FROM AREAS TO BE TEMPORARILY SEEDED. -EVENLY APPLY LIME TO ACHIEVE A PH VALUE OF 6.0.
- EVENLY APPLY 14 LBS. OF 5-10-10 ANALYSIS FERTILIZER TO A DEPTH OF 4" USING SUITABLE EQUIPMENT.
- SEEDBED IS TO BE LEFT IN FIRM AND SMOOTH CONDITION.
- THE LAST TILLAGE OPERATION SHALL BE PERFORMED ACROSS THE SLOPE.

B. ESTABLISHMENT
- EVENLY APPLY SEED IN ACCORDANCE WITH THE SPECIES AND RATE INDICATED ABOVE BY MEANS OF BROADCASTING OR HYDROSEEDING.
- UNLESS HYDROSEEDED, COVER SEED WITH 1/4" TO 1/2" OF TOPSOIL
- APPLY MULCH OR EROSION CONTROL BLANKET IMMEDIATELY FOLLOWING SEEDING.
- VERIFY SEEDING DATES WITH ENGINEER/LANDSCAPE ARCHITECT. IF ENGINEER/LANDSCAPE ARCHITECT DETERMINES THAT SEED CANNOT BE APPLIED DUE TO CLIMATE, TOPSOIL SHALL NOT BE SPREAD AND MULCHING SHALL BE APPLIED TO THE EXPOSED SURFACE TO STABILIZE SOILS UNTIL THE NEXT RECOMMENDED SEEDING PERIOD.
- PERMANENT SEEDING SHALL BE APPLIED BETWEEN APRIL 15 AND SEPTEMBER 30. TEMPORARY SEEDING SHALL BE APPLIED TO ALL DISTURBED AREAS OUTSIDE THIS TIME FRAME, UPON APPROVAL BY THE ENGINEER/LANDSCAPE ARCHITECT.

C. MAINTENANCE
- ALL SEEDED/MULCHED AREAS SHALL BE INSPECTED REGULARLY TO SEE THAT A GOOD STAND IS MAINTAINED. AREAS SHALL BE REPAIRED AS NECESSARY.

NONSTRUCTURAL CONTROL PRACTICES

1. SCARIFICATION: EXPOSED SLOPES EXCEEDING 4:1 SHALL BE SCARIFIED AT RIGHT ANGLES TO THE SLOPE. PROVIDE PERIODIC UPGRADING OF SERRATIONS DURING EXPOSED PERIOD UNTIL VEGETATION IS ESTABLISHED. PROVIDE VEGETATIVE COVER AS SOON AS POSSIBLE.
2. STRAW MULCH: STRAW MULCH SHALL BE APPLIED IN CONJUNCTION WITH TEMPORARY/PERMANENT SEEDING AND TO GRADED AREAS WHICH REMAIN EXPOSED OUTSIDE OF RECOMMENDED SEEDING DATES. MULCH SHALL BE APPLIED AT 90 LBS. PER 1000 S.F. CONTRACTOR SHALL PERIODICALLY INSPECT AND REAPPLY AS NECESSARY, PARTICULARLY FOLLOWING SIGNIFICANT STORM EVENTS.
3. TOPSOIL: DISTURBED AREAS SHALL BE TOPSOILED PRIOR TO SEED APPLICATION. APPLICATION STANDARDS:
- REMOVE ALL ROCKS AND DEBRIS OVER 1"-1 1/2" IN DIAMETER.
- SCARIFY SURFACE PRIOR TO SEED APPLICATION.
- APPLY 6" DEPTH OF TOPSOIL.
4. SILT FENCE: SILT FENCE SHALL BE INSTALLED AROUND THE PERIMETER OF THE SITE, AT CULVERT OUTLET LOCATIONS, OR AS INDICATED ON THE DRAWINGS. SILT FENCE SHALL BE INSPECTED AND REPAIRED ROUTINELY, ESPECIALLY FOLLOWING STORM EVENTS UNTIL THE SITE HAS BEEN STABILIZED (COVER > 70%) BY VEGETATION.

STRUCTURAL CONTROL PRACTICES

1. RIP-RAP OUTLET PROTECTION: RIP-RAP SHALL BE PROVIDED AT ALL PIPE OUTLETS. MATERIAL SHALL BE HARD, DURABLE FIELD OR QUARRY STONE WHICH IS ANGULAR AND RESISTS BREAKING DOWN WHEN EXPOSED TO WATER OR WEATHERING.
2. CONSTRUCTION ENTRANCE: CONSTRUCTION ENTRANCE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE DRAWINGS.
3. DUST CONTROL: A WATER TRUCK SHOULD BE LOCATED ON-SITE FOR DUST CONTROL WHILE WORK IS PROCEEDING. MAINTENANCE SEDIMENTATION CONTROL MEASURES SHALL BE CHECKED WEEKLY AND AFTER EACH SIGNIFICANT RAINFALL EVENT. THE FOLLOWING ITEMS SHALL BE CHECKED IN PARTICULAR:
   A. RIP-RAP OUTLET PROTECTION SHALL BE CHECKED REGULARLY FOR SEDIMENT ACCUMULATION. IF SIGNIFICANT AMOUNTS OF SEDIMENT ACCUMULATE, RIP-RAP SHALL BE REMOVED AND REPLACED.
   B. SILT FENCING SHALL BE INSPECTED REGULARLY FOR UNDERMINING AND DETERIORATION. REMOVE SEDIMENT FROM BEHIND FENCE WHEN IT BECOMES 6 INCHES DEEP.
   C. SEEDED/MULCHED AREAS SHALL BE INSPECTED REGULARLY TO SEE THAT A GOOD STAND IS MAINTAINED. AREAS SHALL BE REPAIRED AS NECESSARY.

SILT FENCE INSTALLATION NOTES

1. THIS SEDIMENT BARRIER UTILIZES MIRAFI ENVIROFENCE (100X) OR EQUAL. IT IS DESIGNED FOR SITUATIONS IN WHICH ONLY SHEET OR OVERLAND FLOWS ARE EXPECTED.
2. THE HEIGHT OF THE BARRIER SHALL NOT EXCEED 36 INCHES (HIGHER BARRIERS MAY IMPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE). IDEALLY THE FILTER FENCE SHALL BE PLACED 10 FEET AWAY FROM THE TOE OF SLOPE.
3. WHEN JOINTS ARE NECESSARY, FILTER FABRICS SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT STAKES WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY SEALED. SEE MANUFACTURER'S RECOMMENDATION.
4. STAKES SHALL BE SPACED A MAXIMUM OF 10 FEET APART AT THE BARRIER LOCATION AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 12 INCHES). IN APPLICATIONS WHERE HEAVY FLOWS ARE EXPECTED SUCH AS IN-STREAM INSTALLATIONS STAKE SPACING SHALL BE PER MANUFACTURER'S RECOMMENDATIONS AND/OR THE ENGINEERS RECOMMENDATIONS.
5. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 6 INCHES WIDE AND 6 INCHES DEEP ALONG THE LINE OF STAKES AND UPSLOPE FROM THE BARRIER IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
6. THE PRE ASSEMBLED SILT FENCE SYSTEM SHALL BE UNROLLED, POSITION THE STAKES ON THE DOWNHILL SIDE OF THE TRENCH AND HAMMER THE STAKES AT LEAST 12 INCHES INTO THE GROUND.
7. THE BOTTOM SIX (6) INCHES OF THE FABRIC SHALL BE LAID INTO THE TRENCH TO PREVENT UNDERMINING BY STORM WATER RUNOFF.
8. BACKFILL THE TRENCH OVER THE FILTER FABRIC AND COMPACT SUFFICIENTLY TO PREVENT THE RUNOFF FROM ERODING THE BACKFILL.
9. THE FABRIC SHALL NOT EXTEND MORE THAT 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES OR SUPPORTS OTHER THAN THE STANDARD STAKES.
10. INSTALLED SILT FENCE BARRIERS SHALL BE MAINTAINED ON A REGULAR SCHEDULE WHICH MAY BE PRESCRIBED BY THE LOCAL, STATE OF FEDERAL REGULATORY AUTHORITY; BUT, AT MINIMUM SHALL BE CHECKED WEEKLY AS WELL AS AFTER EACH STORM EVENT. MAINTENANCE SHALL CONSIST OF AN INSPECTION OF THE ENTIRE LENGTH OF THE BARRIER TO DETERMINE IF IT IS FUNCTIONING AS INTENDED. ALL BREAKS, DETACHED FABRIC, SLUMPED FABRIC, CLOGGED FABRIC, AND UNDERMINED AREAS SHALL BE FIXED THE DAY THAT THEY ARE DISCOVERED.
11. WHEN A MAXIMUM OF SIX (6) INCHES OF SEDIMENT HAS ACCUMULATED BEHIND THE SILT FENCE THIS SEDIMENT SHALL BE REMOVED AND THE FENCE SHALL BE INSPECTED FOR TEARS, CLOGGING OF BREAKS. ALL DEFICIENCIES SHALL BE CORRECTED IMMEDIATELY EITHER BY REPAIR OF REPLACEMENT OF THE SILT FENCE BARRIER AND/OR STAKES AS NEEDED.
12. SILT FENCE BARRIERS SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN CLEANED OF SILT AND PERMANENTLY STABILIZED.

STRAW BALE INSTALLATION & MAINTENANCE (AS REQ'D)

1. STRAW BALES SHALL BE PLACED IN A SINGLE ROW, LENGTHWISE ON THE CONTOUR, WITH ENDS OF ADJACENT BALES TIGHTLY ABUTTING ONE ANOTHER.
2. ALL BALES SHALL BE EITHER WIRE BOUND OR STRING TIES. BALES SHALL BE INSTALLED SO THAT BINDINGS ARE ORIENTED AROUND THE SIDES RATHER THAN ALONG THE TOPS AND BOTTOMS OF THE BALES TO PREVENT DETERIORATION OF THE BINDINGS.
3. THE BARRIER SHALL BE ENTRENCHED AND BACKFILLED. A TRENCH SHALL BE EXCAVATED THE WIDTH OF A BALE AND THE LENGTH OF THE PROPOSED BARRIER TO A MINIMUM DEPTH OF FOUR (4) INCHES AND A MAXIMUM DEPTH OF SIX (6) INCHES. AFTER THE BALES ARE STAKED AND CHINKED, THE EXCAVATED SOIL SHALL BE BACKFILLED AGAINST THE BARRIER. BACKFILL SOIL SHALL CONFORM TO THE GROUND LEVEL ON THE DOWNHILL SIDE AND SHALL BE BUILT UP TO FOUR (4) INCHES AGAINST THE UPHILL SIDE OF THE BARRIER.
4. EACH BALE SHALL BE SECURELY ANCHORED BY AT LEAST TWO (2) STAKES OR REBARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER. STAKES OR REBARS SHALL BE DRIVEN DEEP ENOUGH INTO THE GROUND TO SECURELY ANCHOR THE BALES.
5. THE GAPS BETWEEN BALES SHALL BE CHINKED (FILLED BY WEDGING) WITH STRAW TO PREVENT WATER FROM ESCAPING BETWEEN THE BALES. (LOOSE STRAW SCATTERED OVER THE AREA IMMEDIATELY UPHILL FROM A STRAW BALE BARRIER TENDS TO INCREASE BARRIER EFFICIENCY.)
6. STRAW BALES GENERALLY DETERIORATE IN 2-6 MONTHS AND THUS NEED REPLACEMENT.
7. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
8. BALE BARRIERS SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS, BUT NOT BEFORE THE UPSLOPE AREAS HAVE BEEN PERMANENTLY STABILIZED.

SITE PREP

1. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL RELOCATION, INCLUDING BUT NOT LIMITED TO, ALL UTILITIES, STORM DRAINAGE, SIGNS, TRAFFIC SIGNALS & POLES, ETC. AS REQUIRED. ALL WORK SHALL BE IN ACCORDANCE WITH GOVERNING AUTHORITIES SPECIFICATIONS AND SHALL BE APPROVED BY SUCH.
2. CONTRACTOR SHALL ERECT AND MAINTAIN SAFETY BARRICADES AND POST PROPER NOTICES PRIOR TO THE COMMENCEMENT OF WORK.
3. CONTRACTOR SHALL PROTECT EXISTING SITE IMPROVEMENTS, APPURTENANCES, AND LANDSCAPING TO REMAIN.
4. CONTRACTOR SHALL MAINTAIN EXISTING UTILITIES TO REMAIN IN SERVICE AND PROTECT THEM FROM DAMAGE DURING DEMOLITION OPERATIONS.
5. DO NOT DAMAGE EXISTING UTILITIES TO REMAIN WITHIN PROJECT AREA. ALL DAMAGE TO EXISTING UTILITIES TO REMAIN SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE UTILITY OWNER.
6. THERE SHALL BE NO BURNING OF DEMOLISHED MATERIAL ALLOWED ON SITE.
7. CONTRACTOR SHALL COORDINATE WITH OWNER FOR ANY ITEMS TO BE TURNED OVER TO OWNER.
8. DEMOLISH AND REMOVE ALL PAVEMENT, SLABS, FOOTINGS, SUBSURFACE ELEMENTS, MISCELLANEOUS DEBRIS, ETC. WITHIN PROPERTY LINES UNLESS NOTED OTHERWISE.
9. CONTRACTOR IS RESPONSIBLE FOR CONTROLLING DUST SO THAT DUST DOES NOT CREATE A NUISANCE ON ADJACENT ROADS OR PROPERTIES. SITE CONTRACTOR SHALL BE RESPONSIBLE FOR STREET SWEEPING AND CATCH BASIN CLEANING AFTER EACH PHASE OF CONSTRUCTION AND AS NEED IS DETERMINED BY THE ENGINEER.
10. CONTRACTOR SHALL REMOVE AND DISPOSE OF ANY ABANDONED SUBSURFACE SOIL ABSORPTION SYSTEM (SAS) AND MISCELLANEOUS DEBRIS.
11. NO ACTIVITY OTHER THAN NORMAL MAINTENANCE SHALL OCCUR OUTSIDE OF LIMIT OF WORK LINES AS SHOWN ON PLAN WITHOUT THE APPROVAL OF THE ENGINEER.
12. THE CONTRACTOR SHALL NOTIFY DIG SAFE @ 1-888-344-7233 PRIOR TO COMMENCEMENT OF ANY DEMOLITION/CONSTRUCTION ACTIVITY.

LANDSCAPE NOTES

1. THE CONTRACTOR SHALL VERIFY FINAL SELECTION OF PLANT MATERIALS WITH THE LANDSCAPE ARCHITECT AND OWNER PRIOR TO INSTALLATION.
2. NO PLANT MATERIAL WILL BE ACCEPTED WHICH DISPLAYS MAJOR IRREGULARITIES OR DAMAGE. THE OWNER/LANDSCAPE ARCHITECT RETAINS THE RIGHT TO REJECT ANY PLANT MATERIAL DEEMED UNFIT.
3. WARRANTEE: FOR A PERIOD OF TWO GROWING SEASONS FROM THE DATE THAT THE WORK UNDER THIS CONTRACT IS CERTIFIED AS SUBSTANTIALLY COMPLETE, THE CONTRACTOR SHALL: 1) WARRANTEE ALL PLANTS AND SEEDED AREAS UNDER THIS CONTRACT; 2)REMOVE AND REPLACE DURING THIS GUARANTEE PERIOD PLANTS WHICH DIE OR ARE IN POOR CONDITION AS DETERMINED BY THE OWNER; 3) REPLANT WITH STOCK OF SAME SIZE AND QUALITY AS ORIGINALLY SPECIFIED; 4) GUY AND MAINTAIN AS SPECIFIED HEREIN AT NO ADDITIONAL COST TO THE OWNER.
4. ALL NEW LAWN AREAS SHALL RECEIVE A MINIMUM OF 4 INCHES TOPSOIL OF THE PROPER pH AND ORGANIC CONTENT SUITABLE FOR THE HEALTHY GROWTH OF LAWNS. THESE AREAS SHALL BE SEEDED WITH A FINE BLADE LAWN GRASS SEED OR SODDED. ADDITIONAL OFF-SITE TOPSOIL MAY BE REQUIRED.
5. ALL AREAS TO BE MULCHED SHALL RECEIVE 4 INCHES MINIMUM 100% SHREDDED BARK MULCH WITHIN 48 HOURS OF PLANTING UNLESS OTHERWISE NOTED IN PLANTING DETAILS.
6. ALL TREE AND SHRUB PITS SHALL BE AT LEAST 2 FEET WIDER AND 1 FOOT DEEPER THAN THE TREE OR SHRUB ROOT BALL TO BE PLANTED IN IT. BACKFILL SHALL BE HIGH QUALITY LOAM OF THE PROPER pH AND ORGANIC CONTENT SUITABLE FOR THE HEALTHY GROWTH OF PLANT MATERIALS.
7. ALL PLANTS SHALL BE NURSERY GROWN AND CONFORM TO THE LATEST EDITION OF "ANSI Z60.1, AMERICAN STANDARD FOR NURSERY STOCK".
8. EACH PLANT TO BE FREE FROM DISEASE, INSECT INFESTATION, MECHANICAL INJURIES, AND IN ALL RESPECTS BE SUITABLE FOR FIELD PLANTING.
9. EACH PLANT TO BE IN THE TOP OF ITS SIZE CLASS AFTER SHEARING AND PRUNING.
10. ADJACENT TO THE TOP OF ANY WALLS OVER 36" A FENCE OR WALL SHALL BE CONSTRUCTED PER PLAN THAT MEETS LOCAL BUILDING CODE AND ALL OTHER APPLICABLE STATE AND FEDERAL LAWS.
11. SEE DETAIL SHEETS FOR ADDITIONAL DETAILS & SPECIFICATIONS.
12. SHOULD GC OR ANY SUBCONTRACTOR ENCOUNTER A DISCREPANCE/CONFLICT IN THE PLAN AN THE ACTUAL LOCATION OF A SITE FEATURE, THE CONTRACTOR SHALL CONTACT THE LANDSCAPE ARCHITECT/ENGINEER AND OWNER IMMEDIATELY.
13. ALL AREAS DISTURBED DURING CONSTRUCTION NOT DESIGNATED TO RECEIVE OTHER TREATMENT SHALL BE LOAMED TO A MINIMUM DEPTH OF 4" AND SEEDED IN ACCORDANCE WITH THE FOLLOWING:
   A. INCORPORATE GROUND LIMESTONE INTO ALL AREAS TO BE SEEDED AT A RATE OF 50 LBS/1,000 S.F.
   B. APPLY 10-6-4 FERTILIZER TO ALL AREAS TO BE SEEDED AT A RATE OF 2 LBS/1,000 S.F.
   C. THOROUGHLY INCORPORATE LIME AND FERTILIZER INTO SEED BED TO DEPTH OF 3" BY DISCING OR OTHER APPROVED METHOD.
   D. SEED WITH THE FOLLOWING MIXTURE, APPLIED AT A RATE OF 10 LBS/1,000 S.F. SEED MIX:

