



## **Planning Board AGENDA**

Thursday, June 5, 2025 - 6:00 PM

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

### A. Planning Board Meeting

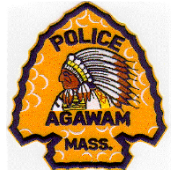
- 1) SITE PLAN – 404 Silver Street – Silver Street Energy Storage, LLC c/o New Leaf Energy
- 2) SITE PLAN – 824 Suffield Street – CKT Partnership, LLC
- 3) SITE PLAN – 223 Garden Street – MBNZ Holding Co
- 4) FORM A – 643 Mill Street – Richard
- 5) Request to Extend Performance Agreement – Samuel Street
- 6) **Sign Plan – 6 & 24 Ace Precision Way – TGE Realty, LLC**
- 7) APPROVAL OF MINUTES May 15, 2025
- 8) Correspondences



# AGAWAM POLICE DEPARTMENT

681 Springfield Street, Feeding Hills, MA 01030  
Telephone (413)786-4767 | FAX (413)786-4821

Eric P. Gillis  
*Chief of Police*



**To:** Planning Board  
**From:** Sergeant Brian Machos- Safety Officer  
**Date:** October 8, 2024  
**Re:** 404 Silver Street

I do not have any issues with the proposed battery storage facility at the rear of the property at 404 Silver Street.





westonandsampson.com

55 Walkers Brook Drive, Suite 100  
Reading, MA 01867  
tel: 978.532.1900

## Site Plan Review Application

May 2025

**AGAWAM ENERGY STORAGE SYSTEM  
DEVELOPMENT**

**404 SILVER STREET, AGAWAM, MA**

**PREPARED FOR: SILVER STREET ENERGY STORAGE, LLC  
C/O NEW LEAF ENERGY, INC.**

**SUBMITTED TO: TOWN OF AGAWAM PLANNING BOARD**

May 16, 2025

Taryn Egerton  
Planning Director & Conservation Agent  
Town of Agawam  
36 Main Street  
Agawam, MA 01001

Re: **Site Plan Review Application**  
**Agawam Battery Energy Storage Development**  
**404 Silver Street, Agawam, MA 01001**

Dear Ms. Egerton:

Weston & Sampson Engineers, Inc. (Weston & Sampson) is submitting this package which includes a Site Plan Review Application, and related appendices to be filed with the Town of Agawam Planning Board for the above-mentioned project on behalf of Silver Street Energy Storage, LLC, c/o New Leaf Energy, Inc. (the Applicant). The Applicant proposes to develop the project, an approximately 5 megawatt (MW), 20 megawatt hour (MWh) battery energy storage system (BESS) at the site located at 404 Silver Street (Map H8, Block 3, Lot 37).

The project will consist of battery containers, transformers, inverters, and associated equipment pads. The electrical equipment will be surrounded by a combination of 8 ft tall chain link fence and 10 ft sound barrier wall as detailed in the attached site plans. The BESS equipment will connect to an existing utility pole on Silver Street via underground conduit and proposed pole mounted interconnection equipment. This application package includes the following attachments:

- Appendix A – Site Plan Form D and Project Narrative
- Appendix B – Previous Approvals
- Appendix C – Site Plans
- Appendix D – Operations and Maintenance Manual
- Appendix E – Decommissioning Plan
- Appendix F – Liability Insurance Documents
- Appendix G – Equipment Specifications
- Appendix H – BESS Testing Data
- Appendix I – Fire Safety Compliance Plan
- Appendix J – Emergency Operations Plan
- Appendix K – Stormwater Report

If you have any further questions or require any additional information, please feel free to contact me by phone at (978) 532-1900 or by email at [costello.melinda@wseinc.com](mailto:costello.melinda@wseinc.com).

Sincerely,  
WESTON & SAMPSON ENGINEERS, INC.



Melinda Costello, P.E.  
Project Manager

cc: William Peregoy, Civil Project Engineer II, Silver Street Energy Storage, LLC, c/o New Leaf Energy, Inc.

Appendix A – Site Plan Form D and Project Narrative

# 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](mailto: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

May 16, 2025

1. Name of Business Silver Street Energy Storage, LLC c/o New Leaf Energy, Inc. (Applicant)

Address 55 Technology Drive #102, Lowell, MA 01851

Phone # (978) 995-3054

email wperegoy@newleafenergy.com

2. Name of Applicant/Owner Robert and Deborah Pelley

Address 404 Silver Street, Agawam, MA 01001

Phone # (413) 530-6102

email \_\_\_\_\_

3. Name of Engineer/Architect Weston & Sampson Engineers, Inc.

Address 55 Walkers Brook Drive, Suite 100

Phone # (978) 532-1900

email costello.melinda@wseinc.com

4. Please give a brief description of the proposed project:

The proposed project is a battery energy storage system (BESS) with a capacity of approximately 5 megawatts (MW) and 20 megawatt hours (MWh). Associated electrical equipment, including battery containers, transformers, and inverters, will sit on concrete pads enclosed by a combined 8 ft tall chain link fence with an access gate and 10 ft sound barrier wall. Improvements to an existing gravel road are proposed for access to the BESS. Underground conduit is proposed to connect the BESS equipment to proposed pole mounted equipment. Interconnection will be to an existing utility pole on Silver Street.

## Introduction

Silver Street Energy Storage, LLC, c/o New Leaf Energy, Inc. (the Applicant) proposes construction of a battery energy storage system (BESS) encompassing approximately 0.98 acres of the approximately 5.7-acre property, located at 404 Silver Street, Agawam, MA (Map H8, Block 3, Lot 37) (E-911 address of 408 Silver Street). The property currently contains a residence along the southern portion of the site, and an existing gravel road, dirt piles, and woodland toward the northern portion of the site.

An application for Zoning Determination was submitted to the Inspection Services, Building Department on September 5, 2024. In accordance with the direction outlined in the Zoning Determination by the Town Building Official dated September 6, 2024, a Site Plan Review application was submitted to the Planning Board for review and approval in accordance with Sections 180-13 and 180-152, of the Zoning Ordinance section of the Town of Agawam Code (the Ordinance). The Planning Board approved the site plan at the November 7, 2024 meeting. Documentation of the Zoning Determination and previous Planning Board Approval are included in **Appendix B** for reference.

Since the Planning Board approval under Section 180-152, the Town of Agawam has issued a new Article, Article XXIII Battery Energy Storage Systems, outlining the requirements for battery energy storage systems. The following narrative and documentation are hereby submitted to the Planning Board in accordance with the above mentioned Article, for Site Plan Review and approval.

A pre-application meeting with the Town was held on Tuesday April 29, 2025 with the Applicant and the Town to discuss the proposed project. This application package includes a Site Plan Review Application and related appendices; the application was submitted electronically to the Planning Director, Taryn Egerton, at [tegerton@agawam.ma.us](mailto:tegerton@agawam.ma.us), and two hard copies have been mailed to the Town Offices.

## Proposed Project

The proposed BESS site will be accessed from Silver Street. The parcel is owned by Robert and Deborah Pelley, with whom Silver Street Energy Storage, LLC, c/o New Leaf Energy, Inc. has a lease agreement. A Tier 2 BESS is a permitted use within the agricultural zoning district via a Site Plan Review by the Planning Board.

As part of this project, a subdivision of the existing lot is proposed. The existing residence will remain on Lot A, and the BESS project will be on Lot B. Lot A will be in the Business A Zone and Lot B will be located in the Agricultural Zone.

As currently designed, the proposed BESS has a capacity of 5.0 megawatts (MW) and 20 megawatt hours (MWh) which is classified as a Tier 2 System under Article XXIII Section 180-166.2. The associated battery containers, transformers, and inverters will sit on concrete pads that will be enclosed by a combined 10 ft tall sound barrier wall and 8 ft tall chain link fence with an access gate. The existing gravel road at the property is proposed to be improved to a 20 ft wide gravel road to allow access to the BESS. Interconnection will be in accordance with utility requirements and will connect an existing power pole on Silver Street to proposed pole mounted equipment adjacent to the gravel access road near Silver Street. Underground conduit is proposed to connect the BESS equipment to the pole mounted equipment.

The name of the Project Applicant is:

Silver Street Energy Storage, LLC  
c/o New Leaf Energy, Inc.  
55 Technology Drive, Suite 102  
Lowell, MA 01851  
Contact: William Peregoy  
Email: [wperegoy@newleafenergy.com](mailto:wperegoy@newleafenergy.com)

The name and contact information of the Engineer authorized to represent the Project Applicant:

Weston & Sampson Engineers, Inc.  
 55 Walkers Brook Drive, Suite 100  
 Reading, MA 01867  
 Contact: Melinda Costello, P.E.  
 Phone: (978) 532-1900  
 e-mail: [costello.melinda@wseinc.com](mailto:costello.melinda@wseinc.com)

### Compliance with Bylaws

On behalf of the Applicant, Weston & Sampson has developed a set of plans (**Appendix C**) that are intended to meet requirements set forth in the BESS Article, and Ordinance for the Agricultural District in which the project is proposed. The Residence A-2 District is the nearest residence district. Below is a summary of the dimensional aspects of the project:

**Table 1 Dimensional and Density Regulations:**

| Requirements                            | Required <sup>1</sup> | Tier 2 BESS Setbacks <sup>4</sup> | Proposed <sup>2</sup> |
|-----------------------------------------|-----------------------|-----------------------------------|-----------------------|
| Minimum Front Yard Setback <sup>1</sup> | 100 ft                | 50 ft                             | 573 ft (min)          |
| Minimum Rear Yard Setback               | 20 ft                 | 50 ft                             | 540 ft (min)          |
| Minimum Side Yard Setback               | 15 ft                 | 50 ft                             | 57 ft (min)           |
| Maximum Structure Height <sup>3</sup>   | 15 ft                 |                                   | < 15 ft               |

1. Setbacks listed in Section 180-39 of the Ordinance.
2. Proposed setbacks measured from the property line to the nearest side of the BESS equipment pad.
3. Height of a medium-scale solar energy system shall not exceed 15 feet as outlined in Ordinance Section 180-512.
4. Tier 2 BESS Setbacks are referenced from Article XXIII Battery Energy Storage Systems Section 180-169.6.