NAME OF SEED	% BY WEIGHT IN MIXTURE	MIN. % PURITY	MIN. GERMINATION
POS PRETENSES "BARON" BARON BLUEGRASS	50	90	75
FESTUCA RUBRA "PENNLAWN" PENNLAWN FESCUE	25	95	85
LOLIUM PERENNE "PENNFINE" PENNFINE	25	98	95

   E. MULCH ALL SEEDED AREAS WITH STRAW AT A RATE OF 5 LBS/1,000 S.F.UNLESS HYDROSEEDING WAS USED.
   F. ALL SLOPES OF 3:1 OR GREATER AFTER BEING LOAMED, SEEDED AND MULCHED IN ACCORDANCE WITH THE ABOVE SHALL SECURED WITH EROSION CONTROL BLANKETS (NO. AMERICAN GREEN S150 OR EQUAL). OVERLAP ALL NETTING JOINTS A MINIMUM OF 6" AND SECURE WITH DOUBLE ROW OF STAPLES.

PERMITTING
NOT FOR CONSTRUCTION

RLA
R LEVESQUE ASSOCIATES INC
Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants
ph: 413.568.0985 fax: 413.568.0986
40 School Street
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NOTES, SYMBOL & LINE LEGEND AND ABBREVIATIONS

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

MASSACHUSETTS ROBERT J. LEVESQUE REGISTERED LANDSCAPE ARCHITECT NO. 1398 3/5/26

PREPARED FOR:
MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

ISSUANCE DATE: March 5, 2026

REVISIONS:	DATE:

DRAFTED BY: M.B.

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SCALE: As Noted

RLA PROJ. NUMBER: 250903

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GENERAL CONSTRUCTION NOTES

1. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE SHALL CONVENE A PRE-CONSTRUCTION CONFERENCE BETWEEN THE CITY/TOWN REPRESENTATIVES, CONSULTING ENGINEER/LANDSCAPE ARCHITECT, UTILITY COMPANY REPRESENTATIVES, AND ANY OTHER AFFECTED PARTIES.
2. THE OWNER, R LEVESQUE ASSOCIATES, INC., AND/OR THEIR REPRESENTATIVES, IN PREPARING THESE PLANS HAVE ATTEMPTED TO LOCATE ALL EXISTING UTILITIES IN THE PROJECT AREA. HOWEVER, THERE MAY BE UTILITIES THAT WERE NOT OR COULD NOT BE LOCATED. UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL CALL ALL APPROPRIATE UTILITY COMPANIES FOR LOCATIONS OF THEIR UTILITIES AT LEAST 48 HOURS BEFORE COMMENCING EXCAVATION. IN THE EVENT THAT A UTILITY IS SITUATED SUCH THAT CONSTRUCTION CANNOT PROCEED AS SHOWN ON THE PLANS, THE PROJECT ENGINEER/LANDSCAPE ARCHITECT AND OWNER SHALL BE NOTIFIED IMMEDIATELY.
3. THE SITE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH OCCUR DUE TO HIS FAILURE TO LOCATE AND PRESERVE ANY AND ALL UTILITIES.
4. ALL FILL WORK REQUIRED TO BRING THE PROPOSED ROADWAY UP TO SUB-GRADE LEVEL SHALL CONFORM TO MHD SPECIFICATIONS SECTION 150.
5. CONSTRUCTION SHALL COMPLY WITH ALL APPLICABLE GOVERNING CODES AND BE CONSTRUCTED TO SAME.
6. ALL WORK IN THE CITY/TOWN RIGHT-OF-WAY AND EASEMENTS SHALL BE IN ACCORDANCE WITH THE CITY/TOWN SPECIFICATIONS AND MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION.
7. THE CONTRACTOR SHALL GIVE THE CITY/TOWN A MINIMUM OF 48 HOURS NOTICE BEFORE BEGINNING EACH PHASE OF CONSTRUCTION.
8. CONTRACTOR IS RESPONSIBLE FOR REPAIRS OF DAMAGE TO ANY EXISTING IMPROVEMENTS DURING CONSTRUCTION, SUCH AS, BUT NOT LIMITED TO, DRAINAGE, UTILITIES, PAVEMENT, STRIPING, CURB, ETC. REPAIRS SHALL BE EQUAL TO OR BETTER THAN EXISTING CONDITIONS.
9. ALL WORK SHALL BE PERFORMED IN CONFORMANCE WITH THE CONDITIONS OF APPROVAL OUTLINED IN ALL STATE AND LOCAL PERMITS. COPIES OF THE CONDITIONS ARE INCLUDED WITHIN THE PROJECTS TECHNICAL SPECIFICATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING THIS INFORMATION PRIOR TO CONSTRUCTION AND CONFORMING TO THE CONDITIONS AS REQUIRED DURING CONSTRUCTION.
10. THE CONTRACTOR SHALL MAINTAIN THE JOB CLEAR OF TRASH AND DEBRIS. THE WORK AREAS ARE TO BE PICKED UP AT THE END OF EACH WORK DAY.
11. ANY TEMPORARY FACILITIES FOR THE STORAGE OR PROTECTION OF TOOLS, EQUIPMENT OR MATERIALS SHALL CONFORM TO LOCAL REGULATIONS AND SHALL BE THE GENERAL CONTRACTORS RESPONSIBILITY. THESE DOCUMENTS DO NOT INCLUDE THE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. SAFETY, CARE OF ADJACENT PROPERTIES DURING CONSTRUCTION, AND COMPLIANCE WITH STATE AND FEDERAL REGULATIONS REGARDING SAFETY SHALL BE THE GENERAL CONTRACTORS RESPONSIBILITY.
12. THE GENERAL CONTRACTOR AND HIS SUBCONTRACTORS SHALL VISIT THE SITE AND BECOME FAMILIAR WITH ALL CONDITIONS PRIOR TO SUBMITTING HIS PROPOSAL. NO EXTRAS DUE TO UNFAMILIARITY WITH THE EXISTING SITE OR WORKING CONDITIONS WILL BE ALLOWED.
13. CONTRACTOR SHALL BE REQUIRED TO PERFORM FINAL CLEANUP CONSISTING OF CLEANING THE PROPOSED DRAINAGE AND SEWER SYSTEMS OF ALL DEBRIS PRIOR TO THE ACCEPTANCE BY THE OWNER. ADDITIONALLY, THE PROPOSED ROADWAY SHALL BE CLEANED AND SWEPT BY THE CONTRACTOR PRIOR TO ACCEPTANCE.
14. ALL EXCAVATION SHALL COMPLY WITH OSHA'S LATEST STANDARDS. ALL REQUIREMENTS OF OSHA'S EXCAVATION STANDARDS SHALL BE PROVIDED BY THE CONTRACTOR INCLUDING, BUT NOT LIMITED TO, THE PROVISION FOR A COMPETENT PERSON ON SITE MANAGER AND ANY REQUIRED DOCUMENTATION THAT MAY REQUIRE CERTIFICATION BY A PROFESSIONAL ENGINEER. THE OWNER, THROUGH ITS ENGINEER, SHALL EXPRESSLY NOT PROVIDE ANY OF THE ABOVE REQUIREMENTS DESIGNATED BY OSHA'S EXCAVATION STANDARD.
15. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE COST OF LAYING OUT ALL ITEMS OF THE WORK BASED ON CERTAIN HORIZONTAL CONTROL AND BENCHMARK SUPPLIED BY THE SURVEYOR OF RECORD. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER.
16. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, EQUIPMENT, PERMITS AND APPURTENANCES NECESSARY TO PROVIDE A COMPLETE PROJECT AS INDICATED ON THE PLANS AND IN THESE SPECIFICATIONS.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR A THOROUGH SITE EXAMINATION IN ORDER TO PREPARE SITE FOR CONSTRUCTION.
18. ANY AND ALL DEMOLISHED TREES, STRUCTURES AND OTHER RUBBLE MATERIAL PERTAINING TO THIS PROJECT SHALL BE DISPOSED OF BY THE CONTRACTOR OFF-SITE AT HIS EXPENSE IN ACCORDANCE WITH ALL OF THE CITY/TOWN ORDINANCES AND ALL APPLICABLE STATE AND FEDERAL ENVIRONMENTAL REGULATIONS.
19. ALL PAVEMENT DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED IN ACCORDANCE WITH THE SPECIFICATIONS AND AS SHOWN ON THE DRAWINGS.
20. ALL STREET EXCAVATIONS SHALL BE COMPLETELY CLOSED AT THE END OF EACH WORKING DAY BY BACKFILLING OR COVERING WITH STEEL PLATES.
21. ALL MATERIALS AND METHODS ARE TO COMPLY WITH THE CITY/TOWN DPW STANDARDS OR MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (MASSDOT) (WHERE APPLICABLE), UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
22. PERMITS WILL BE REQUIRED BY CONTRACTOR WHEN WORKING WITHIN OR OCCUPYING PUBLIC WAY. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED WORK PERMITS AND MAINTAINING A COPY OF ALL PERMITS IN A THREE RING BINDER OR PROJECT BOOK AND ON-SITE AT ALL TIMES.
23. BACKFILL WILL BE PLACED IN SUCCESSIVE LAYERS NOT MORE THAN TWELVE INCHES IN THICKNESS AND SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY DETERMINED BY STANDARD PROCTOR TEST (ASTM 698) FOR ALL APPLICABLE TYPES OF BACKFILL MATERIAL. NO FROZEN MATERIAL SHALL BE USED AS BACKFILL. IF, IN THE OPINION OF THE ENGINEER OR THE DPW, THE EXCAVATED MATERIAL IS UNSUITABLE, THE ENTIRE MATERIAL FOR BACKFILLING SHALL CONSIST OF APPROVED GRAVEL OR APPROVED BORROW, AS DIRECTED. AFTER THOROUGH TAMPING AROUND AND BENEATH THE UTILITY, A SIX-INCH LAYER OF BACKFILL WILL BE THOROUGHLY COMPACTED AS FOLLOWS: IF DRY, SHALL BE MOISTENED AND THEN COMPACTED WITH MECHANICAL TAMPERS OR BY HAND TAMPERS HAVING A TAMPING FACE NOT EXCEEDING 25 SQUARE INCHES IN AREA. THE FINAL TWELVE INCHES OF FILLING WILL, IN ALL CASES, CONSIST OF APPROVED GRAVEL THOROUGHLY TAMPED.
24. CONTRACTOR SHALL PROVIDE FIELD COMPACTION VERIFICATION UTILIZING ASTM D5195-02, STANDARD TEST METHOD FOR DENSITY OF SOIL & ROCK IN-PLACE AT DEPTHS BELOW THE SURFACE BY NUCLEAR METHODS.
25. CONTRACTOR SHALL PROVIDE FIELD COMPACTION RESULTS TO ENGINEER WITHIN 24-HOURS PRIOR TO PLACEMENT OF INFRASTRUCTURE OR BITUMINOUS BINDER.
26. ALL FILL TO BRING PROPOSED ROADWAY UP TO THE SUB-GRADE LEVEL SHALL EXTEND PAST THE EDGE OF THE RIGHT-OF-WAY AT A 2:1 SLOPE. THIS IS TO PROVIDE ADEQUATE SUPPORT FOR THE RIGHT-OF-WAY.

LAYOUT NOTES

1. ALL CONSTRUCTION IN CITY/TOWN RIGHT-OF-WAYS AND/OR EASEMENTS SHALL BE IN ACCORDANCE WITH THE CITY/TOWN STANDARD SPECIFICATIONS.
2. IN THE EVENT OF DISCREPANCIES BETWEEN LOCAL SPECIFICATIONS AND SITE SPECIFICATIONS, THE MORE STRINGENT REQUIREMENT SHALL GOVERN.
3. SITE CONTRACTOR SHALL PROTECT ALL BENCHMARKS AND PROPERTY MONUMENTATION AND SHALL REPLACE OR REPAIR, AT HIS OWN EXPENSE, BENCHMARKS AND MONUMENTATION DISTURBED DURING CONSTRUCTION.
4. ALL STRIPING, PAVEMENT MARKINGS, AND TRAFFIC SIGNAGE SHALL BE IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION, UNLESS OTHERWISE NOTED ON THE PLANS.
5. ALL WORK SHALL COMPLY WITH FEDERAL, STATE AND LOCAL CODES AND ORDINANCES INCLUDING BUT NOT LIMITED TO: AASHTO, OSHA, EPA, DEP, MASSDOT , ETC. THE GENERAL CONTRACTOR SHALL APPLY FOR ALL PERMITS AND SHALL PAY ALL PERMIT RELATED FEES. ALL NECESSARY PERMITS SHALL BE OBTAINED PRIOR TO THE START OF WORK.
6. ALL DIMENSIONS AND CONDITIONS SHOWN ON THE DRAWINGS ARE TO BE VERIFIED BY THE CONTRACTOR. IF FIELD CONDITIONS VARY SIGNIFICANTLY ENOUGH TO REQUIRE A CHANGE TO THE CONTRACT DOCUMENTS, THE PROJECT PROPONENT AND ENGINEER SHALL BE NOTIFIED IMMEDIATELY.
7. THE SITE/GENERAL CONTRACTOR AND SUBCONTRACTORS SHALL CONTACT THE OWNER AND ENGINEER SHOULD HE FIND ANY CONFLICT OR INCONSISTENCY BETWEEN THE WORK SHOWN ON THE DRAWINGS AND NORMAL ACCEPTED CONSTRUCTION PRACTICES, OR HE SHALL ASSUME RESPONSIBILITY FOR ALL CORRECTIONS.
8. ANY CORRECTIONS REQUIRED FOR REVISIONS TO THE CONTRACT DRAWINGS INITIATED BY THE GENERAL CONTRACTOR OR SUBCONTRACTORS WITHOUT PRIOR APPROVAL OF THE OWNER AND OR THE ENGINEER SHALL BE ACCOMPLISHED AT THE CONTRACTORS RISK.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL & LEGAL DISPOSAL OF ALL MATERIAL NECESSARY TO PREPARE THE SITE FOR THE NEW CONSTRUCTION AS SHOWN ON THE SITE DRAWINGS.
10. REPAIR DAMAGED CITY/TOWN ROADS AND CURBS IN ACCORDANCE WITH MASSDOT AND/OR THE CITY/TOWN REGULATIONS.
11. CONTRACTOR SHALL SAWCUT PAVEMENT EDGE WHERE PAVEMENT TO REMAIN IS ADJACENT TO PAVEMENT TO BE REMOVED.
12. CONTRACTOR SHALL PREPARE SITE AS NECESSARY FOR CONSTRUCTION SHOWN ON THE PLANS.