Provisions of the Article relative to the project, followed by an analysis of the project's compliance with applicable provisions (in underlined font), are listed below. The outlined regulations represent an analysis primarily applicable to Article XXIII, Battery Energy Storage Systems and Article I, Section 180-13, Site Plans, of the Ordinance.

### Article XXIII. Battery Energy Storage Systems

#### 180-166 Applicability.

2. Battery energy storage systems that are subject to this Article shall be classified as either a Tier 1, Tier 2 or Tier 3 Battery Energy Storage System as follows:

- a. Tier 1 Battery Energy Storage Systems have an aggregate energy capacity less than or equal to 500 KWh.
- b. Tier 2 Battery Energy Storage Systems have an aggregate energy capacity greater than 500 KWh and less than or equal to 50 MWh.
- c. Tier 3 Battery Energy Storage Systems have an aggregate energy capacity greater than 50MWh.

Acknowledged. As currently designed, the proposed BESS has a capacity of 5.0 megawatts (MW) and 20 megawatt hours (MWh) which is classified as a Tier 2 System.

**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. The proposed utility lines are proposed to be installed underground to the extent practicable. As shown on the site plans in **Appendix C**, the medium voltage line runs underground from the proposed equipment pad area to the first utility pole required for interconnection 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.
  - 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.
  - 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.
  - 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 be posted on the perimeter fence for the proposed system and on the BESS facility doors in compliance with the National Electric Code (NEC).

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. There is no proposed lighting for the project.

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. A minimum of 10 feet between the edge of equipment pad and tree line is provided for the proposed project as shown on sheet C4.0 of the Site Plans included in **Appendix C**.

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. A minimum setback distance of 50 feet is provided for the project as outlined in Table 1 above, and on the site plans included in **Appendix C**.

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. The proposed Tier 2 BESS meets the dimensional limitations for the A-2 zoning district as outlined in Table 1 above.

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 proposed Tier 2 BESS will be enclosed by a combination of a 10-foot tall sound barrier wall to the north and west, and an 8-foot tall chain link fence at the south and east sides of the system as shown on the site plans in **Appendix C**.

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. The 10-foot tall sound barrier wall to the north and west as well as the vegetative buffer remaining along the perimeter of the parcel will aid in screening for the project.



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. Failed battery cells and modules will be removed from the site as noted above. An operation and maintenance plan for the BESS is included in **Appendix D.**

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;
  - 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. 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
  - 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. A decommissioning plan in accordance with the requirements noted above is included in **Appendix E.**

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 prepared for the project prior in an amount acceptable to the Town and in a form approved by the Mayor prior to issuance of the 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. Proof of liability insurance is included in **Appendix F.**

**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.

Electrical documentation including a copy of the project's one-line diagram is included in **Appendix G**.

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.

Electrical documentation including a copy of the proposed equipment specifications sheets are included in **Appendix G**. If any changes to equipment occur prior to construction, copies of the revised proposed equipment sheets will be submitted prior to issuance of the project's building permit.

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.

Contact information is provided on the cover sheet of the proposed site plans in **Appendix C**.

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.

Testing data for the proposed BESS is included in **Appendix H**.

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 will be prepared and submitted prior to the start of commissioning during the construction phase of the project as required in this section.

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.

A Fire Safety Compliance Plan is included in **Appendix I**.

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.

An Operation & Maintenance Plan is included in Appendix D.

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 interconnection design performed by New Leaf has been designed in accordance with the NEC and NFPA and other applicable design codes.

9. Prior to the issuance of the building permit, engineering documents must be signed and sealed by a Massachusetts Licensed Professional Engineer.

Acknowledged. Prior to issuance of a Building Permit by the Town of Agawam, all applicable documentation submitted will be sealed by a Massachusetts Licensed Professional Engineer.

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.
  - b. Procedures for inspection and testing of associated alarms, interlocks, and controls, including time intervals for inspection and testing.
  - 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.
  - 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.
  - e. Response considerations similar to a safety data sheet (SDS) that will address response safety concerns and extinguishment when an SDS is not required.

- 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.
- g. Other procedures as determined necessary by the Town to provide for the safety of occupants, neighboring properties, and emergency responders.
- 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.

An Emergency Operations Plan is included in Appendix J.

#### **Article I General Provisions**

##### **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.

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]

(2) Any nonresidential use of a one-family dwelling.

(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]

(4) Any major change in any condition or feature which is not in conformance with any feature of a previously app

Acknowledged. A site plan is required 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 application, site plan, stormwater management plan, and pre- and post-development stormwater calculations have been submitted. Four hard copies of the site plan and a hard copy of the stormwater plan have been submitted to the Town.

(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, included in **Appendix C**, 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 Layout and Materials Plan (Sheet C-3.0), included in **Appendix C**, contain the proposed site layout at a scale of 1" = 40'.

(c) Topography of the site and adjacent lands.

The Grading and Erosion Control Plan (Sheet C-4.0), included in **Appendix C**, illustrates the topography of the 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 public roads are proposed for this project. Layout and Materials Plan (Sheet C-3.0), included in **Appendix C**, illustrates the dimensions of the proposed gravel access road. A 25 foot long paved apron is proposed at the site entrance from Silver Street to the Property.

(e) Parking areas and loading areas.

Not applicable. There are no parking or loading areas proposed for this project.

(f) Drainage. The plan must be submitted to the Department of Public Works for input prior to Planning Board review.

Connection to public water or drainage features is not proposed with this project as shown on the Layout and Materials Plan (Sheet C-3.0), included in **Appendix C**. A stormwater Management Report and associated watershed drainage figures is included in **Appendix K** which summarizes the stormwater runoff patterns of the project pre- and post-development.

(g) All public utilities (sewer, water, gas, electric).

The Layout and Materials Plan (Sheet C-3.0), included in **Appendix C**, illustrates all existing public utilities and proposed interconnection to the existing power pole on Silver Street.

(h) Landscaping. All landscaped areas are to be designated on the plan. These areas are to specify species type and size.

The Tree Clearing Plan (Sheet C-2.0), and Grading and Erosion Control Plan (Sheet C-4.0), included in **Appendix C**, illustrate all landscaped areas within the proposed limit of work. Existing vegetation will remain outside the proposed limit of work.

(i) Sign location only.

Required signage will be posted on the perimeter fence. Refer to Detail Sheet C-5.0 in the site plans included in **Appendix C**.

(j) Exterior lighting.

Not applicable. There is no exterior lighting proposed for this project.

(k) Rendering or elevations, including all mechanical facility support items originating from or terminating on the building exterior, or both.

Detail Sheet C-5.1, included in **Appendix C**, illustrates the elevations of the BESS system.

(l) The location and characteristics of any proposed screening, fencing or other buffers.

The Layout and Materials Plan (Sheet C-3.0), and Grading and Erosion Control Plan (Sheet C-4.0), included in **Appendix C**, illustrate the location of the proposed fencing. Detail of proposed fencing and sound barrier walls are included on Detail Sheets C-5.0 and C-5.1.

(m) The location of any wetlands, streams, drainage swales and areas subject to flooding.

The Existing Conditions Plan (Sheet C-1.0), included in **Appendix C**, illustrates 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]

Not applicable. No storm drain permit is needed for the proposed project.

(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]

The stormwater management report is included in **Appendix K**, and is in accordance with Section 175-35 of the Code of the Town of Agawam.

## Appendix B – Previous Approvals





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         |
| INSPECTION SERVICES |
| SEP 05 2024         |
| 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.