EARTHWORK NOTES

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
2. ALL CUT OR FILL SLOPES SHALL BE 3:1 OR FLATTER UNLESS OTHERWISE NOTED.
3. STORM PIPE SHALL BE AS NOTED ON PLANS.
4. EXISTING DRAINAGE STRUCTURES TO BE INSPECTED AND REPAIRED AS NEEDED, AND EXISTING PIPES TO BE CLEANED OUT TO REMOVE ALL SILT AND DEBRIS.
5. EXISTING GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT INTERVALS.
6. PROPOSED GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT INTERVALS.
7. IF ANY EXISTING STRUCTURES TO REMAIN ARE DAMAGED DURING CONSTRUCTION IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO REPAIR AND/OR REPLACE THE EXISTING STRUCTURE AS NECESSARY TO RETURN IT TO EXISTING CONDITIONS OR BETTER.
8. ALL STORM PIPE ENTERING STRUCTURES SHALL BE SEALED TO ASSURE CONNECTION AT STRUCTURE IS WATERTIGHT.
9. ALL STORM SEWER MANHOLES FRAMES AND GRATES ARE TO BE SET EQUAL TO FINISH GRADES, AND SHALL HAVE TRAFFIC BEARING RING & COVERS (H20).
10. CONTRACTOR SHALL ADJUST AND/OR CUT EXISTING PAVEMENT AS NECESSARY TO ASSURE A SMOOTH FIT AND CONTINUOUS GRADE.
11. CONTRACTOR SHALL ASSURE POSITIVE DRAINAGE AWAY FROM BUILDINGS FOR ALL NATURAL AND PAVED AREAS.
12. ALL UNSURFACED AREAS DISTURBED BY GRADING OPERATION SHALL RECEIVE 4 INCHES OF TOPSOIL. CONTRACTOR SHALL APPLY STABILIZATION FABRIC TO ALL SLOPES 3H:1V OR STEEPER. CONTRACTOR SHALL GRASS DISTURBED AREAS IN ACCORDANCE WITH THE SPECIFICATIONS UNTIL A HEALTHY STAND OF GRASS IS OBTAINED.
13. CONSTRUCTION SHALL COMPLY WITH ALL APPLICABLE GOVERNING CODES AND BE CONSTRUCTED TO SAME.
14. IF CONTRACTOR RELOCATES OR SETS NEW BENCHMARKS, THE VERTICAL ELEVATIONS OF THE BENCHMARKS SHALL BE SET WITHIN A TOLERANCE OF 0.010 FT.
15. CONTRACTOR SHALL LEAVE GRADE BEHIND CURB IN ALL PLANTER AREAS A MINIMUM OF 4" LOW FOR THE PLACEMENT OF SUITABLE TOPSOIL OR PLANTING MIX.

SITE UTILITY NOTES

GENERAL:

1. ALL FILL MATERIAL IS TO BE IN PLACE, AND COMPACTED BEFORE INSTALLATION OF PROPOSED UTILITIES.
2. TOPS OF EXISTING MANHOLES SHALL BE SET EQUAL TO FINISH GRADE. IN GRASSED LANDSCAPED AREAS WITH WATER TIGHT LIDS.
3. ALL CONCRETE FOR ENCASEMENTS SHALL HAVE A MINIMUM 28 DAY COMPRESSION STRENGTH AT 3000 P.S.I.
4. DRAWINGS DO NOT PURPORT TO SHOW ALL EXISTING UTILITIES.
5. EXISTING UTILITIES SHALL BE VERIFIED IN FIELD PRIOR TO INSTALLATION OF ANY NEW LINES.
6. SITE/GENERAL CONTRACTOR IS RESPONSIBLE FOR COMPLYING TO THE SPECIFICATIONS OF THE LOCAL AUTHORITIES AT THE CITY WITH REGARD TO MATERIALS AND INSTALLATION OF THE WATER AND SEWER LINES.
7. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
8. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES FOR INSTALLATION REQUIREMENTS AND SPECIFICATIONS.
9. CONTRACTOR SHALL COORDINATE INSPECTION OF UTILITY LINES WITH APPROPRIATE AUTHORITIES PRIOR TO BACKFILLING TRENCHES.
10. CONTRACTOR SHALL COMPLY WITH THE LATEST OSHA STANDARDS OR DIRECTIVES OR ANY OTHER AGENCY HAVING JURISDICTION FOR EXCAVATION AND TRENCHING PROCEDURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND MAINTENANCE OF ALL SUPPORT SYSTEMS, SLOPING, BENCHING, AND OTHER MEANS OF PROTECTION.
11. CONTRACTOR SHALL COORDINATE INSTALLATION OF UTILITIES WITH LOCAL COMPANIES TO AVOID CONFLICTS AND TO ASSURE THAT PROPER DEPTHS ARE ACHIEVED. CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITY COMPANIES FOR EXACT LOCATION AND SCHEDULING OF CONNECTIONS TO THEIR FACILITIES.
12. THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. DUE TO THE LACK OF AVAILABLE DOCUMENTATION. ALL UTILITIES, INCLUDING CURB BOXES, MAY NOT BE SHOWN ON THESE DRAWINGS. THE CONTRACTOR SHALL CALL THE "DIG SAFE CENTER" TO HAVE ALL UTILITIES MARKED ON THE GROUND PRIOR TO THE START OF CONSTRUCTION
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH OCCUR DUE TO HIS FAILURE TO LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
14. DO NOT INTERRUPT EXISTING UTILITIES WITHOUT AUTHORIZATION FROM THE OWNER, OWNERS OF ADJACENT PROPERTIES, AND THE CORRESPONDING UTILITY OWNER. CONTRACTOR SHALL ARRANGE TO SHUT OFF UTILITIES, AS REQUIRED, WITH THE UTILITY OWNERS.
15. COORDINATE UTILITY TERMINATION WITH UTILITY OWNERS.

SEWER:

1. SANITARY SEWER MAINS AND LATERALS SHALL BE PVC PIPE CONFORMING TO ASTM D 3034-SDR35. THE MINIMUM SIZE FOR SEWER MAINS SHAL BE 8"; SEWER LATERALS SHALL BE 4" MIN.
2. ALL SANITARY SEWERS, SEWER FORCE MAINS, AND SEWER LATERALS SHALL BE INSTALLED IN FIRST-CLASS BEDDING AND IN ACCORDANCE WITH THE DEPARTMENT OF PUBLIC WORKS SPECIFICATIONS. SEWERS SHALL BE INSTALLED TO THE LINE AND GRADE INDICATED ON THE PLANS.
3. ONLY PRECAST CONCRETE MANHOLES OF A DESIGN APPROVED BY THE TOWN ENGINEER SHALL BE INSTALLED ON A SANITARY SEWER MAIN.
4. NO GROUNDWATER OR SURFACE WATER SHALL BE DISCHARGED INTO THE SANITARY SEWER.
5. WHERE ROCK IS ENCOUNTERED, IT SHALL BE REMOVED TO A DEPTH OF ONE FOOT BELOW THE FLOWLINE OF THE SEWER AND THE PIPE LAID IN A PROPERLY COMPACTED GRANULAR MATERIAL APPROVED BY THE TOWN ENGINEER.
6. ONLY GRANULAR MATERIAL APPROVED BY THE TOWN ENGINEER SHALL BE USED AS BACKFILL IN ANY TRENCH EXCAVATION.

WATER:

1. CONTRACTOR SHALL CONTACT THE CITY/TOWN WATER DEPARTMENT FOR SPECIFICATIONS AND MAKE OF VALVES, VALVE BOXES, FIRE HYDRANTS AND ALL OTHER WATER LINE APPURTENANCES.
2. WATER LINE TESTING AND STERILIZATION SHALL BE PERFORMED IN ACCORDANCE WITH LOCAL DPW SPECIFICATIONS AND WATER DISTRIBUTION SYSTEM. CONTRACTOR SHALL COORDINATE TESTING WITH THE CITY WATER DEPARTMENT.
3. ALL WATER MAIN SHALL BE DUCTILE IRON (D.I.), CLASS 52, AWWA C-151 (ANSI A21.40). D.I. PIPE SHALL BE DOUBLE CEMENT LINED WITH A SEAL COAT CONFORMING TO AWWA C-104 (ANSI A-21.4).
4. JOINTS FOR D.I. PIPE SHALL BE PUSH-ON OR OTHERWISE APPROVED, AWWA C151(ANSI A-21.51) WITH GASKETS CONFORMING TO AWWA C-111 (ANSI A-21.11) MAXIMUM LENGTH OF PIPE TO BE 20 L.F.
5. ALL FITTINGS SHALL BE DUCTILE IRON CLASS 53 WITH PRESSURE RATING OF 350 PSI AND MECHANICAL JOINTS CONFORMING TO AWWA C-151 (ANSI A21.51).
6. RETAINER GLANDS: RETAINER GLANDS SHALL BE DESIGNED TO IMPART MULTIPLE WEDGING ACTION AGAINST THE PIPE, INCREASE ITS RESISTANCE AS THE PRESSURE INCREASES. GLANDS SHALL BE MANUFACTURED OF DUCTILE IRON CONFORMING TO ASTM A536-80. RESTRAINING DEVICES SHALL BE DUCTILE IRON HEAT-TREATED TO A MINIMUM HARNESS OF 370 BHN. TWIST-OFF NUTS SHALL BE USED TO INSURE PROPER ACTUATING OF THE RETAINER GLAND. DIMENSIONS OF THE GLAND SHALL BE SUCH THAT IT CAN BE USED WITH THE STANDARD MECHANICAL JOINT BELL AND TEE-HEADED BOLTS CONFORMING TO ANSI/AWWA A21.1 AND ANSI/WWA 153/A21.5. THE RETAINER GLAND SHALL HAVE A WORKING PRESSURE OF 250 PSI WITH A MINIMUM SAFETY FACTOR OF 2:1 AND SHALL BE CERTIFIED BY THE MANUFACTURER TO BE COMPATIBLE WITH THE PIPE CLASS AND PIPE MANUFACTURER FOR ALL SIZES PROVIDED ON THE JOB. THE RETAINER GLAND SHALL BE MEGA-LUG AS MANUFACTURED EBAA IRON, INC., OR APPROVED EQUAL.
7. ALL WATER MAINS, UNLESS OTHERWISE NOTED, SHALL BE INSTALLED WITH A MINIMUM FIVE FEET OF COVER. WHEN CROSSING ABOVE OR BELOW WATER PIPELINES, A MINIMUM VERTICAL SEPARATION OF SIX INCHES SHALL BE PROVIDED. WHEN CROSSING SANITARY SEWERS, A MINIMUM OF 18" SHALL BE PROVIDED.

SITE UTILITY NOTES (CONTINUED)

8. THE INSTALLED WATER MAIN SHALL BE PRESSURE TESTED, FLUSHED AND DISINFECTED BY CONTRACTOR IN ACCORDANCE WITH AWWA C-600 AND AWWA C-651 OR PER CITY/TOWN WATER DEPARTMENT STANDARDS.
9. DUCTILE IRON PIPES SHALL BE INSTALLED IN ACCORDANCE WITH AWWA C-600.
10. ALL MECHANICAL JOINTS ARE TO BE RESTRAINED. FITTINGS SHALL BE RESTRAINED BY MECHANICAL JOINT RESTRAINTS. THE PIPE CONNECTED TO THE FITTING SHALL BE RESTRAINED PER THE MANUFACTURER'S SCHEDULE.
11. THE CONTRACTOR SHALL MARK THE LOCATION OF THE PROPOSED WATER MAIN AT LEAST 48 HOURS PRIOR TO EXCAVATING. EXCAVATION SHALL NOT PROCEED WITHOUT AUTHORIZATION BY THE ENGINEER.
12. ALL WATER MAINS, HYDRANT BRANCHES, AND SERVICES SHALL HAVE UTILITY WARNING TAPE. THE TAPE SHALL BE BURIED APPROXIMATELY 2 FEET BELOW FINISHED GRADE.
13. BACKFILL SHALL BE COMPACTED TO 95 PERCENT OF THE STANDARD PROCTOR DENSITY AS DETERMINED BY ASTM D698. COMPACTION EQUIPMENT USED MUST BE SPECIFICALLY DESIGNED FOR COMPACTION. TAMPING WITH THE BACK OF THE BACK HOE BUCKET IS UNACCEPTABLE COMPACTION.
14. ALL WATER SERVICES SHALL BE 1" DIA. COPPER TUBING TYPE K, SOFT TEMPER CONFORMING TO ASTM B88 UNLESS OTHERWISE NOTED.
15. DEPRESS WATER MAIN UNDER EXISTING SERVICES AND HYDRANT BRANCHES TO MAINTAIN 5'-0" OF COVER.
16. ALL WATER MAINS SHALL BE LAID PER THE PLANS TO MAINTAIN THE MAXIMUM SEPARATION FROM EXISTING OR PROPOSED SANITARY SEWER. DISTANCE SHALL BE MEASURED EDGE TO EDGE.
17. IDENTIFY EACH PIPE LENGTH & FITTING CLEARLY WITH MANUFACTURE'S NAME & TRADEMARK. NOMINAL PIPE SIZE & MATERIAL DESIGNATION.
18. ALL WATER MAINS & SERVICE PIPES SHALL BE LAID IN A TRENCH SEPARATE FROM ANY OTHER UTILITY (GAS, ELECTRIC, TELEPHONE, ETC.) SHALL BE A MINIMUM NO LESS THAN FIVE (5) FEET FROM ANOTHER UTILITY.
19. ALL MATERIAL SHALL BE IN ACCORDANCE WITH CITY/TOWN WATER DEPARTMENT "RULES & REGULATIONS". ALL WORK TO BE PERFORMED IN ACCORDANCE WITH CITY/TOWN WATER DEPARTMENT "SPECIFICATIONS". CITY/TOWN WATER DEPARTMENT STANDARDS SHALL TAKE PRECEDENCE OVER ANY REQUIREMENTS LISTED ABOVE.

PERMITTING
NOT FOR CONSTRUCTION

RLA
R LEVESQUE ASSOCIATES INC
Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants
ph: 413.568.0985 fax: 413.568.0986
40 School Street
Westfield, MA 01085
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CONSTRUCTION NOTES

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

COMMONWEALTH OF MASSACHUSETTS · ROBERT L. LEVESQUE · REGISTERED LANDSCAPE ARCHITECT · NO. 1395 · 3/5/26

PREPARED FOR:
MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

ISSUANCE DATE: March 5, 2026

REVISIONS:	DATE:

DRAFTED BY: M.B.

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SCALE: As Noted

RLA PROJ. NUMBER: 250903

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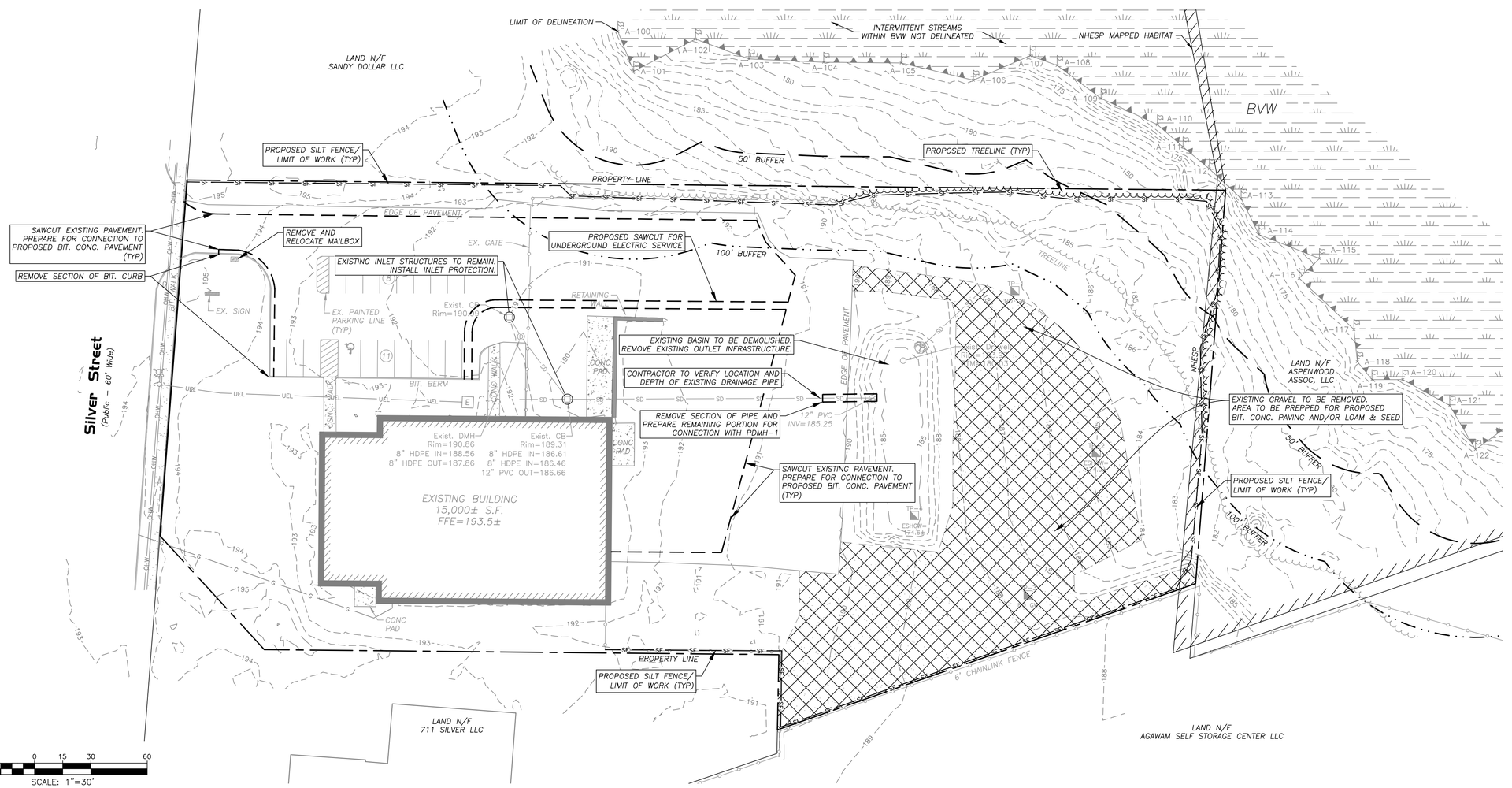
DEMOLITION NOTES

1. THE INFORMATION SHOWN HEREON IS NOT INTENDED TO BE AN EXHAUSTIVE SURVEY OF ALL APPURTENANCES THAT MAY OR MAY NOT BE IN PLACE TO SERVE THE EXISTING ON-SITE STRUCTURES AND USE. SEPTIC SYSTEM COMPONENTS, UNDERGROUND TANKS, AND OTHER SUB-SURFACE STRUCTURES MAY BE IN PLACE AND MAY REQUIRE ATTENTION BEFORE CONSTRUCTION MAY PROCEED.
2. CONTRACTOR SHALL CONDUCT A PRE-DEMOLITION SURVEY TO IDENTIFY ANY AND ALL UTILITIES AND UTILITY COMPONENTS TO BE DISCONTINUED, REMOVED, OR DEMOLISHED IN PLACE AND THE PRESENCE OR ABSENCE OF ANY HAZARDOUS MATERIALS.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DEMOLITION, REMOVAL OR RELOCATION, INCLUDING BUT NOT LIMITED TO: ALL UTILITIES, STORM DRAINAGE, SIGNS, TRAFFIC SIGNALS & POLES, ETC. AS REQUIRED. ALL WORK SHALL BE IN ACCORDANCE WITH GOVERNING AUTHORITIES' SPECIFICATIONS AND SHALL BE APPROVED BY SUCH. ALL COSTS SHALL BE INCLUDED IN BASE BID.
4. CONTRACTOR SHALL ERECT AND MAINTAIN SAFETY BARRICADES AND POST PROPER NOTICES PRIOR TO THE COMMENCEMENT OF WORK.
5. CONTRACTOR SHALL PROTECT EXISTING SITE IMPROVEMENTS, APPURTENANCES AND LANDSCAPING TO REMAIN.
6. CONTRACTOR SHALL MAINTAIN EXISTING UTILITIES TO REMAIN IN SERVICE AND PROTECT THEM FROM DAMAGE DURING DEMOLITION OPERATIONS. ANY DAMAGE TO EXISTING UTILITIES TO REMAIN SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE UTILITY OWNER.
7. ALL UTILITY DISCONNECTION SHALL BE PERFORMED TO THE SATISFACTION OF THE RELEVANT UTILITY COMPANY AND COMPLY WITH ANY LOCAL, STATE AND/OR FEDERAL REGULATORY AGENCIES.
8. CONTRACTOR SHALL PROMPTLY TRANSPORT AND LEGALLY DISPOSE OF DEMOLISHED MATERIALS OFF OWNERS PROPERTY. DO NOT ALLOW DEMOLISHED MATERIAL TO COLLECT ON SITE. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DISPOSAL.
9. THERE SHALL BE NO BURNING OF DEMOLISHED MATERIAL ALLOWED ON SITE.
10. CONTRACTOR SHALL COORDINATE WITH OWNER FOR ANY ITEMS TO BE TURNED OVER TO OWNER.
11. CONTRACTOR IS RESPONSIBLE FOR CONTROLLING DUST SO THAT DUST DOES NOT CREATE A NUISANCE ON ADJACENT ROADS OR PROPERTIES. SITE CONTRACTOR SHALL BE RESPONSIBLE FOR STREET SWEEPING AND CATCH BASIN CLEANING AFTER EACH PHASE OF CONSTRUCTION AND AS NEED IS DETERMINED BY THE LANDSCAPE ARCHITECT/ENGINEER.
12. NO ACTIVITY SHALL OCCUR OUTSIDE OF LIMIT OF WORK LINE AS SHOWN ON PLAN WITHOUT THE APPROVAL OF THE LANDSCAPE ARCHITECT/ENGINEER AND LANDOWNER.
13. THE CONTRACTOR SHALL NOTIFY DIG SAFE @ 1-888-344-7233 A MINIMUM OF 72 HOURS (M-F) PRIOR TO COMMENCEMENT OF ANY DEMOLITION/CONSTRUCTION ACTIVITY.
14. THE LANDSCAPE ARCHITECT/ENGINEER IS NOT RESPONSIBLE FOR ANY ITEMS THAT MAY BE DISCOVERED ON-SITE DURING DEMOLITION OR CONSTRUCTION THAT WAS NOT PREVIOUSLY INDICATED ON THE SURVEYS OR INFORMATION PROVIDED.
15. PAVEMENT SHALL BE SAWCUT AT THE LIMIT OF WORK. ALL PAVING, FOOTINGS, UTILITIES, CURBING AND OTHER EXISTING IMPROVEMENTS SHALL BE REMOVED OR SUITABLY MILLED TO THE SATISFACTION OF THE OWNER AND GENERAL CONTRACTOR.

CONSTRUCTION SEQUENCE

1. CONTACT THE TOWN OF AGAWAM AT LEAST FORTY-EIGHT HOURS PRIOR TO COMMENCEMENT OF ANY DEMOLITION, CONSTRUCTION, OR EARTHWORK ACTIVITY ON THIS PROJECT.
2. CONSTRUCT ANTI-TRACKING PAD AT ENTRANCE AND INSTALL ANY REQUIRED INLET PROTECTION AS DEPICTED ON THE PLAN.
3. INSTALL SILT FENCE AS SHOWN ON THE PLANS.
4. UPON COMPLETION OF EROSION CONTROL MEASURES, CLEARING AND GRUBBING AND EARTHWORK MAY COMMENCE.
5. CLEAR AND GRUB SITE. STOCKPILE ANY CHIPPING OR TOPSOIL MATERIAL TO REMAIN ON SITE FOR LONGER THAN 14 DAYS AND INSTALL SILT FENCE AROUND THE PERIMETER OF THE STOCKPILE.
6. COMMENCE EARTHWORK BY EXCAVATING FOR THE CUT/FILL SLOPES AS SHOWN ON THE PLANS. STABILIZE/SEED ANY SLOPES THAT HAVE ACHIEVED FINAL GRADE.
7. INSTALL UTILITIES AS SHOWN ON PLANS INCLUDING WATER SERVICE, SEWER SERVICE, GAS SERVICE, ELECTRICAL SERVICE AND STORMWATER MANAGEMENT SYSTEM.
8. GRADE THE SITE TO ACCEPT PAVEMENT SECTION MATERIALS.
9. INSTALL PAVEMENT AS SPECIFIED ON THE PLANS.
10. UPON INSTALLATION OF PAVEMENT SURFACE, INSTALL INLET PROTECTION AS REQUIRED ON ANY NEW INLET STRUCTURES.
11. FINAL GRADING AND STABILIZATION OF ANY REMAINING EXPOSED AREAS.
12. AT THE DIRECTION OF THE TOWN OF AGAWAM, EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED.



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DEMOLITION & REMOVALS PLAN

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

MASSACHUSETTS REGISTERED LANDSCAPE ARCHITECT ROBERT A. LEVESQUE NO. 1395 35726

PREPARED FOR:
MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

ISSUANCE DATE: March 5, 2026

REVISIONS:	DATE:

DRAFTED BY: M.B.

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ZONING REVIEW - Industrial B (IB)

TYPE (MINIMUM)	REQUIRED	PROPOSED
AREA	1 ACRE	3.12± ACRES
FRONTAGE	100 FT	189.86 FT
FRONT YARD	75 FT	80.5± FT
SIDE YARD	25 FT	25.5± FT
REAR YARD	25 FT	131.6± FT
HEIGHT (MAX)	40 FT (2 STORIES)	<40± FT
BUILDING COVERAGE (MAX)	NONE	±16%
PARKING	30*	31

* PARKING REQUIREMENTS: Service Industrial Building - 1 space per 500 square feet of gross floor area
15,000 S.F. / 500 S.F. = 30 REQUIRED SPACES

NOTES

1. THE RECORD OWNER OF THE SUBJECT PARCEL IS MSR PROPERTIES, LLC. SEE HAMPDEN COUNTY REGISTRY OF DEEDS BOOK 22411 PAGE 254, BOOK 20869 PAGE 318, AND BOOK 26235 PAGE 356.
2. THE PROPERTY LINES SHOWN HEREON ARE BASED UPON A PLAN TITLED, "PLAN OF LAND IN AGAWAM, MASSACHUSETTS SURVEYED AND MAPPED FOR (OWNERS) AGAWAM SELF STORAGE CENTER, LLC., 711 SILVER, LLC., AND MSR PROPERTIES, LLC." PREPARED BY THIS OFFICE, DATED AUGUST 19, 2025. SEE HAMPDEN COUNTY REGISTRY OF DEEDS BOOK OF PLANS 403 PAGE 110.
3. THE EXISTING BUILDING(S) SHOWN HEREON ARE BASED ON AN APPROXIMATE MEASUREMENT OF THE OUTSIDE PERIMETER OF THE EXISTING STRUCTURES. THE ACTUAL LOCATION OF THE EXISTING BUILDING WALLS AND CORNERS SHOULD BE VERIFIED IN THE FIELD PRIOR TO ANY CONSTRUCTION WORK THAT WOULD ABUT OR TAKE PLACE ADJACENT TO THE EXISTING BUILDING(S). IF THE PLAN HEREON IS USED FOR CONSTRUCTION LAYOUT PURPOSES, THE PARTIES CONDUCTING LAYOUT SHALL CONTACT R. LEVESQUE ASSOCIATES INC. PRIOR TO SAID LAYOUT TO DETERMINE PROPER CONTROL. PLEASE NOTE WHILE THE BUILDING(S) ARE SHOWN TO BE SQUARE, IT SHOULD NOT BE ASSUMED THAT THE WALLS ARE SQUARE OR PLUMB. R. LEVESQUE ASSOCIATES TAKES NO RESPONSIBILITY FOR THIRD PARTY LAYOUT OF THE PLAN SHOWN HEREON.
4. THIS PLAN HAS BEEN PREPARED FOR SITE PLANNING PURPOSES AND SHALL NOT BE USED FOR THE CONVEYANCE OF LAND OR FOR ANY OTHER USE.
5. SUBJECT PARCEL CONTAINS 136,158.9± S.F. OR 3.12± ACRES.
6. THE SUBJECT PROPERTIES SHOWN HEREON MAY BE SUBJECT TO RIGHTS AND EASEMENTS AS CONTAINED IN THE VARIOUS DEEDS OF RECORD DESCRIBING SAID PROPERTIES. THE LOCATION AND EXTENT OF ANY SUCH RIGHTS AND EASEMENTS IS NOT THE SUBJECT OF THIS PLAN.
7. WETLANDS DELINEATED BY R LEVESQUE ASSOCIATES, INC. ON 09-12-2025. OFFSITE WETLAND RESOURCE AREAS HAVE BEEN SHOWN TO ACCURATELY SHOW BUFFER ZONES ON THE SUBJECT PROPERTY. THE DETERMINATION OF WETLAND RESOURCE AREAS IS THE THE SUBJECT OF THIS PLAN.
8. THE EXISTING CONDITIONS INFORMATION SHOWN IS BASED UPON A SURVEY PERFORMED BY R LEVESQUE ASSOCIATES, INC. ON 09-15-2025, AN UNRECORDED EXISTING CONDITIONS SITE PLAN PREPARED BY SMITH ASSOCIATES SURVEYORS, INC., DATED DECEMBER 11, 2015, AND NOAA LIDAR.
9. THE UNDERGROUND UTILITIES SHOWN HEREON HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION, AVAILABLE RECORD DATA, AND THE TOWN OF AGAWAM WEB GIS. R LEVESQUE ASSOCIATES, INC. MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN HEREON COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. R LEVESQUE ASSOCIATES, INC. FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN HERE ARE IN THE EXACT LOCATION INDICATED, ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM AVAILABLE INFORMATION.
10. ADJACENT PROPERTY LINES AND ABUTTERS SHOWN HEREON ARE REFERENCED FROM THE TOWN OF AGAWAM WEB GIS.
11. SUBJECT PARCEL IS ZONED INDUSTRIAL B ACCORDING TO THE TOWN OF AGAWAM ZONING MAP.
12. THE SUBJECT PARCEL IS NOT LOCATED WITHIN A SPECIAL FLOOD ZONE AREA ACCORDING TO FLOOD INSURANCE RATE MAP NUMBER 25013C0392E – EFFECTIVE DATE: 07-16-2013.
13. THE SUBJECT PROPERTY IS PARTIALLY LOCATED WITHIN NATURAL HERITAGE & ENDANGERED SPECIES PROGRAM (NHESP) JURISDICTION.

LAYOUT NOTES

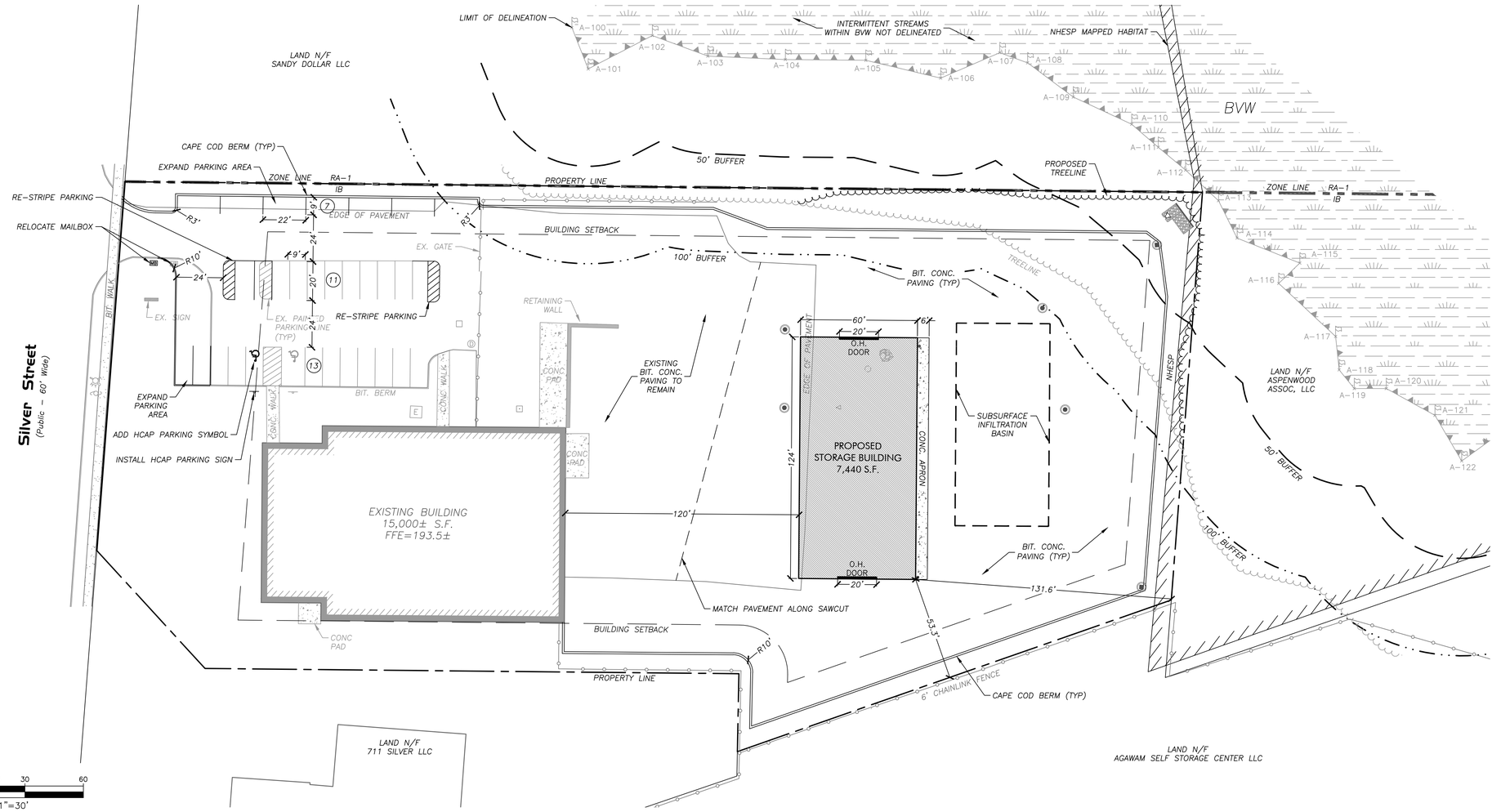
1. SITE CONTRACTOR SHALL REFER TO REMAINING PLAN SET FOR INFORMATION REGARDING SITE LAYOUT.
2. IT SHALL BE THE SITE CONTRACTORS RESPONSIBILITY TO CROSS REFERENCE INFORMATION CONTAINED IN OTHER SHEETS WITH SITE INFORMATION SHOWN HEREON.
3. PRIOR TO SUBMITTING THEIR BID FOR CONSTRUCTION, THE SITE CONTRACTOR SHALL COMMUNICATE ANY DISCREPANCIES BETWEEN THE PROPOSED DESIGN AND THE SAID SPECIFICATIONS WITH THE PROJECT PROPONENT AND LANDSCAPE ARCHITECT/ENGINEER. SHOULD THE SITE CONTRACTOR FAIL TO COMMUNICATE ANY DISCREPANCIES, HE/SHE SHALL BE RESPONSIBLE FOR ANY COSTS RESULTING FROM SAID DISCREPANCY.