|                                                                                                                                                       |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--|------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------|--|------------------------------------------------|--|---------------------------------------------------|--------------------------|
| <b>1) PROPERTY INFORMATION</b>                                                                                                                        |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
| <b>a. Street Address</b> 404 Silver Street                                                                                                            |                                                |  |                                                | <b>b. Zoning District</b> Business A Front 200', Rest Ag |                                                              |  |                                                |  |                                                   |                          |
| <b>c. Assessor's Map</b> H8                                                                                                                           |                                                |  |                                                | <b>d. Lot(s)</b> 3 and 37                                |                                                              |  |                                                |  |                                                   |                          |
| <b>e. Registry of Deeds Book</b> 9420                                                                                                                 |                                                |  |                                                | <b>f. Page</b> 337                                       |                                                              |  |                                                |  |                                                   |                          |
| <b>g. Overlay Districts</b> <input type="checkbox"/> Historic Preservation <input type="checkbox"/> Mixed-Use Business C                              |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
| <b>h. Previous Special Permits, Site Plan Approvals, Findings or Variances Issued for this Site</b>                                                   |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
|                                                                                                                                                       |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
| <b>2) APPLICANT &amp; OWNER INFORMATION</b>                                                                                                           |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
| <b>a. Applicant Name</b> Silver Street Energy Storage, LLC                                                                                            |                                                |  |                                                | <b>b. Applicant Phone</b> 978-995-3054                   |                                                              |  |                                                |  |                                                   |                          |
| <b>c. Applicant Email</b> wperegoy@newleafenergy.com                                                                                                  |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
| <b>d. Applicant Mailing Address</b> 55 Technology Dr Suite 102 Lowell, MA 01851                                                                       |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
| <b>e. Applicant Relationship to Property</b> <input type="checkbox"/> Owner <input type="checkbox"/> Agent <input checked="" type="checkbox"/> Other: |                                                |  |                                                | Applicant has lease on property to develop project.      |                                                              |  |                                                |  |                                                   |                          |
| <b>f. Representative Name (if any)</b> William Peregoy                                                                                                |                                                |  |                                                | <b>g. Rep. Phone</b> 978-995-3054                        |                                                              |  |                                                |  |                                                   |                          |
| <b>h. Rep. Email</b> wperegoy@newleafenergy.com                                                                                                       |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
| <b>i. Owner Mailing Address</b>                                                                                                                       |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
| <b>j. Owner Name (if different)</b> Robert and Deborah Pelley                                                                                         |                                                |  |                                                | <b>k. Owner Phone</b> 413-530-6102                       |                                                              |  |                                                |  |                                                   |                          |
| <b>l. Owner Email</b>                                                                                                                                 |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
| <b>m. Owner Mailing Address</b> 404 Silver Street, Agawam, MA 01001                                                                                   |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
| <b>3) PROJECT &amp; SITE DETAILS</b>                                                                                                                  |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
| <b>NOTE: Any omission of requested information may result in an INCOMPLETE determination</b>                                                          |                                                |  |                                                |                                                          |                                                              |  |                                                |  |                                                   |                          |
|                                                                                                                                                       | <b>Existing</b>                                |  |                                                |                                                          | <b>Proposed</b>                                              |  |                                                |  | <b>-FOR BUILDING DEPT. REVIEW- REQUIRED / NCU</b> |                          |
|                                                                                                                                                       |                                                |  |                                                |                                                          | <input type="checkbox"/> No changes to building, site or lot |  |                                                |  |                                                   |                          |
| <b>a. Lot Size</b>                                                                                                                                    | 240,407                                        |  | SF                                             |                                                          | 184778                                                       |  | SF                                             |  | <b>LOT SIZE</b>                                   | <input type="checkbox"/> |
| <b>b. Frontage</b>                                                                                                                                    | 200                                            |  | FT                                             |                                                          | 100                                                          |  | FT                                             |  | <b>FRONTAGE</b>                                   | <input type="checkbox"/> |
| <b>c. Front Lot Line</b>                                                                                                                              | 200                                            |  | FT                                             |                                                          | 100                                                          |  | FT                                             |  | <b>FRONT SB</b>                                   | <input type="checkbox"/> |
| <b>d. Side Lot Line (Left/Right)</b>                                                                                                                  | L: FT 1230                                     |  | R: 1189                                        |                                                          | L: 1189                                                      |  | R: 1189                                        |  | <b>SIDE SB</b>                                    | <input type="checkbox"/> |
| <b>e. Rear Lot Line</b>                                                                                                                               | 200                                            |  | FT                                             |                                                          | 200                                                          |  | FT                                             |  | <b>REAR SB</b>                                    | <input type="checkbox"/> |
| <b>f. Building Height</b>                                                                                                                             | 15                                             |  | FT                                             |                                                          | 15                                                           |  | FT                                             |  | <b>BLDG HT</b>                                    | <input type="checkbox"/> |
| <b>g. Total BLDG/Res Area</b>                                                                                                                         | 3144                                           |  | SF                                             |                                                          | 1103                                                         |  | SF                                             |  | <b>AREA LIM</b>                                   | <input type="checkbox"/> |
| <b>h. BLDG Coverage (Footprint)</b>                                                                                                                   | 2104                                           |  | SF                                             |                                                          | 0.8                                                          |  | % of lot                                       |  | <b>LOT COVER</b>                                  | <input type="checkbox"/> |
| <b>i. Impervious Coverage</b>                                                                                                                         | 2593                                           |  | SF                                             |                                                          | 1.1                                                          |  | % of lot                                       |  | <b>IMPERVIOUS</b>                                 | <input type="checkbox"/> |
| <b>j. Parking/Loading Spaces</b>                                                                                                                      | P: 0                                           |  | L: 0                                           |                                                          | P: 0                                                         |  | L: 0                                           |  | <b>PARKING</b>                                    | <input type="checkbox"/> |
| <b>k. Bicycle/EV Charge Spaces</b>                                                                                                                    | B: 0                                           |  | EV: 0                                          |                                                          | B: 0                                                         |  | EV: 0                                          |  | <b>BIKE/EV</b>                                    | <input type="checkbox"/> |
| <b>l. Signs (Size &amp; Type)</b>                                                                                                                     | 0 x 0                                          |  | T: 0                                           |                                                          | x 0                                                          |  | T: 0                                           |  | <b>SIGNS</b>                                      | <input type="checkbox"/> |
| <b>m. Fence (Size &amp; Type)</b>                                                                                                                     | 0 LIN FT                                       |  | T: N/A                                         |                                                          | 500 LIN FT                                                   |  | T: Chain Link                                  |  |                                                   |                          |
| <b>n. Wetland Area</b>                                                                                                                                | 22313                                          |  | SF                                             |                                                          | 22313                                                        |  | SF                                             |  |                                                   |                          |
| <b>o. Utility Services</b>                                                                                                                            | <input checked="" type="checkbox"/> Town Water |  | <input checked="" type="checkbox"/> Town Sewer |                                                          | <input checked="" type="checkbox"/> Town Water               |  | <input checked="" type="checkbox"/> Town Sewer |  | <b>NON-CONFORMING USE</b>                         | <input type="checkbox"/> |



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>p. Current Use of Property</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Residence                                                                                           |
| <b>q. Proposed Use of Property</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Split lot - Residence to remain in Business A Zone and Battery Energy Storage System in Ag Zone.    |
| <b>r. Project Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                     |
| <p>The proposed project is for a 5 MW, 20 MWh battery energy storage system (BESS) located at 404 Silver Street. The battery Containers will set on concrete foundation pads. The batteries will charge/discharge via transformers and inverters that will sit on the concrete pads as well. The electrical equipment will be enclosed by a 7' tall chain link fence, and will be serviced by a 20' wide gravel access road with ample turn around space. There will be pole mounted interconnection equipment adjacent to the gravel access road that connects into an existing power pole on Silver Street adjacent to the parcel. The pole mounted interconnection equipment will be connected to the BESS equipment via underground conduit. See attached preliminary site plan for project location. Also see attached Exhibit A that shows the proposed subdivision of the lot. Proposed Lot A will have the existing residence stay in the Business A Zone with required 100' frontage, and Proposed Lot B have the BESS project in the Agricultural Zone and will also have 100' Frontage on Silver Street.</p> |                                                                                                     |
| <b>s. I have attached additional narrative, plans or supporting materials</b><br>(any oversize plans should also be included in an 8.5 x 11" format)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No                                 |
| <b>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.</b><br>If so, <b>CONSERVATION COMMISSION</b> review is required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unsure |
| <b>u. The following projects shall be required to comply with the requirements of a <u>STORM DRAIN PERMIT</u>:</b><br>[1] Any alteration to sites on parcels of one acre or greater.<br>[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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unsure |
| <b>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.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 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.

|                                                                                                   |                 |             |          |
|---------------------------------------------------------------------------------------------------|-----------------|-------------|----------|
| <b>Signature</b>                                                                                  | William Peregoy | <b>Date</b> | 9/5/2024 |
| <input type="checkbox"/> Applicant <input checked="" type="checkbox"/> Applicant's Representative |                 |             |          |

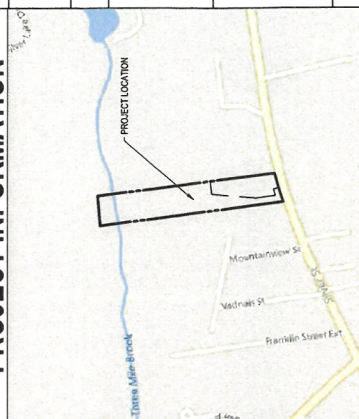
BOOK SIGN 1787Q534-4Q5WBV6X

| ZONING DETERMINATION - OFFICE USE ONLY                                                                                                                                                                                                                          |                                                                                     |                                                      |                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------|
| <input type="checkbox"/> Approved <input type="checkbox"/> Denied: <input type="checkbox"/> The proposed use is not permitted in the subject zoning district<br><input type="checkbox"/> Only permissible with variance relief from the Zoning Board of Appeals |                                                                                     |                                                      |                                                    |
| <input checked="" type="checkbox"/> Approved <b>Pending additional approval:</b>                                                                                                                                                                                |                                                                                     |                                                      |                                                    |
| <u>Per Zoning Ordinance Section(s)</u>                                                                                                                                                                                                                          | <u>Required Permit(s)</u>                                                           | <u>Approval Required</u>                             | <u>Permitting Authority</u>                        |
| 180-152-S.P.R.                                                                                                                                                                                                                                                  | <input checked="" type="checkbox"/> Building Permit(s)                              | <input type="checkbox"/> Special Permit(s)           | <input checked="" type="checkbox"/> Planning Board |
| AND to divide the parcels                                                                                                                                                                                                                                       | <input checked="" type="checkbox"/> Electrical Permit(s)                            | <input checked="" type="checkbox"/> Site Plan Review | <input type="checkbox"/> Board of Appeals          |
|                                                                                                                                                                                                                                                                 | <input type="checkbox"/> Plumbing/Gas Permit(s)                                     | <input type="checkbox"/> Variance                    | <input type="checkbox"/> City Council              |
| <b>Town Building Official</b>                                                                                                                                                                                                                                   |  | <b>Issue Date</b>                                    | 9/6/2024                                           |

This determination may be appealable to the Zoning Board of Appeals under the provisions of MGL Ch. 40A Sec. 8.  
Revised 09/08/2022



## PROJECT INFORMATION



| PROPOSAL SPECIFICATION              |               |
|-------------------------------------|---------------|
| SYSTEM POWER CAPACITY (MW)          | 4890          |
| SYSTEM ENERGY CAPACITY (MWH)        | 19660         |
| POWER CONVERSION SYSTEM INFORMATION | HYDRIUM GEN 2 |
| TRANSFORMER INFORMATION             | (2) 2500      |
| INTERCONNECTION VOLTAGE             | 13.8 KV       |
| UTILITY                             | EVERSOURCE    |

SITE USE PERMIT SET  
404 SILVER ST  
AGAWAM, MA 01001

PROJECT NUMBER:  
120-0339[illegible]

PL-1.0

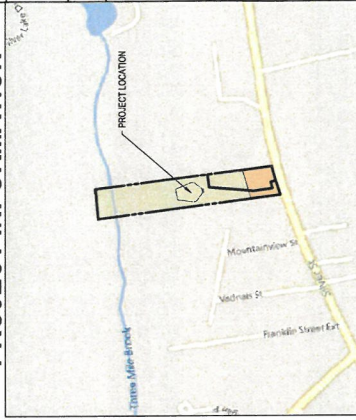
## PROPOSAL LAYOUT



## EXHIBIT A - PROPOSED SUBDIVISION



## PROJECT INFORMATION



| PROPOSAL SPECIFICATION              |              |
|-------------------------------------|--------------|
| SYSTEM POWER CAPACITY (kW)          | 4980         |
| SYSTEM ENERGY CAPACITY (kWh)        | 19960        |
| POWER CONVERSION SYSTEM INFORMATION | HYTRON GEN 2 |
| TRANSFORMER INFORMATION             | (2) 2500     |
| INTERCONNECTION VOLTAGE             | 13.8 KV      |
| UTILITY                             | OVERSOURCE   |

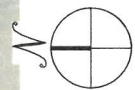
SITE USE PERMIT SET  
404 SILVER ST  
AGAWAM, MA 01001

PROJECT NUMBER:  
120-0339

|     |
|-----|
| REV |
|-----|

# PROPOSAL LAYOUT

SCALE: 1" = 50'



PL-1.0

## PROPOSAL LAYOUT



# Town of Agawam

## Planning & Community Development

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36 Main Street  
Agawam, MA 01001  
Telephone:  
413-786-0400 ext. 8245  
Fax: 413-786-9927

### PLANNING BOARD

November 12, 2024

Silver St Energy Storage  
c/o New Leaf Energy, Inc.  
55 Technology Drive #102  
Lowell, MA 01851

To Whom It May Concern:

At its duly called meeting held on November 7, 2024, the Agawam Planning Board approved the site plan entitled "Site Use Permit 404 Silver Street, Agawam, Ma"; prepared by Weston & Sampson and dated October 01, 2024, revised October 25, 2024 conditional upon the receipt of an ANR plan; and receipt of NHESP approval.