SIGNAGE AND PAVEMENT MARKING NOTES

1. STRIPE ALL PARKING AREAS AS SHOWN, INCLUDING PARKING SPACES, STOP BARS, CROSSWALKS, AND ACCESSIBLE ROUTE MARKINGS AND SYMBOLS USING WHITE TRAFFIC PAINT. PAINTED ISLANDS, FIRE LANES, AND TRAVEL WAY CENTERLINES SHALL BE PAINTED USING YELLOW TRAFFIC PAINT. ALL TRAFFIC PAINT SHALL CONFORM TO AASHTO M248 TYPE "N".
2. STOP BARS SHALL BE 12" WIDE (WHITE).
3. ALL PARKING STALL LINES SHALL BE 4" WIDE (WHITE).
4. ALL PAVEMENT MARKINGS AND SIGNS SHALL CONFORM TO "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", "STANDARD ALPHABETS FOR HIGHWAY SIGNS AND PAVEMENT MARKINGS", MASSDOT, STATE BUILDING CODE AND ADA REQUIREMENTS, AND AS SHOWN ON THE PLANS & DETAILS.

ACCESSIBILITY NOTES

1. ALL ACCESSIBLE ROUTES, TRANSITIONS, AND ACCESSIBLE PARKING/LOADING AREAS, INCLUDING ALL ENTRANCES TO BUILDING, SHALL ADHERE TO 521 CMR.
2. SHOULD THE ARCHITECT PROVIDE ADDITIONAL ENTRANCES OR MEANS OF EGRESS, ADDITIONAL ACCESSIBLE ROUTES MAY BE REQUIRED.
3. IT IS THE RESPONSIBILITY OF THE ARCHITECT AND CONTRACTOR TO NOTIFY THE ENGINEER AND LANDSCAPE ARCHITECT OF ANY CHANGES TO THE PROPOSED BUILDING THAT WOULD AFFECT THE ACCESSIBILITY REQUIREMENTS OF THE PROPOSED SITE.
4. THE CONTRACTOR SHALL REVIEW IN DETAIL THE REQUIREMENTS OF 521 CMR AND SHALL BE RESPONSIBLE FOR CONFORMANCE WITH SAID REGULATIONS.



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RLA
R LEVESQUE ASSOCIATES INC
Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants
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40 School Street
Westfield, MA 01085
rlaland.com

LAYOUT & MATERIALS PLAN

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

ROBERT J. LEVESQUE No. 39981 REGISTERED LANDSCAPE ARCHITECT COMMONWEALTH OF MASSACHUSETTS
3/5/26

PREPARED FOR:
MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

ISSUANCE DATE: March 5, 2026

REVISIONS:	DATE:

DRAFTED BY: M.B.

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SCALE: As Noted

RLA PROJ. NUMBER: 250903

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SHORT–TERM EROSION CONTROL MAINTENANCE

1. THE CONTRACTOR OR SUBCONTRACTOR WILL BE RESPONSIBLE FOR IMPLEMENTING EACH CONTROL SHOWN ON THE SEDIMENTATION AND EROSION CONTROL PLAN.
2. ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL MEASURES WILL BE INSTALLED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFF–SITE SEDIMENTATION IF DEEMED NECESSARY BY ON–SITE INSPECTION.
3. EFFECTIVE EROSION CONTROL MEASURES SHALL BE INITIATED PRIOR TO THE COMMENCEMENT OF CLEARING, GRADING, EXCAVATION, OR OTHER OPERATIONS THAT WILL DISTURB THE NATURAL PROTECTION.
4. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED AT LEAST ONCE EVERY SEVEN (7) CALENDAR DAYS AND AFTER ANY STORM EVENT GREATER THAN 0.5 INCHES OF PRECIPITATION DURING ANY 24–HOUR PERIOD, AND THE INSPECTION SHALL BE DOCUMENTED IN WRITING. DAMAGED OR INEFFECTIVE DEVICES SHALL BE REPAIRED OR REPLACED, AS NECESSARY.
5. THE CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO AVOID EXCESS EROSION OF THE SITE DUE TO THE CONSTRUCTION OF THIS PROJECT.
6. SILT SHALL BE REMOVED FROM BEHIND BARRIERS IF GREATER THAN 6–INCHES DEEP OR AS NEEDED. SEDIMENT THAT IS COLLECTED IN STRUCTURES SHALL BE DISPOSED OF PROPERLY AND COVERED IF STORED ON–SITE.
7. DAMAGED OR DETERIORATED ITEMS WILL BE REPAIRED IMMEDIATELY AFTER IDENTIFICATION.
8. ALL DITCHES SHALL BE STABILIZED AS SOON AS IS PRACTICABLE TO MINIMIZE EROSION.
9. THE CONTRACTOR SHALL MAINTAIN ALL EROSION CONTROL DEVICES IN A GOOD, WORKING STATE OF REPAIR UNTIL THEIR USE IS NO LONGER WARRANTED. AT THAT TIME, THE EROSION CONTROL DEVICES SHALL BE REMOVED AND DISPOSED OF SO AS TO CAUSE NO OFF–SITE SILTATION.
10. INSPECT AND MAINTAIN CONSTRUCTION ENTRANCE STONE SUCH THAT SEDIMENT DOES NOT TRACK ONTO THE STREET. ANY SEDIMENT TRACKED ONTO THE STREET SHALL BE CLEANED DAILY.
11. AFTER CATCH BASINS HAVE BEEN CONSTRUCTED AND THE SITE HAS BEEN PAVED, THE CONTRACTOR SHALL PROTECT THE INLETS BY CONSTRUCTING INLET PROTECTION AS SHOWN ON THE PLANS. INLET PROTECTION TO REMAIN IN PLACE AND MAINTAINED UNTIL DISTURBED AREAS HAVE BEEN STABILIZED, LOAMED AND SEEDED.
12. EROSION CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL ALL DISTURBED EARTH HAS BEEN SUBSTANTIALLY STABILIZED. AFTER REMOVAL OF MEASURES, DISTURBED AREAS SHALL BE REGRADED AND STABILIZED AS NECESSARY.
13. THIS PLAN IS PROVIDED AS A BASIS FOR THE INITIAL SEDIMENTATION AND EROSION CONTROL MEASURES. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO UPDATE AND EXPAND THIS PLAN AS SITE CONDITIONS DICTATE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PREVENT THE OCCURRENCE OF SILTATION TO WETLAND RESOURCE AREAS AND THE MOVEMENT OF SEDIMENT BEYOND THE SITE BOUNDARIES.

CONSTRUCTION NOTES

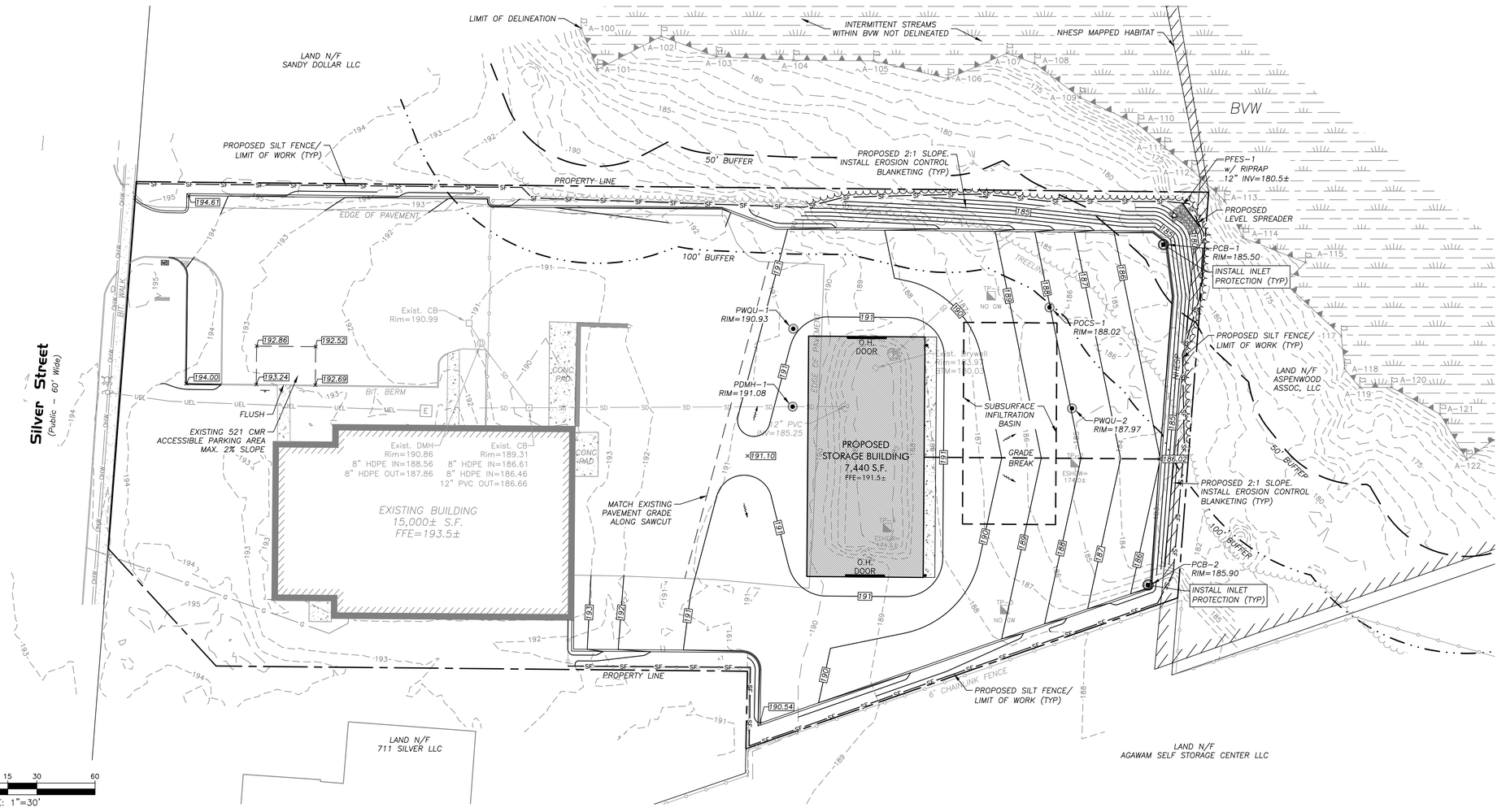
1. THE CONTRACTOR/OWNER/DEVELOPER TO BE AWARE THAT A STORMWATER POLLUTION PREVENTION PLAN (SWPPP) AND AN ILLICIT DISCHARGE COMPLIANCE STATEMENT ARE REQUIRED PRIOR TO ANY LAND DISTURBANCE.
2. UNDERGROUND UTILITIES SHOWN HEREON ARE BASED UPON SURFACE FEATURES AS LOCATED BY SURVEY AND AVAILABLE RECORD DATA AND ARE APPROXIMATE. ACTUAL FIELD LOCATIONS SHOULD BE VERIFIED WITH THE APPROPRIATE UTILITY COMPANY AND/OR MUNICIPAL DEPARTMENT PRIOR TO CONSTRUCTION.
3. CONTRACTOR TO NOTIFY DIG SAFE A MINIMUM OF 72 HOURS PRIOR TO START OF CONSTRUCTION ACCORDING TO MA GENERAL LAWS.
4. APPROVED PLANS TO BE ON SITE AT ALL TIMES.
5. CHANGES TO THIS PLAN MAY OCCUR AS UNFORESEEN CONDITIONS ARISE. ALL CHANGES TO BE APPROVED BY DESIGN ENGINEER, FIELD INSPECTOR AND CITY/TOWN ENGINEER.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND SAFETY OF TRAFFIC ON THE PUBLIC AND PRIVATE WAYS AFFECTED BY THE CONSTRUCTION OF THIS PROJECT.
7. CONTRACTOR SHALL PROTECT ALL SLOPES, VEGETATION, PAVING, WALKS, AND IMPROVEMENTS OUTSIDE THE AREAS TO BE AFFECTED BY THE CONSTRUCTION OF THIS PROJECT.
8. TREES, BRUSH AND STUMPS REMOVED BY CLEARING AND GRUBBING OPERATIONS SHALL BE TRANSPORTED OFF THE PROJECT SITE TO AN APPROVED DISPOSAL LOCATION.
9. ALL PAVEMENT MARKINGS CHANGED, ALTERED OR REMOVED SHALL BE REAPPLIED.
10. ALL CONSTRUCTION METHODS TO CONFORM TO AGAWAM PLANNING BOARD REGULATIONS AND DEPARTMENT OF PUBLIC WORKS SPECIFICATIONS.
11. AGAWAM DEPARTMENT OF PUBLIC WORKS APPROVAL IS NOT TO BE CONSTRUED AS AN ALL INCLUSIVE APPROVAL AS OTHER APPROVALS MAY BE NECESSARY, I.E. TOWN ENGINEER, CONSERVATION, FIRE DEPARTMENT, WATER DEPARTMENT, ETC.
12. EROSION CONTROL MEASURES TO BE IN PLACE PRIOR TO START OF CONSTRUCTION.

GRADING & DRAINAGE NOTES

1. SITE CONTRACTOR SHALL REFER TO REMAINING PLAN SET FOR INFORMATION REGARDING GRADING AND DRAINAGE.
2. IT SHALL BE THE SITE CONTRACTORS RESPONSIBILITY TO CROSS REFERENCE INFORMATION CONTAINED IN OTHER SHEETS WITH GRADING AND DRAINAGE INFORMATION SHOWN HEREON.
3. PRIOR TO SUBMITTING A BID FOR CONSTRUCTION, THE SITE CONTRACTOR SHALL COMMUNICATE ANY DISCREPANCIES BETWEEN THE PROPOSED DESIGN AND THE SPECIFICATIONS WITH THE PROJECT PROPONENT AND LANDSCAPE ARCHITECT/ENGINEER. SHOULD THE SITE CONTRACTOR FAIL TO COMMUNICATE ANY DISCREPANCIES, HE/SHE SHALL BE RESPONSIBLE FOR ANY COSTS RESULTING FROM SAID DISCREPANCY.
4. CONTRACTOR SHALL NOTIFY LANDSCAPE ARCHITECT/ENGINEER OF ANY UNEXPECTED CONDITIONS THAT ARE ENCOUNTERED DURING CONSTRUCTION.
5. ONCE DRAINAGE SYSTEM IS INSTALLED AND FUNCTIONING, THE OWNER/SITE CONTRACTOR SHALL COORDINATE WITH R LEVESQUE ASSOCIATES, INC. (RLA) TO CONDUCT A POST–CONSTRUCTION ANALYSIS OF THE DRAINAGE SYSTEM DURING ACTUAL STORM EVENTS TO DETERMINE THE FUNCTIONALITY OF THE INSTALLED DRAINAGE SYSTEM DURING SAID EVENTS. SHOULD THE DRAINAGE SYSTEM NOT FUNCTION AS DESIGNED UNDER REAL WORLD CONDITIONS, RLA WILL RECOMMEND ADJUSTMENTS TO THE DRAINAGE SYSTEM TO BE IMPLEMENTED BY THE OWNER/SITE CONTRACTOR.
6. ALL UTILITY CONSTRUCTION SHALL CONFORM TO THEIR RESPECTIVE CITY DEPARTMENT SPECIFICATIONS.
7. CONTRACTOR TO ACHIEVE POSITIVE DRAINAGE AWAY FROM PROPOSED BUILDINGS.

ACCESSIBILITY NOTES

1. ALL ACCESSIBLE ROUTES, TRANSITIONS, AND ACCESSIBLE PARKING/LOADING AREAS, INCLUDING ALL ENTRANCES TO BUILDING, SHALL ADHERE TO 521 CMR.
2. SHOULD THE ARCHITECT PROVIDE ADDITIONAL ENTRANCES OR MEANS OF EGRESS, ADDITIONAL ACCESSIBLE ROUTES MAY BE REQUIRED.
3. IT IS THE RESPONSIBILITY OF THE ARCHITECT AND CONTRACTOR TO NOTIFY THE ENGINEER AND LANDSCAPE ARCHITECT OF ANY CHANGES TO THE PROPOSED BUILDING THAT WOULD AFFECT THE ACCESSIBILITY REQUIREMENTS OF THE PROPOSED SITE.
4. THE CONTRACTOR SHALL REVIEW IN DETAIL THE REQUIREMENTS OF 521 CMR AND SHALL BE RESPONSIBLE FOR CONFORMANCE WITH SAID REGULATIONS.



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R LEVESQUE ASSOCIATES INC
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GRADING, EROSION & SEDIMENTATION CONTROL PLAN

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

COMMONWEALTH OF MASSACHUSETTS
ROBERT J. LEVESQUE
REGISTERED LANDSCAPE ARCHITECT
NO. 1986
3/5/26

PREPARED FOR:
MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

ISSUANCE DATE: March 5, 2026

REVISIONS:	DATE:

DRAFTED BY: M.B.

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GRADING & DRAINAGE NOTES

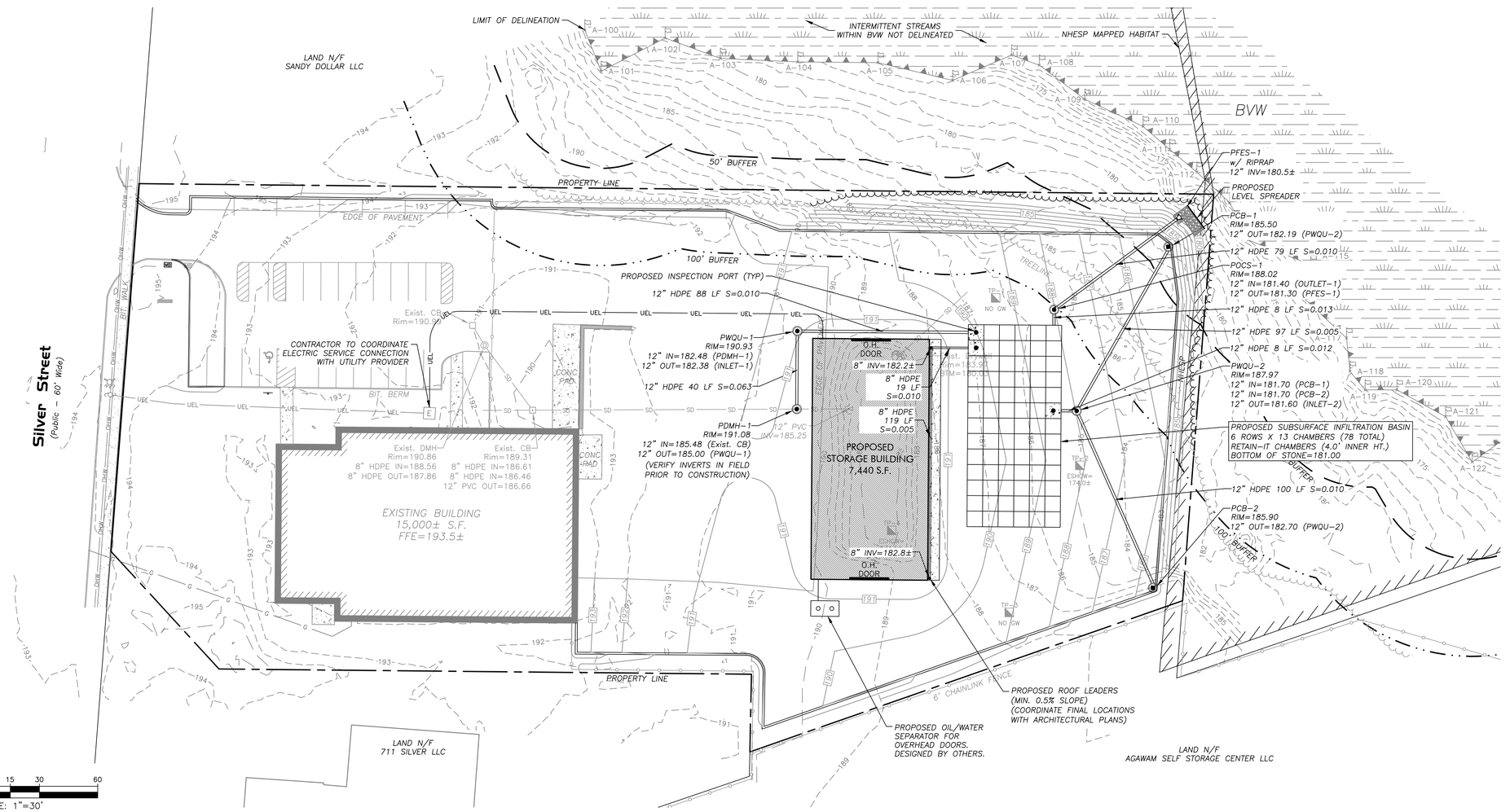
1. SITE CONTRACTOR SHALL REFER TO REMAINING PLAN SET FOR INFORMATION REGARDING GRADING AND DRAINAGE.
2. IT SHALL BE THE SITE CONTRACTOR'S RESPONSIBILITY TO CROSS REFERENCE INFORMATION CONTAINED IN OTHER SHEETS WITH GRADING AND DRAINAGE INFORMATION SHOWN HEREON.
3. PRIOR TO SUBMITTING A BID FOR CONSTRUCTION, THE SITE CONTRACTOR SHALL COMMUNICATE ANY DISCREPANCIES BETWEEN THE PROPOSED DESIGN AND THE SPECIFICATIONS WITH THE PROJECT PROPONENT AND LANDSCAPE ARCHITECT/ENGINEER. SHOULD THE SITE CONTRACTOR FAIL TO COMMUNICATE ANY DISCREPANCIES, HE/SHE SHALL BE RESPONSIBLE FOR ANY COSTS RESULTING FROM SAID DISCREPANCY.
4. CONTRACTOR SHALL NOTIFY DESIGNER/ENGINEER OF ANY UNEXPECTED CONDITIONS THAT ARE ENCOUNTERED DURING CONSTRUCTION.
5. ONCE DRAINAGE SYSTEM IS INSTALLED AND FUNCTIONING, THE OWNER/SITE CONTRACTOR SHALL COORDINATE WITH R LEVESQUE ASSOCIATES, INC. (RLA) TO CONDUCT A POST-CONSTRUCTION ANALYSIS OF THE DRAINAGE SYSTEM DURING ACTUAL STORM EVENTS TO DETERMINE THE FUNCTIONALITY OF THE INSTALLED DRAINAGE SYSTEM DURING SAID EVENTS. SHOULD THE DRAINAGE SYSTEM NOT FUNCTION AS DESIGNED UNDER REAL WORLD CONDITIONS, RLA WILL RECOMMEND ADJUSTMENTS TO THE DRAINAGE SYSTEM TO BE IMPLEMENTED BY THE OWNER/SITE CONTRACTOR.
6. ALL UTILITY CONSTRUCTION SHALL CONFORM TO THEIR RESPECTIVE AGAWAM DEPARTMENT SPECIFICATIONS.
7. ALL FILL MATERIAL DISCOVERED UNDER INFILTRATION SITES SHALL BE REMOVED AND PROPERLY DISPOSED OF PRIOR TO INSTALLATION OF INFILTRATION STRUCTURE.
8. A LICENSED SOIL EVALUATOR AND/OR PROFESSIONAL ENGINEER MUST BE PRESENT DURING GRADING AND CONSTRUCTION OF THE SUBSURFACE INFILTRATION SYSTEM TO ENSURE NATIVE OR SIMILAR SOILS UNDERLAY THE STRUCTURES.

CONSTRUCTION NOTES

1. UNDERGROUND UTILITIES SHOWN HEREON ARE BASED UPON SURFACE FEATURES AS LOCATED BY SURVEY AND AVAILABLE RECORD DATA AND ARE APPROXIMATE. ACTUAL FIELD LOCATIONS SHOULD BE VERIFIED WITH THE APPROPRIATE UTILITY COMPANY AND/OR MUNICIPAL DEPARTMENT PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO NOTIFY DIG SAFE A MINIMUM OF 72 HOURS PRIOR TO START OF CONSTRUCTION ACCORDING TO MA GENERAL LAWS.
3. APPROVED PLANS TO BE ON SITE AT ALL TIMES.
4. CHANGES TO THIS PLAN MAY OCCUR AS UNFORESEEN CONDITIONS ARISE. ALL CHANGES TO BE APPROVED BY DESIGN ENGINEER, FIELD INSPECTOR AND CITY/TOWN ENGINEER.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND SAFETY OF TRAFFIC ON THE PUBLIC AND PRIVATE WAYS AFFECTED BY THE CONSTRUCTION OF THIS PROJECT.
6. CONTRACTOR SHALL PROTECT ALL SLOPES, VEGETATION, PAVING, WALKS, AND IMPROVEMENTS OUTSIDE THE AREAS TO BE AFFECTED BY THE CONSTRUCTION OF THIS PROJECT.
7. TREES, BRUSH AND STUMPS REMOVED BY CLEARING AND GRUBBING OPERATIONS SHALL BE TRANSPORTED OFF THE PROJECT SITE TO AN APPROVED DISPOSAL LOCATION.
8. CALCIUM CHLORIDE/WATER FOR DUST CONTROL TO BE AVAILABLE AT ALL TIMES.
9. ALL PAVEMENT MARKINGS CHANGED, ALTERED OR REMOVED SHALL BE REAPPLIED.
10. ALL CONSTRUCTION METHODS TO CONFORM TO AGAWAM PLANNING BOARD REGULATIONS AND BOARD OF PUBLIC WORKS SPECIFICATIONS.
11. AGAWAM DEPARTMENT OF PUBLIC WORKS APPROVAL IS NOT TO BE CONSTRUED AS AN ALL INCLUSIVE APPROVAL AS OTHER APPROVALS MAY BE NECESSARY, I.E. TOWN ENGINEER, CONSERVATION, FIRE DEPARTMENT, WATER DEPARTMENT, ETC.
12. ALL CATCH BASINS TO HAVE 48" SEALED SUMPS AND HOODS.
13. EROSION CONTROL MEASURES TO BE IN PLACE PRIOR TO START OF CONSTRUCTION.

UTILITY NOTES

1. SITE CONTRACTOR SHALL REFER TO REMAINING PLAN SET FOR INFORMATION REGARDING GRADING AND DRAINAGE.
2. IT SHALL BE THE SITE CONTRACTORS RESPONSIBILITY TO CROSS REFERENCE INFORMATION CONTAINED IN OTHER SHEETS WITH GRADING AND DRAINAGE INFORMATION SHOWN HEREON.
3. PRIOR TO SUBMITTING A BID FOR CONSTRUCTION, THE SITE CONTRACTOR SHALL COMMUNICATE ANY DISCREPANCIES BETWEEN THE PROPOSED DESIGN AND THE SPECIFICATIONS WITH THE PROJECT PROPONENT AND LANDSCAPE ARCHITECT/ENGINEER. SHOULD THE SITE CONTRACTOR FAIL TO COMMUNICATE ANY DISCREPANCIES, HE/SHE SHALL BE RESPONSIBLE FOR ANY COSTS RESULTING FROM SAID DISCREPANCY.
4. CONTRACTOR TO VERIFY ALL UTILITY CONNECTIONS AND INVERTS FROM EXISTING/PROPOSED BUILDING TO SERVICES IN THE STREET. IF ANY DISCREPANCIES EXISTS BETWEEN PLAN AND INFORMATION FOUND IN THE FIELD, CONTACT ENGINEER AND LANDSCAPE ARCHITECT IMMEDIATELY.
5. SEE ARCHITECTURAL PLANS FOR BUILDING CONNECTIONS OF ALL UTILITIES.
6. UTILITY CONNECTIONS (NATURAL GAS, ELECTRICAL, TELECOMMUNICATIONS, ETC) SHOWN HEREON ARE SCHEMATIC IN NATURE TO DEPICT CONNECTION OF SAID UTILITIES TO THE SUBJECT BUILDING(S). THE RESPECTIVE UTILITY PROVIDER SHALL BE RESPONSIBLE FOR THE FINAL DESIGN OF THE RELEVANT UTILITY.
7. ONCE DRAINAGE SYSTEM IS INSTALLED AND FUNCTIONING, THE OWNER/SITE CONTRACTOR SHALL COORDINATE WITH R LEVESQUE ASSOCIATES, INC. (RLA) TO CONDUCT A POST-CONSTRUCTION ANALYSIS OF THE DRAINAGE SYSTEM DURING ACTUAL STORM EVENTS TO DETERMINE THE FUNCTIONALITY OF THE INSTALLED DRAINAGE SYSTEM DURING SAID EVENTS. SHOULD THE DRAINAGE SYSTEM NOT FUNCTION AS DESIGNED UNDER REAL WORLD CONDITIONS, RLA WILL RECOMMEND ADJUSTMENTS TO THE DRAINAGE SYSTEM TO BE IMPLEMENTED BY THE OWNER/SITE CONTRACTOR.
8. ALL UTILITY CONSTRUCTION SHALL CONFORM TO THEIR RESPECTIVE TOWN DEPARTMENT SPECIFICATIONS.



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Landscape Architects
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Westfield, MA 01085
rlaland.com

DRAINAGE & UTILITIES PLAN

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

COMMONWEALTH OF MASSACHUSETTS
FILIPE J. CRAVO
CIVIL
NO. 46576
PROFESSIONAL ENGINEER
3/5/26

PREPARED FOR:
MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

ISSUANCE DATE: March 5, 2026

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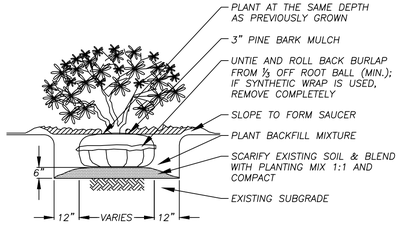
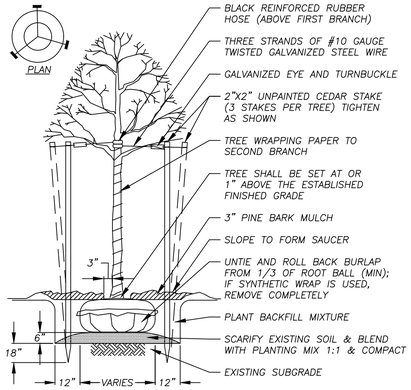


SHRUB PLANTING DETAIL

NO SCALE



TREE PLANTING DETAIL

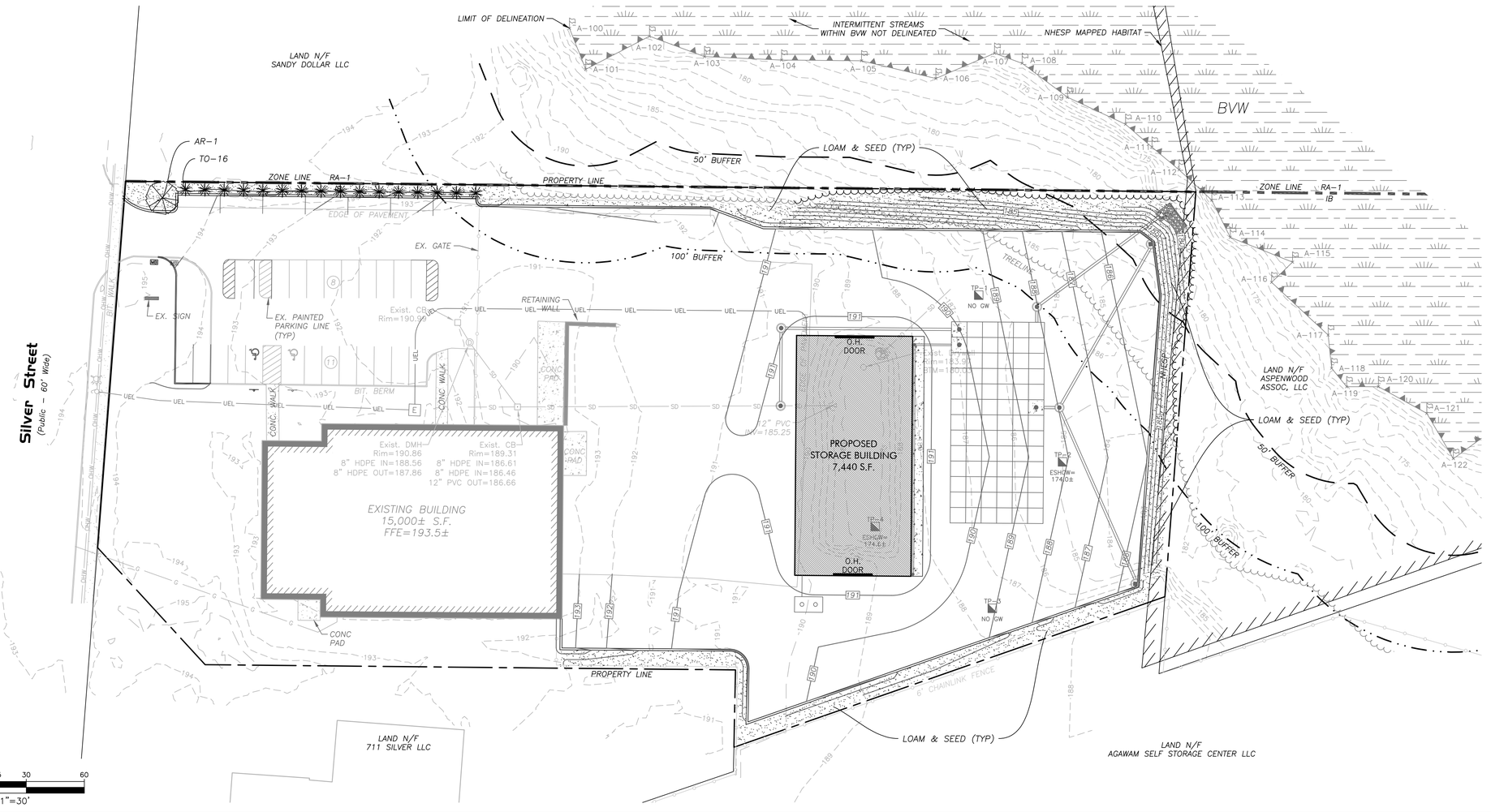
NO SCALE

PLANT LIST				
KEY	QTY.	BOTANICAL NAME	COMMON NAME	SIZE/SPACING
TO	16	THUJA OCCIDENTALIS	AMERICAN ARBORVITAE	2–3' HT.
AR	1	ACER RUBRUM	RED MAPLE	2.5–3" CAL.
	–	LAWN AREA (MIN. 4" LOAM & SEED)		RATE PER SUPPLIER REC.
	–	PERENNIAL PLANTING BED*		MAX. 3' O.C.