If you have any questions, please contact this office at 786-0400, extension 8245.

Sincerely,

  
Violet Baldwin, Chairperson  
Agawam Planning Board

Cc: Weston & Sampson  
Robert & Deborah Pelley  
Engineering Department  
Inspection Services  
Town Clerk & File

## Agawam Planning Board November 7, 2024

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### MEMBERS PRESENT:

Violet Baldwin, Chair  
Frank DeStefano  
Michael DiLullo  
Charles Elfman  
Michael Cleavall

### ALSO PRESENT:

Stefanie Kesecker  
Pam Kerr

Chairperson Baldwin called the meeting to order at 6:00pm.

1. 6:00PM PUBLIC HEARING-ZONE CHANGE-71 Maynard/131 Coronet Circle-Savonin

Chairperson Baldwin opened the meeting stating this agenda item was for the request for a zone change by petitioner Savonin for 71 Maynard/131 Coronet Circle from Agricultural to Residential A-1. She then explained the public hearing process. She stated the Planning Board sends a recommendation to the City Council, who ultimately approves or denies the request. She stated the City Council meeting will be held on November 18, 2024 at 7:00pm.

Attorney Gary Liquori and petitioners Viktor and Olga Savonin were present for this agenda item. Attorney Liquori stated the petitioner is requesting a zone change from Agricultural to Residential A-1. He went on to say the property is surrounded by Residential A-1 properties. He stated his client purchased the lot in 2019, when the house was dilapidated and the yard overgrown. He stated he has built a new single family home on the parcel and increased the property values.

Mr. Elfman asked if the proposal was for a single family home. Attorney Liquori stated yes. Mr. Elfman questioned the plan for the proposed home. Mr. Savonin stated he lives at the current residence and the second residence would be kept in the family. Mr. Elfman asked if the home would be a rental property. Mr. Savonin responded no.

Mr. Cleavall asked if the parcel was subdivided if there would be enough frontage. Attorney Liquori stated there would be enough square footage, while also meeting all zoning setback requirements.

Mr. Elfman asked if the land would be subdivided by an ANR. Mr. Savonin stated yes and with his parcel subdivided, both lots would still be larger than the surrounding lots.

Chairperson Baldwin opened the public hearing at 6:09pm.

Sandra O'Dea, 76 Maynard Street stated she lives directly across the street from this parcel. She stated she does not think there is enough room to put a house where the petitioner wants to build. She stated this would also increase the traffic in front of her residence. She stated she is totally against this zone change.

## Agawam Planning Board November 7, 2024

---

Pamela Desilets, 85 Maynard Street stated this proposed single family home would be near her residence and she is opposed to the zone change.

Chairperson Baldwin then read letters from abutters into the minutes.

Ernest Graziano, 14 Coronet Circle-opposed  
Daniel & Janine Swiecanski, 120 Coronet Circle-opposed  
Lucilia Cauley-119 Coronet Circle-opposed  
William Murphy, 115 Coronet Circle-opposed

Chairperson Baldwin stated professional comments were received from the Safety Officer, Building Inspector, and the Engineering Department and there were no concerns.

Motion was made by Mr. DeStefano and seconded by Mr. Cleavall to close the Public Hearing-71 Maynard/131 Coronet Circle-Savonin.

VOTE 5-0-0

Motion was made by Mr. Elfman and seconded by Mr. Cleavall to send a Positive Recommendation to the City Council for the zone change for 71 Maynard/131 Coronet Circle, from Agricultural to Residential A-1.

VOTE 5-0-0

2. SITE PLAN-404 Silver Street-Silver Street Energy Storage, LLC c/o New Leaf Energy, Inc.

Eric Weinstein with New Leaf Energy Inc., was present for this agenda item. He stated since the last Planning Board meeting they have addressed all professional comments satisfactorily. He stated the proposed Battery Energy Storage System (BESS) would be located on the back part of this Agricultural parcel, which would be subdivided.

Chairperson Baldwin asked the representative about a turtle protection plan that was a requirement of the Natural Heritage and Endangered Species Program (NHESP). Mr. Weinstein stated a turtle protection plan would be in place, prior to construction, and would comply with all requirements.

Ms. Baldwin stated the Planning Board had received all professional comments and there were no issues or concerns.

Motion was made by Mr. Elfman and seconded by Mr. DiLullo to approve the SITE PLAN-404 Silver Street-Silver Street Energy Storage, LLC c/o New Leaf Energy, Inc, conditional upon submittal of an ANR Plan and NHESP comments being addressed.

VOTE 5-0-0

3. SITE PLAN-1422-1444 Main Street-Shields Hotel



## Agawam Planning Board November 7, 2024

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John Tomaszewski, R. Levesque Associates was present for this agenda item. He updated the Board on the changes since the last Planning Board meeting in June. He stated the proposed hotel is on the north side of Main Street, currently there is a restaurant at the front of the property. He stated the back parcels are currently wooded and about 4 acres in size, and the proposal would be to construct the hotel on this portion of land. He stated there will be associated parking and storm water management. He stated the Conservation Commission did a peer review and they have worked with Conservation Commission the last several months and have received approval as well as an Order of Conditions. He stated MASS DOT had requested sidewalks in the right-of-way be part of the plan and those have been included and an ANR plan will be submitted. He went on to say they have received approvals from Engineering, Police, and Fire Departments.

Chairperson Baldwin ask how the hotel would be accessed. Mr. Tomaszewski stated it would be accessed through the existing entrance, and there would be a driveway added to access the hotel in the back and that traffic would flow in a circular motion. Ms. Baldwin asked if the current entrance was gravel or paved. Mr. Tomaszewski stated it is paved. Ms. Baldwin asked to see an image of what the hotel would look like. She also asked if there would be a landscaping plan. Mr. Tomaszewski stated there will be bio-retention ponds that require plantings and there will plants in front and around the building. Ms. Baldwin asked if there would be a dumpster and if it would be fenced in. Mr. Tomaszewski stated yes and it would be fenced in by 6ft. vinyl. Ms. Baldwin asked if there would be lighting that broadcasts to abutters. Mr. Tomaszewski stated the lighting would be dark sky compliant.

Mr. DiLullo asked about the setback from Main Street. Mr. Patel stated it was around 250 to 300 ft.

Ms. Baldwin questioned the height of the building. Mr. Tomaszewski stated 43ft.

Mr. Elfman asked about signage. Mr. Tomaszewski stated the existing sign would be replaced and a new sign erected near the entrance which would meet permitting requirements.

Mr. Destefano asked if there would be any food service to the room or microwaves or refrigerators in the room. Mr. Rayonia (owner of existing restaurant) stated no and the restaurant would cater to the hotel customers.

Motion was made by Mr. DeStefano and seconded by Mr. DiLullo to approve the SITE PLAN-1422-1444 Main Street-Shields Hotel, conditional upon an ANR plan being submitted and any required parking easements.

VOTE 5-0-0

#### 4. SITE PLAN-195 South Westfield Street-Aljanabi

The Planning Board received a request to continue this agenda item to the November 21, 2024 meeting.

Motion was made by Mr. Cleavall and seconded by Mr. DeStefano to continue the SITE PLAN-195 South Westfield Street-Aljanabi to the November 21, 2024 meeting, as requested.

VOTE 5-0-0



## Agawam Planning Board November 7, 2024

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### 5. APPROVAL OF MINUTES-October 17,2024

Motion was made by Mr. DeStefano and seconded by DiLullo to approve the October 17, 2024 minutes as written.

VOTE 4-0-1(Elfman)

### 6. Correspondences

None

Motion was Mr. Elfman and seconded by Mr. Cleavall to adjourn the meeting.

VOTE 5-0-0

Meeting adjourned at 6:45pm.



William Peregoy &lt;wperegoy@newleafenergy.com&gt;

---

**FW: 404 Silver Street - BESS (updated plan)**

---

**Costello, Melinda** <Costello.Melinda@wseinc.com>

Thu, Nov 7, 2024 at 12:55 PM

To: Eric Weinstein &lt;eweinstein@newleafenergy.com&gt;, William Peregoy &lt;wperegoy@newleafenergy.com&gt;

Cc: "Bukowski, Rob" &lt;Bukowski.Rob@wseinc.com&gt;

FYI, Fire Inspector approval below.

**Melinda Costello**

Weston &amp; Sampson

direct: 781-315-4662

mobile: 978-866-6929

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**From:** Stefanie Kesecker <SKesecker@agawam.ma.us>**Sent:** Thursday, November 7, 2024 12:54 PM**To:** Costello, Melinda <Costello.Melinda@wseinc.com>**Subject:** FW: 404 Silver Street - BESS (updated plan)

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**From:** Derek Myers <afdinsp@agawam.ma.us>**Sent:** Thursday, November 7, 2024 12:50 PM**To:** Stefanie Kesecker <SKesecker@agawam.ma.us>**Subject:** FW: 404 Silver Street - BESS (updated plan)

Hello,

Updated swept path plan is approved.

Thank You

---

**From:** Costello, Melinda <Costello.Melinda@wseinc.com>**Sent:** Wednesday, October 23, 2024 3:31 PM**To:** Derek Myers <afdinsp@agawam.ma.us>**Cc:** Taryn Egerton <TEgerton@agawam.ma.us>**Subject:** RE: 404 Silver Street - BESS (updated plan)

Hi Derek,

Please see attached for the updated fire truck plan based on the truck drawing you provided for us. Please let us know if you have any comments on this plan.