* PERENNIAL PLANTING BEDS MAY TYPICALLY INCLUDE NATIVE AND NON–INVASIVE VARIETIES SUCH AS VERNONIA NOVEBORACENSIS, PHLOX PANICULATA, ACHILLEA MILLEFOLIUM, ASTILBE VAR., HEUCHERA VAR., SAPONARIA OCYMOIDES, VERONICASTRUM VIRGINICUM ALBUM, RUDBECKIA HIRTA, AND ORNAMENTAL NON–SPREADING GRASSES. ANNUAL PLANTINGS MAY BE CHOSEN TO PROVIDE ADDITIONAL SEASONAL INTEREST.

LANDSCAPE NOTES

1. SITE CONTRACTOR SHALL REFER TO SHEET C–1, C–2, DETAIL SHEETS AND REMAINING PLAN SET FOR INFORMATION REGARDING LANDSCAPING.
2. IT SHALL BE THE SITE CONTRACTOR'S RESPONSIBILITY TO CROSS–REFERENCE INFORMATION CONTAINED IN OTHER SHEETS WITH THE LANDSCAPE INFORMATION SHOWN HEREON.
3. ALL SITE PLANTINGS ARE TO MEET OR EXCEED THE MINIMUM SPECIFICATIONS DETAILED IN THE AFOREMENTIONED NOTES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REVIEW THE SPECIFICATIONS FOR EACH INDIVIDUAL PLANTING AND SOURCE IT APPROPRIATELY.
4. PRIOR TO SUBMITTING THEIR BID FOR CONSTRUCTION, THE SITE CONTRACTOR SHALL COMMUNICATE ANY DISCREPANCIES BETWEEN THE PROPOSED DESIGN AND SAID SPECIFICATIONS WITH THE PROJECT PROPONENT, LANDSCAPE ARCHITECT/ENGINEER. SHOULD THE SITE CONTRACTOR FAIL TO COMMUNICATE ANY DISCREPANCIES, HE/SHE SHALL BE RESPONSIBLE FOR ANY COSTS RESULTING FROM SAID DISCREPANCY.
5. LANDSCAPE CONTRACTOR SHALL HAVE EXCAVATING CONTRACTOR, "DIGSAFE", AND ANY APPLICABLE NON–[DIGSAFE] MEMBER UTILITIES MARK ALL UNDERGROUND UTILITIES AND PRIOR TO ANY PLANTING. LANDSCAPE CONTRACTOR SHALL NOTIFY LANDSCAPE ARCHITECT AND PROJECT PROPONENT IF ANY CONFLICTS ARISE AND STOP ALL WORK UNTIL CONFLICT IS RESOLVED.



PERMITTING

NOT FOR CONSTRUCTION

RLA

R LEVESQUE ASSOCIATES INC

Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants

ph: 413.568.0985 fax: 413.568.0986

40 School Street
Westfield, MA 01085

rlaland.com

SITE LANDSCAPING PLAN

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

MASSACHUSETTS REGISTERED LANDSCAPE ARCHITECT ROBERT A. LEVESQUE NO. 1395 REGISTERED LANDSCAPE ARCHITECT 3/5/26

PREPARED FOR:

MSR Properties, LLC
c/o Rick Mahan

699 Silver Street
Agawam, MA 01001

ISSUANCE DATE: March 5, 2026

REVISIONS:	DATE:

DRAFTED BY: M.B.

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SCALE: As Noted

RLA PROJ. NUMBER: 250903

DRAWING#	REV.
C-7	-

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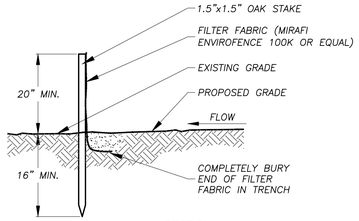
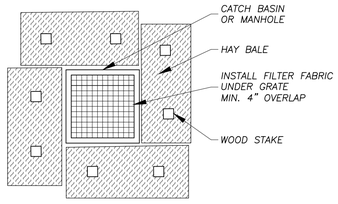


SECTION

SILT FENCE DETAIL

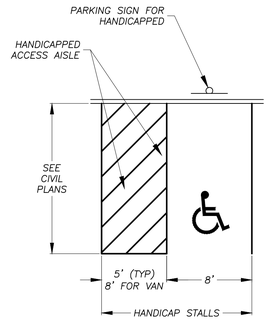
NO SCALE



NOTE
INSTALL BARRIER AT EACH CATCH BASIN AND DRAINAGE BASIN. CATCH BASINS IN PAVEMENT AREAS ARE TO RECEIVE ONLY THE FILTER FABRIC TREATMENT.

INLET PROTECTION - HAY BALES

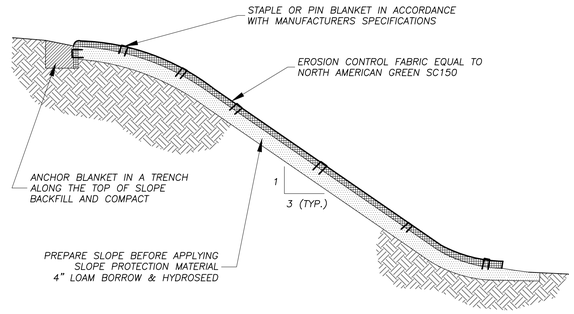
NO SCALE



NOTES:
1. ALL DIMENSIONS TO CENTER OF 4" PAVEMENT STRIPING.
2. ALL STRIPING SHALL BE 4" SOLID WHITE PAVEMENT MARKING PAINT UNLESS OTHERWISE NOTED.
3. CONTRACTOR TO ENSURE HANDICAP ACCESSIBLE PARKING SPACE SHALL HAVE A SLOPE OF 2% OR LESS IN ALL DIRECTIONS.
4. SEE AAB 521 CMR 23.00 FOR REQUIRED NUMBER AND PROPORTION OF VAN ACCESSIBLE SPACES.

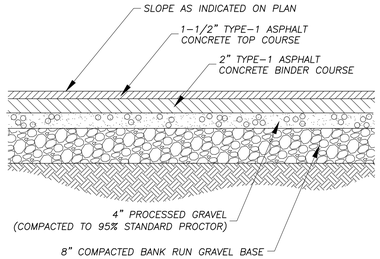
HANDICAP PARKING STALL

NO SCALE



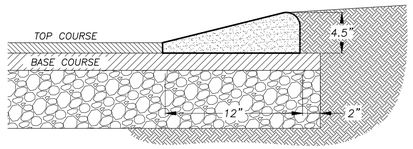
SLOPE PROTECTION MATERIAL INSTALLATION (AS REQ'D)

NO SCALE



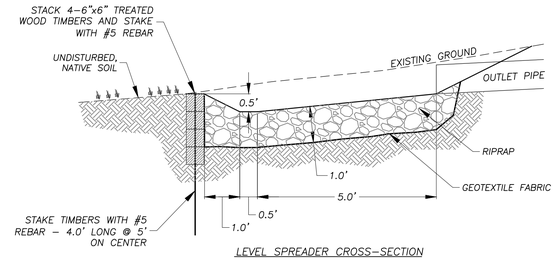
BITUMINOUS CONCRETE PAVING DETAIL

NO SCALE

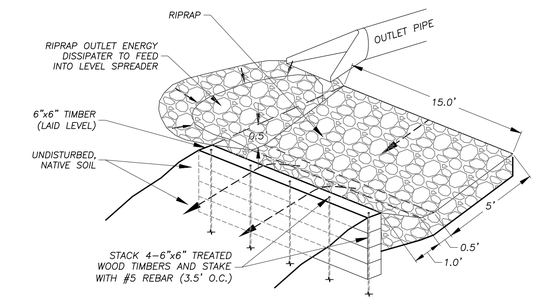


BITUMINOUS CONCRETE BERM (CAPE COD)

NO SCALE



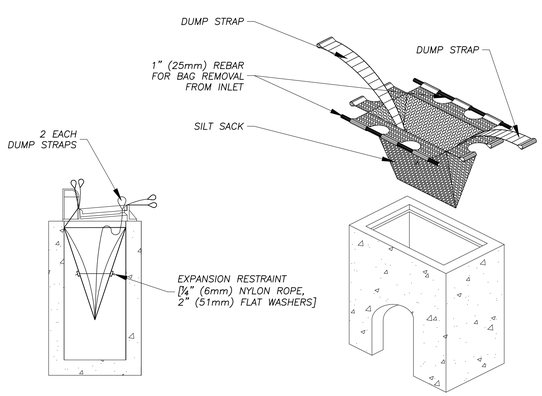
LEVEL SPREADER CROSS-SECTION



NOTES
1.) LEVEL SPREADER SHALL BE INSTALLED WITH A LEVEL INSTRUMENT. CONSTRUCT LEVEL UP TO 0% GRADE TO ENSURE UNIFORM SHEET FLOW. LEVEL SPREADER SHALL BE CONSTRUCTED ON UNDISTURBED SOIL.
2.) CONSTRUCTION OF LEVEL SPREADER SHALL BE FROM UPHILL SIDE ONLY. LEVEL LIP AND AREA BELOW SPREADER SHALL BE AT EXISTING GRADES AND UNDISTURBED BY EARTHWORK OR EQUIPMENT.
3.) CONSTRUCT SPREADER WITH LIP AT EXISTING GRADE AS SPECIFIED.
4.) DOWNGRADIENT RECEIVING AREA MUST BE NATURALLY WELL VEGETATED.

LEVEL SPREADER DETAIL

NO SCALE



INLET PROTECTION - SEDIMENT FILTER SACK

NO SCALE

PERMITTING
NOT FOR CONSTRUCTION

RLA
R LEVESQUE ASSOCIATES INC
Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants
ph: 413.568.0985 fax: 413.568.0986
40 School Street
Westfield, MA 01085
rlaland.com

DETAILS

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

REGISTERED LANDSCAPE ARCHITECT
ROBERT J. LEVESQUE
NO. 1395
COMMONWEALTH OF MASSACHUSETTS
3/5/26

PREPARED FOR:
MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

ISSUANCE DATE: March 5, 2026

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DRAFTED BY: M.B.

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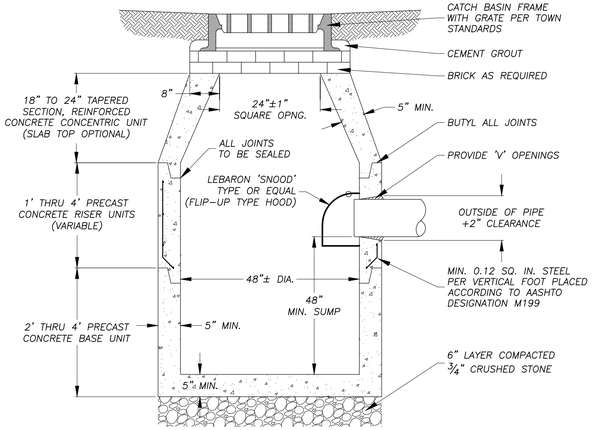
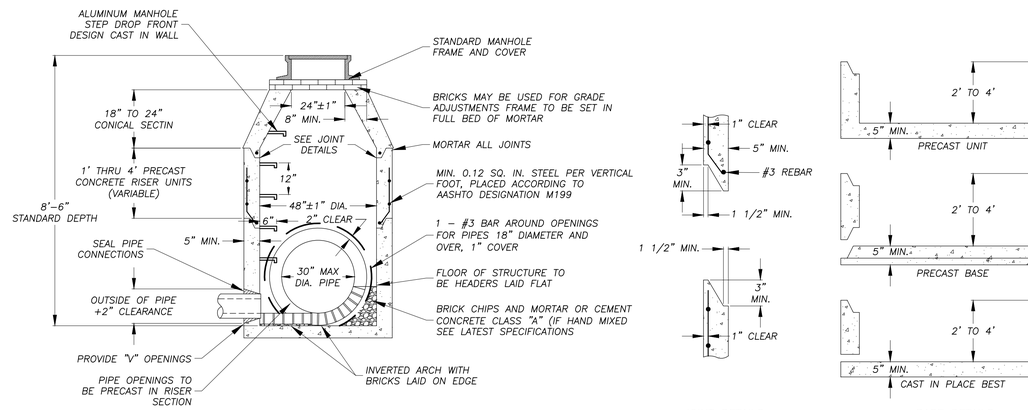


STANDARD PRECAST CONCRETE CATCH BASIN

NO SCALE

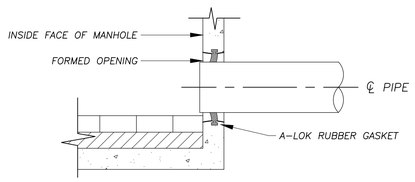


JOINT DETAILS

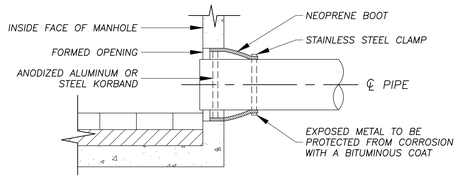
BASE DETAILS

PRECAST CONCRETE MANHOLE

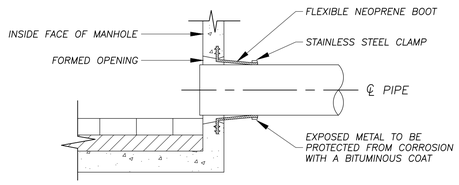
NO SCALE



A-LOK SYSTEM



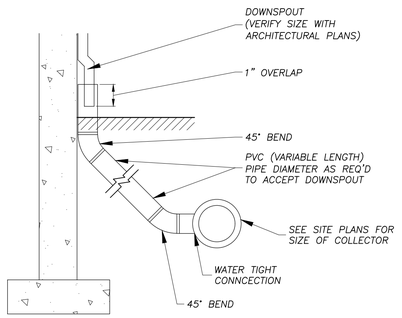
KOR-N-SEAL BOOT



FLEXIBLE SLEEVE

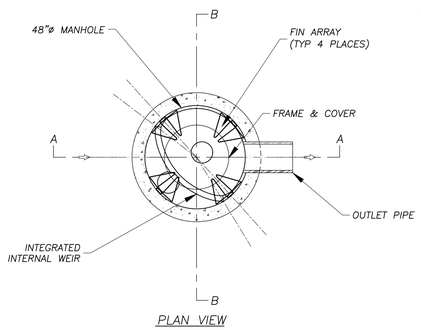
PIPE CONNECTION DETAILS

NO SCALE

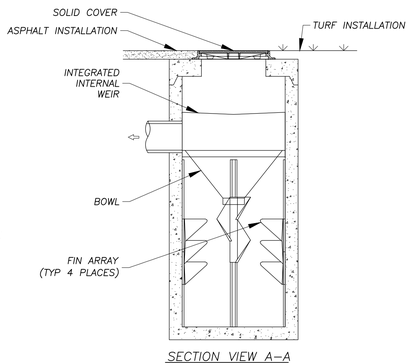


DOWNSPOUT COLLECTOR DETAIL

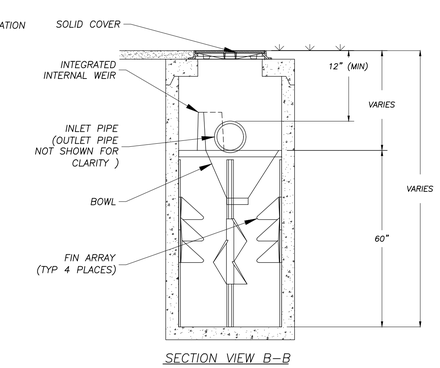
NO SCALE



PLAN VIEW



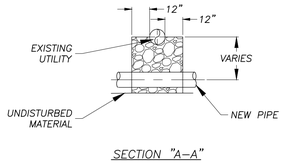
SECTION VIEW A-A



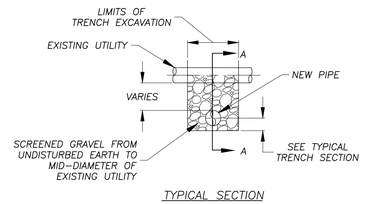
SECTION VIEW B-B

WATER QUALITY UNIT - BARRACUDA MAX S4

NO SCALE



SECTION "A-A"



TYPICAL SECTION

UTILITY CROSSING DETAIL

NO SCALE

PERMITTING
NOT FOR CONSTRUCTION

RLA
R LEVESQUE ASSOCIATES INC
Landscape Architects
Civil Engineers · Land Surveyors
Environmental Consultants
ph: 413.568.0985 fax: 413.568.0986
40 School Street
Westfield, MA 01085
rlaland.com

DETAILS

699 Silver Street
Agawam, MA
Parcel ID: G6-2-12

COMMONWEALTH OF MASSACHUSETTS
FILIPE J. CRAVO
CIVIL
NO. 46376
REGISTERED PROFESSIONAL ENGINEER
3/5/26

PREPARED FOR:

MSR Properties, LLC
c/o Rick Mahan
699 Silver Street
Agawam, MA 01001

ISSUANCE DATE: March 5, 2026

REVISIONS:	DATE:

DRAFTED BY: M.B.

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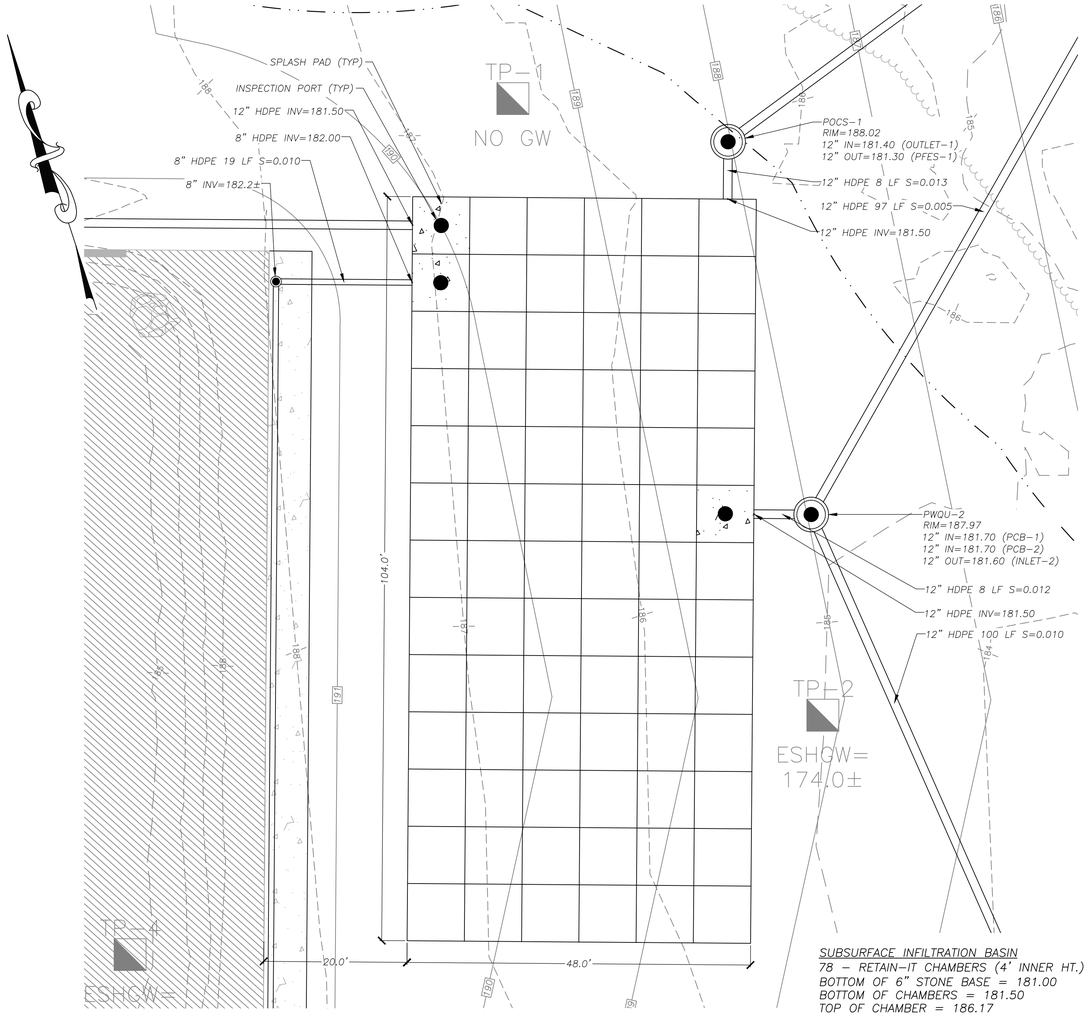


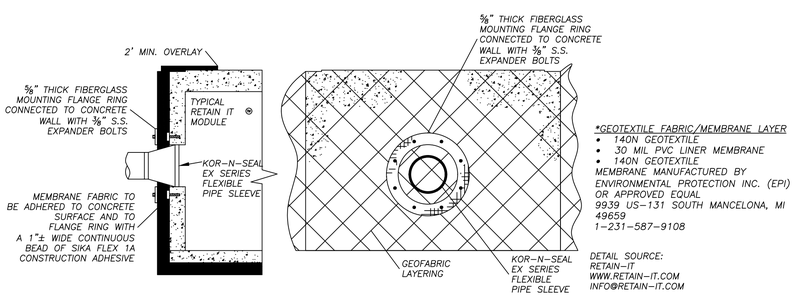
SUBSURFACE INFILTRATION BASIN
78 – RETAIN-IT CHAMBERS (4' INNER HT.)
BOTTOM OF 6" STONE BASE = 181.00
BOTTOM OF CHAMBERS = 181.50
TOP OF CHAMBER = 186.17

SUBSURFACE INFILTRATION BASIN DETAIL

1" = 10'

10 0 5 10 20

1" = 10'



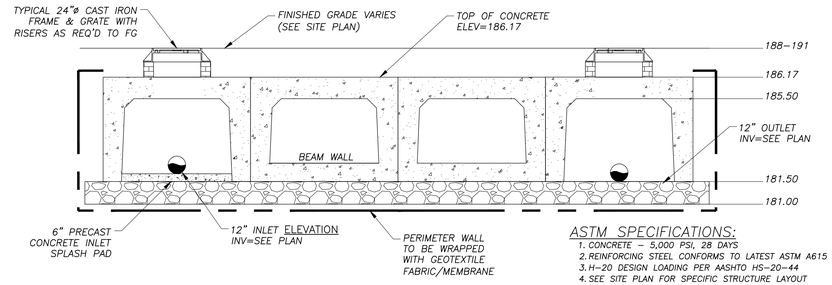
*GEOTEXTILE FABRIC/MEMBRANE LAYER
- 140N GEOTEXTILE
- 30 MIL PVC LINER MEMBRANE
- 140N GEOTEXTILE

MEMBRANE MANUFACTURED BY ENVIRONMENTAL PROTECTION INC. (EPI) OR APPROVED EQUAL
9939 US-131 SOUTH MANCELONA, MI 49659
1-231-587-9108

DETAIL SOURCE:
RETAIN-IT
WWW.RETAIN-IT.COM
INFO@RETAIN-IT.COM

WATERTIGHT PIPE CONNECTION DETAIL

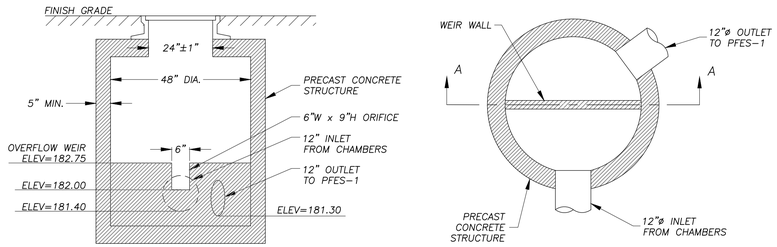
NO SCALE



ASTM SPECIFICATIONS:
1. CONCRETE – 5,000 PSI, 28 DAYS
2. REINFORCING STEEL CONFORMS TO LATEST ASTM A615
3. H-20 DESIGN LOADING PER AASHTO HS-20-44
4. SEE SITE PLAN FOR SPECIFIC STRUCTURE LAYOUT

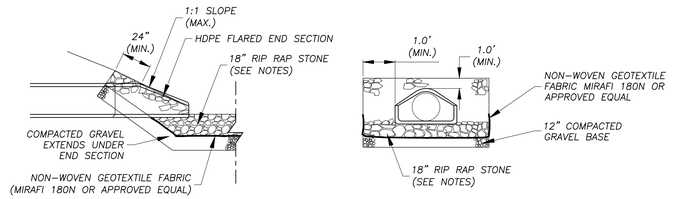
RETAIN-IT PRECAST CONCRETE STORMWATER MANAGEMENT SYSTEM

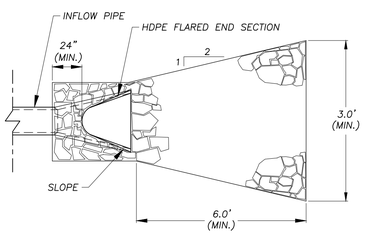
NO SCALE



OUTLET CONTROL STRUCTURE (POCS-1)

NO SCALE





NOTES
1. FLARED END SECTION PIPE JOINT SHALL BE SIMILAR TO THE MAIN RUN OF PIPE JOINTS
2. STONE RIPRAP SHALL NOT BE LESS THAN 50 POUNDS NOR MORE THAN 125 POUNDS AND AT LEAST 75% OF THE VOLUME SHALL BE AT LEAST 75 POUNDS

STANDARD RIP RAP PIPE OUTLET

NO SCALE

PERMITTING
NOT FOR CONSTRUCTION

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Landscape Architects
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REGISTERED PROFESSIONAL ENGINEER
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PREPARED FOR:

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D-3	-

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MEMBERS PRESENT:
Frank DeStefano – Vice Chair
Charles Elfman
Michael Cleavall
Michael DiLullo

MEMBERS ABSENT:
Vi Baldwin – Chair

ALSO PRESENT:
Taryn Egerton

Mr. DeStefano called the meeting to order at 6:00pm.

1. 6:00PM PUBLIC HEARING – DEFINITIVE PLAN – Old River Street, 27 Walnut Street, & 17 High Street – Calabrese Construction, LLC

Filipe Cravo, R. Levesque Associates, and Charles Calabrese, Calabrese Construction, LLC were present to discuss this application. Mr. Cravo stated they are proposing a subdivision on Old River Street, which is a paper street that was once longer but has since been discontinued. He explained that this property was granted a zone change from Industrial A to Residence B. Mr. Cravo stated existing conditions consist of a gravel road that leads to a flat vegetated area, which ultimately grades down to the Connecticut River. The boundaries of resource areas were confirmed by the Conservation Commission and Mr. Cravo stated the project would be outside their jurisdiction. He explained that there are five lots in total, two existing and three additional lots. The applicant submitted a swept path analysis that was approved by the Fire Department and the Board also received memos from both the Building Department and Health Department that they had no concerns. Mr. Cravo stated that the Town Engineering Department comments would be addressed. He stated that stormwater would be contained onsite and mitigated for, and that there will be a subsurface system beneath the cul-de-sac. Mr. Cleavall asked about the surrounding lots and Mr. Cravo stated they are multifamily homes. Mr. Elfman asked for clarification on the stormwater management system. Mr. Cravo stated there are no stormwater controls existing, so the water sheet flows offsite. Once constructed, the cul-de-sac would have catch basins collecting water which will be treated through a water quality unit and then discharged through the outlet. Mr. Elfman asked who maintains the stormwater system and Mr. Cravo stated once the street is accepted it would be maintained by the Town. Prior to that, maintenance is the responsibility of the developer. Ms. Egerton explained that the width of Walnut Street needed to be shown on the plans and the Board should be given a copy of approximate sale prices and square footages of the proposed dwellings. Mr. Cravo stated they are requesting four waivers. They are requesting sidewalks on one side of the roadway rather than both, as the cul-de-sac is small and there are currently no sidewalks on that side of Walnut Street. Mr. Elfman asked if sidewalks could physically be put in if the waiver was not granted and Mr. Cravo stated yes. Mr. DeStefano asked the distance they are requesting not to put sidewalks and Mr. Cravo stated about 150’. The second request is to have the curb return be a 15’ radius instead of the required 25’ radius due to a conflict with a utility pole on Walnut Street. The third waiver is for the sanitary sewer main to be 6” instead of the required 8” since the existing main all have

6" pipes connecting to it. This would prevent the developer from having to extend work into Walnut Street. The final waiver is that the storm drain lines be HDPE, which is industry standard.

Mr. DeStefano then opened the meeting up to the public.

Vincent Maynard, 45 High Street, stated he's lived in the area a long time and that Mr. Calabrese constructs excellent developments and increases the surrounding property values.

Mr. Cravo then requested a continuance to the next Planning Board meeting.

Motion was made by Mr. Cleavall and seconded by Mr. DiLullo to continue the Public Hearing for the Definitive Plan on Old River Street, 27 Walnut Street, & 17 High Street – Calabrese Construction, LLC to the March 19, 2026 meeting, as requested.

VOTE 4 – 0

2. 6:10PM PUBLIC HEARING – ZONE CHANGE – 515 & 533 Mill Street – Dikan & Ashlaban

Filipe Cravo, R. Levesque Associates, was in attendance to present this zone change request. Mr. Cravo explained that this portion of Franklin Street Extension is a paper street that intersects with Mill Street. The lots are currently zoned Business B and Agricultural and the applicant is requesting the zone be changed to Residence A-2. Mr. Cravo explained that Business B no longer allows for residential development. He explained that the Agricultural District has a lot size requirement of 20,000 square feet while Residential A-2 is 15,000 square feet. Mr. Elfman asked about future development and Mr. Cravo stated they are planning on constructing a cul-de-sac for a maximum of 12 single family dwellings. Mr. Cleavall asked if the right of way was existing and Mr. Cravo confirmed.

Mr. DeStefano opened the meeting up to the public and there were no comments. He explained that the Board's role is to provide a recommendation to the City Council, who then makes the decision whether to grant the zone change.

Motion was made by Mr. DiLullo and seconded by Mr. Cleavall to send a positive recommendation to the City Council for the requested Zone Change on 515 & 533 Mill Street for Dikan & Ashlaban

VOTE 4 – 0

3. SITE PLAN – 769 Silver Street – Agawam Energy Center, LLC

Adam Duchesneau, BSC Group, Melissa Kaplan, BSC Group, Tom Henaghen, SME, and Tim Harris, Fire-Risk Alliance, were all present to discuss this application.

Mr. Henaghen presented the changes to the plans and explained how professional staff comments were addressed. He stated that the two existing buildings that will remain will maintain water, sewer, and power to those buildings. A note was added to the plans to ensure there are no conflicts with these existing utilities and to assess the conditions of the utilities in the existing easement prior to construction. He explained that standard Town details have been added to the plans as requested by the Town Engineering Department. Mr. Henaghen stated that erosion controls have been added to the plans and that they will be maintained and inspected during construction. He anticipates a second set of erosion controls will be installed to satisfy Natural Heritage requirements for the endangered species on site. He stated that a handicap accessible parking space has been added to the plans and the Town specific detail and striping will be added in the next plan revision. Mr. Henaghen explained there were changes to the stormwater management system, including adding stone to the top of the basin and at the lip so it doesn't cover the entirety of the basin, adding one foot of freeboard during a 100 year storm by raising the elevation of the perimeter of the basin, and submitting an Operation, Inspection, and Maintenance plan which included a general schedule for BMPs. He explained that they did an analysis of the basin and confirmed it would drain in approximately 48 hours. He stated other changes included adding a trash rack on the outlet pipe, which also will be needed for Natural Heritage. The building inspector, fire chief, and safety officer do not have any comments at this time. Ms. Egerton asked about snow removal. Mr. Henaghen stated there are snow storage areas on site. Mr. DeStefano asked if a large snow storm could affect the unit and Mr. Henaghen stated it could affect operations and extra measures would need to be taken.

Mr. Henaghen requested a continuance to the next Planning Board meeting.

Motion was made by Mr. Cleavall and seconded by Mr. Elfman to continue the review for the Site Plan at 769 Silver Street – Agawam Energy Center LLC to the March 19, 2026 meeting as requested.

VOTE 4 – 0

4. FORM A – 544 Mill Street – RLS Realty Holdings

Dan O'Brien, Smith Associate Surveyors, was present to present this ANR plan. He explained they are proposing adding a 5 ft by 900 ft strip from 544 Mill Street to a lot on Franklin Street to bring the lot size into conformance. Mr. O'Brien stated a zoning map from the 1960's has this area zoned Residence A-2 and it is now zoned Agricultural. Mr. Elfman asked if the property owner owned other properties in the area. Mr. O'Brien stated he had conveyed some property to neighboring parcels previously. There is 125' of frontage on Franklin Street. The Engineering Department and Building Inspector did not have any comments on this plan.

Motion was made by Mr. Elfman and seconded by Mr. DiLullo to accept the ANR Plan for 544 Mill Street – RLS Realty Holdings under Subdivision Control Law not Required.

VOTE 4 – 0

Mr. Elfman stepped out of the meeting at 7:05pm

5. APPROVAL OF MINUTES February 5, 2026 & February 19, 2026

Motion was made by Mr. Cleavall and seconded by Mr. DiLullo to approve the February 5, 2026 as written.

VOTE 2 – 0 – 1 (DeStefano)

Mr. Elfman returned to the meeting at 7:06pm

Motion was made by Mr. Cleavall and seconded by Mr. Elfman to approve the February 19, 2026 minutes as written.

VOTE 3 – 0 – 1 (DiLullo)

6. Correspondences

Motion was made by Mr. Elfman and seconded by Mr. Cleavall to adjourn the meeting.

VOTE 4 – 0

Meeting adjourned at 7:05pm.

DRAFT