Thank you,  
Melinda

### Melinda Costello

Weston & Sampson

direct: 781-315-4662

mobile: 978-866-6929

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**From:** Taryn Egerton <[TEgerton@agawam.ma.us](mailto:TEgerton@agawam.ma.us)>  
**Sent:** Thursday, October 17, 2024 4:18 PM  
**To:** Costello, Melinda <[Costello.Melinda@wseinc.com](mailto:Costello.Melinda@wseinc.com)>; Thomas R. Reidy <[TReidy@baconwilson.com](mailto:TReidy@baconwilson.com)>  
**Cc:** Pamela Kerr <[PKerr@agawam.ma.us](mailto:PKerr@agawam.ma.us)>; Stefanie Kesecker <[SKesecker@agawam.ma.us](mailto:SKesecker@agawam.ma.us)>  
**Subject:** FW: 404 Silver Street - BESS (updated plan)

Hello,

See email below from the Fire Inspector and attached Fire Truck dimensions.

Thank you

### Taryn Egerton

Assistant Planner and Conservation Officer

Office of Planning and Community Development

413.726.9737 | [tegerton@agawam.ma.us](mailto:tegerton@agawam.ma.us)



---

**From:** Derek Myers <[afdinsp@agawam.ma.us](mailto:afdinsp@agawam.ma.us)>  
**Sent:** Thursday, October 17, 2024 4:16 PM  
**To:** Taryn Egerton <[TEgerton@agawam.ma.us](mailto:TEgerton@agawam.ma.us)>  
**Subject:** RE: 404 Silver Street - BESS (updated plan)

Taryn,

The tuck dimensions in plan that was submitted was not accurate. The model is roughly 4 feet short of the new truck. Please have the design team use the numbers in the attached specification sheet. The submitted sweep path plan is not approved at this time.

Thanks

Derek

[Quoted text hidden]

[Quoted text hidden]

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 **C-6.0\_r.pdf**  
468K

October 25, 2024

55 Walkers Brook Drive, Suite 100, Reading, MA 01867  
Tel: 978.532.1900

Taryn Egerton  
Assistant Planner and Conservation Officer  
Office of Planning and Community Development  
Town of Agawam, Massachusetts  
36 Main Street  
Agawam, MA 01001

**Re: Battery Energy Storage System (BESS), 404 Silver Street, Agawam MA  
Response to Comments – Site Plan Review Application**

Dear Ms. Egerton:

Weston & Sampson Engineers, Inc. (Weston & Sampson), on behalf of Silver Street Energy Storage, LLC c/o New Leaf Energy, Inc., has prepared this letter in response to the comments received by the Agawam Fire Department on October 2, 2024, the Agawam Department of Public Works (DPW) on October 17, 2024, and the Agawam Inspection Services Department on October 21, 2024 related to the Site Plan Review Application for the proposed BESS project at 404 Silver Street. Please find our responses to your comments below. Fire Department, DPW, and Inspection Services Department comments have been listed in bold, followed by our response in italics.

#### **Fire Department**

**The swept path analysis submitted for this project does not get the fire department access around the entire ESS area. It shows the fire truck making a 3 point turn which is not compliant for a successful swept path. That also being said, we are also getting a new fire truck that has different specifications to this swept path. I will submit them to you as soon as I hear back from the vendor.**

*The updated swept path is shown on all proposed sheets in the Revised Site Plans, included in Attachment A, and provides an adequate path for the new fire truck (Model: 100' Rear Mount Platform (S53RP-100)).*

#### **DPW**

1. **The existing parcel has been divided into 2 parcels, Proposed Lot A and Proposed Lot B. Proposed Lot A will continue to have an address of 404 Silver Street and Proposed Lot B will be assigned a new address of 408 Silver Street.**

*Acknowledged, this is noted in the General Notes on the Civil Notes sheet (Sheet C-0.0) and the notes on the Layout and Materials Plan (C-3.0), included in Attachment A.*

2. **The plan calls for a silt fence to be installed on the east side of the driveway only at the very end of said driveway. Please extend the silt fence along the limit of work for the entire east side of the driveway.**

*The Grading and Erosion Control Plan (Sheet C-4.0), included in Attachment A, illustrates the revised silt fence location, extending along the limit of work for the entire east side of the driveway.*

3. **The catch basin on Silver Street needs inlet protection from any excess sediment as a result of this project.**

*The Grading and Erosion Control Plan (Sheet C-4.0) and the Civil Details (Sheet C-5.1), included in Attachment A, include silt sack protection for the catch basin on Silver Street.*

4. **Sheet C-4.0 of the plans has a leader pointing to a riprap swale but it is unclear how that swale is graded and the extents of its location.**

*The riprap swale has been removed from the project plans and replaced with a stone infiltration trench as shown on the Grading and Erosion Control Plan (Sheet C-4.0) included in Attachment A.*



5. Project must be in accordance with the new Agawam Chapter 176 Stormwater Management Ordinance and Regulations for Stormwater Management Permit.

*The Stormwater Report, included in Attachment B, details compliance with relevant sections of the Agawam Chapter 176 Stormwater Management Ordinance. The Regulations for Stormwater Permit have been acknowledged.*

**Inspection services Department**

**A Form-A (ANR) would be required to split the parcels for the proposed project.**

*Acknowledged. An ANR will be submitted prior to construction of the proposed project.*

Should you have any questions, please contact me at (978) 532-1900 or [costello.melinda@wseinc.com](mailto:costello.melinda@wseinc.com).

Sincerely,

WESTON & SAMPSON ENGINEERS, INC.



Melinda Costello, P.E.  
Project Manager



Robert J. Bukowski, P.E.  
Principal Engineer/Project Manager

cc: William Peregoy, Silver Street Energy Storage, LLC

**Attachments:**

Attachment A – Revised Site Plans

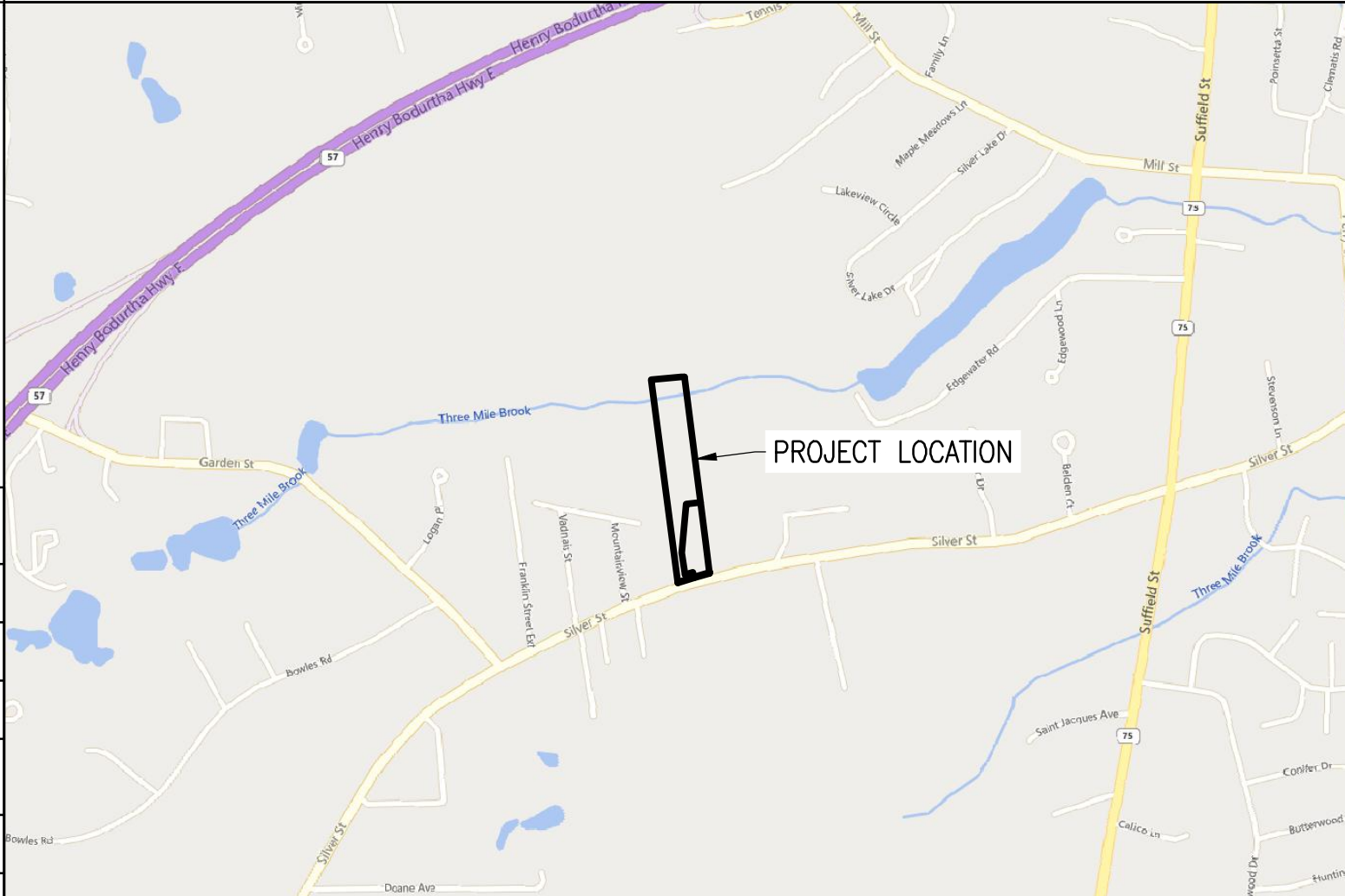
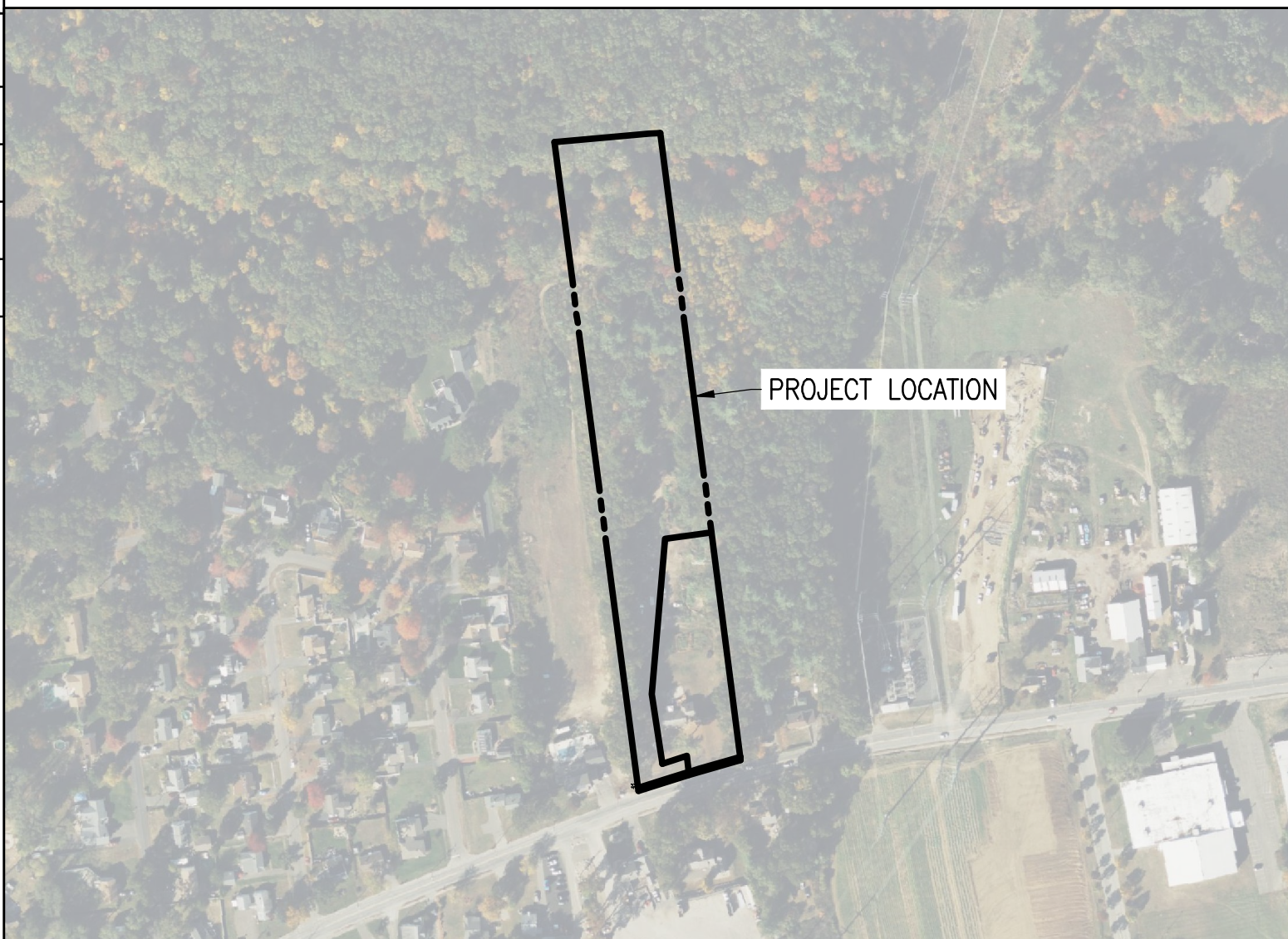
Attachment B – Revised Stormwater Report

## Appendix C – Site Plans



# SITE USE PERMIT SET

## 404 SILVER ST - AGAWAM 404 SILVER ST, AGAWAM, MA 01001 BATTERY STORAGE SYSTEM

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| <div>GENERAL NOTES</div> <div><div><div>1. AS CONTAINED HEREIN, "CONTRACTOR" IS ASSUMED TO BE THE EPC PROVIDER HIRED BY THE SYSTEM/PROJECT OWNER.</div><div>2. WHEN THERE IS A CONFLICT BETWEEN THESE GENERAL NOTES AND THE DRAWINGS, THE DRAWINGS SHALL GOVERN.</div><div>3. ALL WORK SHALL CONFORM TO THE MINIMUM STANDARDS OF THE FOLLOWING: LOCAL BUILDING CODE, LOCAL ELECTRICAL CODE, ANY OTHER REGULATING AGENCIES WHICH HAVE AUTHORITY OVER ANY PORTION OF THE WORK AND THOSE CODES AND STANDARDS LISTED IN THESE DRAWINGS.</div><div>4. THESE DRAWINGS SHALL NOT BE USED FOR CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEVELOPING A CONSTRUCTION LEVEL DESIGN AND ASSOCIATED DRAWINGS AND DETAILS.</div><div>5. COORDINATE THESE DRAWINGS WITH SPECIFICATIONS AND MANUFACTURER INSTALLATION AND OPERATION MANUALS.</div><div>6. UNLESS OTHERWISE NOTED, THE DESIGN REPRESENTED ON THESE PLANS IS BASED ON THE INFORMATION AND CRITERIA LISTED IN THE "BASIS OF DESIGN" SECTION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY SUCH INFORMATION IN PREPARATION OF THE CONSTRUCTION DESIGN.</div><div>7. THE EXISTING CONDITIONS REPRESENTED ON THESE PLANS ARE BASED ON PUBLICLY AVAILABLE INFORMATION AND THE SITE DISCOVERY SUMMARIZED IN THESE DRAWINGS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF SUCH INFORMATION AND SUPPLEMENT WITH ANY ADDITIONAL REQUIRED INFORMATION.</div><div>8. UNLESS INDICATED AS EXISTING (E), ALL PROPOSED MATERIALS AND EQUIPMENT SHALL BE CONSIDERED TO BE NEW.</div><div>9. ALL EQUIPMENT AND COMPONENTS SHALL BE MOUNTED IN COMPLIANCE WITH THE MANUFACTURER'S REQUIREMENTS, CONSTRUCTION DETAILS, AND/OR PRUDENT INDUSTRY STANDARDS.</div><div>10. TO THE EXTENT THAT TREES AND OTHER FEATURES AFFECT THE SYSTEM'S PRODUCTION, SUCH PRODUCTION MODELING IS BASED ON THE EXISTING APPROXIMATE HEIGHTS AND LOCATIONS RELATIVE TO THE SYSTEM AND MAY BE IMPACTED AS TREES GROW AND OTHER FEATURES CHANGE.</div></div></div> | <div>PROJECT SCOPE</div> <div><div>THIS PROJECT CONSISTS OF THE INSTALLATION OF BATTERY ENERGY STORAGE EQUIPMENT, PER THE SYSTEM DESCRIPTION BELOW. THE ENERGY STORAGE MODULES WILL BE INSTALLED IN PURPOSE BUILT ENCLOSURES WITH INTEGRATED FIRE SUPPRESSION AND COOLING SYSTEMS. THE ENERGY STORAGE MODULES WILL BE WIRED IN SERIES AND PARALLEL TO ACCOMMODATE THE POWER REQUIREMENTS OF THE POWER CONVERSION SYSTEM OR DC-DC CONVERTER (DEPENDENT ON PROJECT REQUIREMENTS). THE COMBINED POWER WILL BE CONNECTED TO CERTIFIED POWER CONVERSION SYSTEMS THAT CONVERT AC/DC AND DC/AC FOR CHARGE/DISCHARGE CAPABILITIES. DC-DC CONVERTERS WILL BE USED IN DC COUPLED PROJECTS WITH ONLY CERTIFIED INVERTERS (DC/AC) DISCHARGING ENERGY TO THE GRID.</div><div>ENERGY STORAGE SYSTEM DESCRIPTION</div><table><tr><td>SYSTEM POWER CAPACITY (kWAC)</td><td>4990</td></tr><tr><td>SYSTEM ENERGY CAPACITY (kWh)</td><td>30090</td></tr><tr><td>POWER CONVERSION SYSTEM / INVERTER</td><td>(2) HITHIUM ESS CONTAINER 2.0</td></tr></table><div>TOTAL SYSTEM DESCRIPTION</div><table><tr><td>TOTAL STORAGE POWER CAPACITY (kWAC)</td><td>4990</td></tr><tr><td>MAXIMUM EXPORT TO UTILITY</td><td>4 HOURS AT RATED CAPACITY</td></tr><tr><td>STORAGE CHARGING MODE</td><td>GRID ONLY</td></tr></table><div>SPECIAL INSPECTIONS</div><table><tr><td>GENERAL CONSTRUCTION SPECIAL INSPECTIONS</td><td>CODE/SECTION</td></tr><tr><td>1. FIRE RESISTANT PENETRATIONS AND JOINTS</td><td>BC 1704.27</td></tr><tr><td>2. ENERGY CODE COMPLIANCE INSPECTIONS</td><td>BC 110.3.5</td></tr><tr><td>FINAL</td><td></td></tr></table></div> | SYSTEM POWER CAPACITY (kWAC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 4990                                 | SYSTEM ENERGY CAPACITY (kWh) | 30090 | POWER CONVERSION SYSTEM / INVERTER | (2) HITHIUM ESS CONTAINER 2.0 | TOTAL STORAGE POWER CAPACITY (kWAC) | 4990 | MAXIMUM EXPORT TO UTILITY | 4 HOURS AT RATED CAPACITY | STORAGE CHARGING MODE | GRID ONLY | GENERAL CONSTRUCTION SPECIAL INSPECTIONS | CODE/SECTION | 1. FIRE RESISTANT PENETRATIONS AND JOINTS | BC 1704.27 | 2. ENERGY CODE COMPLIANCE INSPECTIONS | BC 110.3.5 | FINAL |     | <div>LOCATION MAP</div> <div></div> <div>AERIAL VIEW</div> <div></div> | <div>DRAWING LIST</div> <table><tr><td>Sheet Number</td><td>Sheet Title</td></tr><tr><td>T-1.0</td><td>TITLE PAGE</td></tr><tr><td colspan="2">CIVIL</td></tr><tr><td>C-0.0</td><td>CIVIL NOTES</td></tr><tr><td>C-1.0</td><td>EXISTING CONDITIONS PLAN</td></tr><tr><td>C-2.0</td><td>TREE CLEARING PLAN</td></tr><tr><td>C-3.0</td><td>LAYOUT AND MATERIALS PLAN</td></tr><tr><td>C-4.0</td><td>GRADING AND EROSION CONTROL PLAN</td></tr><tr><td>C-5.0</td><td>CIVIL DETAILS</td></tr><tr><td>C-5.1</td><td>CIVIL DETAILS</td></tr><tr><td>C-6.0</td><td>FIRE TRUCK TURNING PLAN</td></tr></table> | Sheet Number | Sheet Title | T-1.0     | TITLE PAGE | CIVIL           |    | C-0.0            | CIVIL NOTES | C-1.0      | EXISTING CONDITIONS PLAN | C-2.0                                | TREE CLEARING PLAN | C-3.0                   | LAYOUT AND MATERIALS PLAN | C-4.0                   | GRADING AND EROSION CONTROL PLAN | C-5.0    | CIVIL DETAILS | C-5.1        | CIVIL DETAILS | C-6.0 | FIRE TRUCK TURNING PLAN | <div>NOT FOR CONSTRUCTION</div> <div><div><div>THIS DOCUMENT IS PROVIDED BY NEW LEAF ENERGY, INC. 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REPRODUCTION, RELEASE OR UTILIZATION FOR ANY OTHER PURPOSE, WITHOUT PRIOR WRITTEN CONSENT IS STRICTLY PROHIBITED.</div><div></div><div>55 TECHNOLOGY DRIVE, SUITE 102<br/>LOWELL, MA 01851<br/>PHONE: (800) 818-5249<br/>FAX: (888) 678-8991<br/>WWW.NEWLEAFENERGY.COM</div></div><div><div>COMMONWEALTH OF MASSACHUSETTS<br/>MELINDA COSTELLO<br/>CIVIL<br/>No. 52956<br/>PROFESSIONAL ENGINEER<br/>Melinda Costello<br/>5/16/2025</div><div>IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER ANY DOCUMENT WHICH BEARS THE SEAL OF A PROFESSIONAL ENGINEER, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER.</div></div><div>SITE USE PERMIT SET<br/>404 SILVER ST<br/>AGAWAM, MA 01001</div><div>PROJECT NUMBER:<br/>120-0339</div><table><tr><td>REV</td><td>DATE</td><td>DRAWN</td><td>CHECKED</td><td>RELEASE LEVEL</td></tr><tr><td>0</td><td>02/24/25</td><td>AM&amp;WP</td><td>NP&amp;DL</td><td>BID SET</td></tr><tr><td>1</td><td>10/17/24</td><td>RWG</td><td>MRC</td><td>SPR FIRE DEPARTMENT COMMENTS</td></tr><tr><td>2</td><td>10/25/24</td><td>DED</td><td>MRC</td><td>SPR ENGINEERING COMMENTS</td></tr><tr><td>3</td><td>05/16/25</td><td>DED</td><td>RJB</td><td>BESS PERMIT SET</td></tr></table><div>SCALES STATED ON DRAWINGS ARE VALID ONLY WHEN PLOTTED ARCH D 24" X 36"</div><div>T-1.0</div><div>TITLE PAGE</div></div> | REV | DATE      | DRAWN | CHECKED  | RELEASE LEVEL | 0                     | 02/24/25 | AM&WP           | NP&DL | BID SET             | 1   | 10/17/24                | RWG | MRC                 | SPR FIRE DEPARTMENT COMMENTS | 2                        | 10/25/24 | DED            | MRC | SPR ENGINEERING COMMENTS | 3    | 05/16/25   | DED | RJB          | BESS PERMIT SET |                    |     |         |      |                                          |     |                        |    |                 |     |                 |  |  |    |               |                                                                                                                                                                                                                                        |
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| <div>APPLICABLE CODES AND STANDARDS</div> <div>2020 MASSACHUSETTS ELECTRICAL CODE 527 CMR12.00<br/>MASSACHUSETTS BUILDING CODE 9TH EDITION<br/><br/>UL-1642 - STANDARD FOR LITHIUM BATTERIES<br/>UL-1741 - INVERTERS, COMBINER BOXES<br/>UL-1973 - STANDARD FOR BATTERIES FOR USE IN LIGHT ELECTRIC RAIL (LER) APPLICATIONS AND STATIONARY APPLICATIONS<br/>UL-9540 - STANDARD FOR ENERGY STORAGE SYSTEM AND EQUIPMENT</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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OWNER<br/>SILVER STREET ENERGY STORAGE, LLC<br/>55 TECHNOLOGY DRIVE, SUITE 102<br/>LOWELL, MA 01851</div><div>LAND OWNER / HOST<br/>ROBERT AND DEBORAH PELLEY<br/>404 SILVER STREET, AGAWAM, MA 01001</div><div>AUTHORITY HAVING JURISDICTION<br/>TOWN OF AGAWAM PLANNING BOARD<br/>36 MAIN STREET<br/>AGAWAM, MA 01001</div><div>UTILITY<br/>EVERSOURCE</div></div><div><div>CIVIL ENGINEER<br/>FIRM: WESTON &amp; SAMPSON ENGINEERS, INC.<br/>CONTACT: MELINDA COSTELLO, PE<br/>PHONE: (978) 532-1900</div><div>DESIGN ENGINEER<br/>FIRM: NEW LEAF ENERGY, INC.<br/>PHONE: (800) 818-5249</div><div>ELECTRICAL ENGINEER<br/>FIRM: NEW LEAF ENERGY, INC.<br/>PHONE: (80) 818-5249</div></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <div>GENERAL ABBREVIATIONS</div> <table><tr><td>(E)</td><td>EXISTING</td><td>MFR</td><td>MANUFACTURER</td></tr><tr><td>AHJ</td><td>AUTHORITY HAVING JURISDICTION</td><td>MOD</td><td>SOLAR MODULE</td></tr><tr><td>AL</td><td>ALUMINUM</td><td>NS</td><td>NORTH-SOUTH</td></tr><tr><td>APPROX</td><td>APPROXIMATE</td><td>NTS</td><td>NOT TO SCALE</td></tr><tr><td>ARY</td><td>ARRAY</td><td>OAE</td><td>OR APPROVED EQUAL</td></tr><tr><td>BLDG</td><td>BUILDING</td><td>OC</td><td>ON CENTER</td></tr><tr><td>NLE</td><td>NEW LEAF ENERGY</td><td>OD</td><td>OUTSIDE DIAMETER</td></tr><tr><td>CL</td><td>CENTERLINE</td><td>OFCl</td><td>OWNER FURNISHED CONTRACTOR INSTALLED</td></tr><tr><td>DAS</td><td>DATA ACQUISITION SYSTEM</td><td>PCS</td><td>POWER CONVERSION SYSTEM</td></tr><tr><td>DIA</td><td>DIAMETER</td><td>PV</td><td>PHOTOVOLTAIC</td></tr><tr><td>DO</td><td>DITTO</td><td>PVC</td><td>POLY VINYL CHLORIDE</td></tr><tr><td>EW</td><td>EAST-WEST</td><td>SCH</td><td>SCHEDULE</td></tr><tr><td>ESS</td><td>ENERGY STORAGE SYSTEM</td><td>SS</td><td>STAINLESS STEEL</td></tr><tr><td>ESU</td><td>ENERGY STORAGE UNIT</td><td>SSS</td><td>SOLAR SUPPORT STRUCTURE</td></tr><tr><td>FBO</td><td>FURNISHED BY OTHERS</td><td>STC</td><td>STANDARD TEST CONDITIONS</td></tr><tr><td>FF</td><td>FORWARD FACING</td><td>TBD</td><td>TO BE DETERMINED</td></tr><tr><td>GALV</td><td>GALVANIZED</td><td>TP</td><td>TAMPER PROOF</td></tr><tr><td>HDG</td><td>HOT DIP GALVANIZED</td><td>TYP</td><td>TYPICAL</td></tr><tr><td>HVAC</td><td>HEATING VENTILATION AND AIR CONDITIONING</td><td>UON</td><td>UNLESS OTHERWISE NOTED</td></tr><tr><td>ID</td><td>INSIDE DIAMETER</td><td>VIF</td><td>VERIFY IN FIELD</td></tr><tr><td></td><td></td><td>WP</td><td>WEATHER PROOF</td></tr></table> <div>REV 1.0</div> | (E)                                  | EXISTING                     | MFR   | MANUFACTURER                       | AHJ                           | AUTHORITY HAVING JURISDICTION       | MOD  | SOLAR MODULE              | AL                        | ALUMINUM              | NS        | NORTH-SOUTH                              | APPROX       | APPROXIMATE                               | NTS        | NOT TO SCALE                          | ARY        | ARRAY | OAE | OR APPROVED EQUAL                                                                                                                                                                                          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DIP GALVANIZED | TYP | TYPICAL | HVAC | HEATING VENTILATION AND AIR CONDITIONING | UON | UNLESS OTHERWISE NOTED | ID | INSIDE DIAMETER | VIF | VERIFY IN FIELD |  |  | WP | WEATHER PROOF | <div>BASIS OF DESIGN</div> <div>LIMITED ALTA/NSPS LAND TITLE SURVEY:<br/>NORTHEAST SURVEY CONSULTANTS<br/>FEBRUARY 2022<br/><br/>WETLAND STREAM AND DELINEATION REPORT:<br/>WESTON &amp; SAMPSON ENGINEERS, INC.<br/>AUGUST 2024</div> |
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                |     |                        |    |                 |     |                 |  |  |    |               |                                                                                                                                                                                                                                        |



GENERAL CIVIL NOTES

GENERAL NOTES

1.

AS CONTAINED HEREIN, "CONTRACTOR" IS ASSUMED TO BE THE EPC PROVIDER HIRED BY THE SYSTEM OWNER. "SUBCONTRACTOR" IS THE EPC PROVIDER'S INSTALLATION SUBCONTRACTORS (INCLUDING SITE WORK SUBCONTRACTOR) AND CIVIL ENGINEER OF RECORD (CEOR) IS THE EPC PROVIDER'S DESIGNATED CIVIL ENGINEER.

2.

EXISTING CONDITIONS SURVEY INFORMATION WAS PREPARED BY NORTHEAST SURVEY CONSULTANTS PERFORMED ON 2/1/2022. HORIZONTAL DATUM IS REFERENCED TO THE MASSACHUSETTS COORDINATE SYSTEM NORTH AMERICAN DATUM 1983. VERTICAL DATUM IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM 1988.

3.

THERE IS NO GUARANTEE THAT ALL THE EXISTING UTILITIES, WHETHER FUNCTIONAL OR ABANDONED WITHIN THE PROJECT LIMITS ARE ON THIS DRAWING. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL UNDERGROUND UTILITIES BEFORE STARTING WORK AND SHALL BE RESPONSIBLE FOR ALL DAMAGE RESULTING FROM THIS WORK. A DIG SAFE TICKET NUMBER INDICATING ALL EXISTING UTILITIES HAVE BEEN LOCATED AND MARKED SHALL BE OBTAINED PRIOR TO COMMENCING WORK. CONTACT "DIG SAFE SYSTEM, INC." AT 1-888-344-7233 AND PROVIDE 72 HOURS NOTICE TO RECEIVE A TICKET NUMBER.

4.

THE LOCATION, SIZE, DEPTH, AND SPECIFICATIONS FOR CONSTRUCTION OF PRIVATE UTILITY SERVICES SHALL BE INSTALLED ACCORDING TO THE REQUIREMENTS PROVIDED BY, AND APPROVED BY, THE RESPECTIVE ELECTRIC UTILITY COMPANY. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF THE UTILITY CONNECTIONS WITH THE RESPECTIVE COMPANIES PRIOR TO ANY UTILITY CONSTRUCTION.

5.

TOWN APPROVALS SHALL BE KEPT ON SITE AT ALL TIMES.

6.

PRIOR TO CONSTRUCTING THE SITE ENTRANCE ONTO SILVER STREET, THE CONTRACTOR SHALL OBTAIN A HIGHWAY/DRIVEWAY PERMIT FROM THE APPLICABLE AHJ.

7.

SUBCONTRACTOR(S) SHALL THOROUGHLY FAMILIARIZE THEMSELVES WITH ALL CONSTRUCTION DOCUMENTS, SPECIFICATIONS, AND SITE CONDITIONS PRIOR TO BIDDING AND PRIOR TO CONSTRUCTION.

8.

ANY DISCREPANCIES BETWEEN DRAWINGS, SPECIFICATIONS, AND SITE CONDITIONS SHALL BE REPORTED IMMEDIATELY TO THE CONTRACTOR/CEOR FOR CLARIFICATION AND RESOLUTION PRIOR TO BIDDING OR CONSTRUCTION.

9.

AREAS USED AS FOR PARKING DURING CONSTRUCTION SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITIONS INCLUDING, BUT NOT LIMITED TO, REGRADING, LOAMING AND SEEDING. IN NO CASE SHALL PARKING AREAS, LAYDOWN AREAS, CONSTRUCTION TRAILERS, AND PORTABLE TOILETS BE LOCATED WITHIN A WETLAND RESOURCE AREA AND/OR ANY BUFFER ZONES.

10.

PER THE TOWN OF AGAWAM ENGINEERING DEPARTMENT THE PROJECT SHALL HAVE AN E911 ADDRESS OF 408 SILVER STREET.

11.

ARTICLE XXIII BATTERY ENERGY STORAGE SYSTEM REQUIRES A MINIMUM SETBACK OF 50 FEET FROM ALL SIDE, REAR, AND FRONT LOT LINES FOR TIER II BATTERY ENERGY STORAGE SYSTEMS (BESS).

SITE PREPARATION NOTES

1.

AREAS DESIGNATED FOR TREE CUTTING SHALL BE CUT ONLY. NO GRUBBING OR STRIPPING OF TOPSOIL IS NECESSARY UNLESS SPECIFICALLY SHOWN OTHERWISE AND APPROVAL HAS BEEN GIVEN BY THE CONTRACTOR.

2.

TREE CLEARING AND STUMP REMOVAL SHALL BE IN ACCORDANCE WITH APPROVED LOCAL, STATE, AND FEDERAL PERMITS. TREES TO BE REMOVED SHALL BE MARKED BY THE CONTRACTOR'S PROJECT MANAGER OR SITE SUPERINTENDENT PRIOR TO COMMENCEMENT OF WORK ON-SITE.

3.

SEASONAL TREE CLEARING RESTRICTIONS MAY BE REQUIRED FOR ENDANGERED SPECIES PROTECTION. THE CONTRACTOR SHALL REFER TO THE TREE CLEARING PLAN FOR ANY RESTRICTIONS.

4.

THE SUBCONTRACTOR(S) IS/ARE RESPONSIBLE FOR ANY DAMAGE TO EXISTING SITE CONDITIONS TO REMAIN THAT ARE DUE TO SUBCONTRACTOR(S) OPERATIONS.

5.

ITEMS TO BE REMOVED THAT ARE NOT STOCKPILED FOR LATER REUSE ON THE PROJECT OR DELIVERED TO THE OWNER SHALL BE LEGALLY DISPOSED OF OFF SITE BY THE SUBCONTRACTOR(S).

6.

THE SUBCONTRACTOR(S) SHALL BE RESPONSIBLE FOR COORDINATING THEIR EFFORTS WITH ALL TRADES.

7.

THE SUBCONTRACTOR(S) SHALL COORDINATE ALL ADJUSTMENT OR ABANDONMENT OF UTILITIES WITH THE RESPECTIVE UTILITY COMPANY.

8.

TEMPORARY CONSTRUCTION HAUL ROADS SHALL BE USED DURING CONSTRUCTION IF DEEMED NECESSARY BY THE CONTRACTOR. THE USE OF SEPARATION FABRICS SHALL BE USED TO FACILITATE FUTURE REMOVAL AND RECOVERY OF GRANULAR MATERIALS. HAUL ROADS SHALL BE MAINTAINED DURING CONSTRUCTION WITH APPROPRIATE EROSION CONTROL AND STORMWATER REDUCTION MEASURES. ONCE REMOVED, THE SUB-BASE AREA SHOULD BE DECOMPACTED, LOAM REPLACED, AND RESEEDED.

9.

THE SITE ACCESS ROADS ARE DESIGNED TO MEET STATE FIRE CODE FOR FIRE TRUCK ACCESS. MEANS AND METHODS FOR ACCOMMODATING LARGER CONSTRUCTION DELIVERY VEHICLES MUST BE DETERMINED BY THE CONTRACTOR.

10.

THE PROPOSED ROAD DESIGN SHOWN IN THESE PLANS SHALL BE CONSIDERED THE FINAL DESIGN CONDITION. ADDITIONAL MEANS AND METHODS OF CONSTRUCTION DEEMED NECESSARY BY THE OWNER OR CONTRACTOR SHALL BE DESIGNED BY OTHERS AND INCLUDED IN THE INITIAL EPC BID PRICE (INCLUDING, BUT NOT LIMITED TO: TEMPORARY HAUL ROADS, WIDENED OR LENGTHENED ROADS AND TURN OUT AREAS FOR LARGER CONSTRUCTION AND DELIVERY VEHICLES, TEMPORARY PARKING AND LAYDOWN AREAS, MODIFIED GRADING TO SUPPORT CONSTRUCTION AND DELIVERY VEHICLES, ETC.).

EROSION AND SEDIMENT CONTROL MEASURES

1.

EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO ANY SITE EXCAVATION OR DISTURBANCE AND SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PROCESS. THE SMALLEST PRACTICAL AREA OF LAND SHALL BE EXPOSED AT ANY ONE TIME.

2.

SEDIMENT BARRIERS SHALL BE INSPECTED AND APPROVED BY THE TOWN OF AGAWAM OR THEIR REPRESENTATIVE AND THE CONTRACTOR/CEOR BEFORE CONSTRUCTION BEGINS.

3.

STRAW BALES AND MULCH SHALL BE MOWINGS OF ACCEPTABLE HERBACEOUS GROWTH, FREE OF NOXIOUS WEEDS OR WOODY STEMS, AND SHALL BE DRY WHEN INSTALLED.

4.

DISTURBED AREAS SHALL BE BLANKETED OR SEEDED AND MULCHED AS SOON AS PRACTICAL AFTER CONSTRUCTION ACTIVITIES IN THAT AREA HAVE CONCLUDED. ALL ERODABLE/BARE AREAS SHALL BE BLANKETED OR SEEDED AND MULCHED WITHIN 7 DAYS WITH TEMPORARY EROSION CONTROL SEEDING.

5.

PRIOR TO SEEDING, ACCESS AISLES, TEMPORARY STAGING, STORAGE, AND PARKING AREAS ARE TO BE DE-COMPACTED AND RESTORED PER THE SWPPP.

6.

STABILIZE SLOPES GREATER THAN 3:1 (HORIZONTAL: VERTICAL) WITH SEED, SECURED GEOTEXTILE FABRIC, SPRAYED COMPOST BLANKET, OR RIP-RAP AS REQUIRED TO PREVENT EROSION DURING CONSTRUCTION.

7.

SEDIMENT BARRIERS SHALL BE CONSTRUCTED AROUND ALL SOIL STOCKPILE AREAS.

8.

CLEAN OUT PROJECT DRAINAGE FEATURES AND STRUCTURES (I.E. CULVERTS, BASINS, SWALES, ETC.) AFTER COMPLETION OF CONSTRUCTION.

9.

SEDIMENT COLLECTED DURING CONSTRUCTION BY THE VARIOUS EROSION CONTROL SYSTEMS SHALL BE DISPOSED OF ON THE SITE ON A REGULAR BASIS. SEDIMENT SHALL BE REMOVED FROM EROSION CONTROL SYSTEMS WHEN THE HEIGHT OF THE SEDIMENT EXCEEDS ONE-HALF OF THE HEIGHT OF THE SEDIMENT CONTROL MEASURE.

10.

AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, THE SUBCONTRACTOR(S) SHALL REMOVE ALL TEMPORARY EROSION CONTROL MEASURES AT THE CONTRACTOR/CEOR DIRECTION.

11.

AFTER THE REMOVAL OF TEMPORARY EROSION CONTROL MEASURES, THE SUBCONTRACTOR(S) SHALL GRADE AND SEED AREA OF TEMPORARY EROSION CONTROL MEASURE.

12.

DAMAGED OR DETERIORATED EROSION AND SEDIMENT CONTROL ITEMS WILL BE REPAIRED IMMEDIATELY AFTER IDENTIFICATION OR AS DIRECTED BY THE CONTRACTOR/CEOR.

13.

THE CONTRACTOR'S SITE SUPERINTENDENT IS RESPONSIBLE FOR DAILY INSPECTIONS, MAINTENANCE, AND DIRECTING REPAIR ACTIVITIES. THE CONTRACTOR SHALL INSPECT EROSION CONTROL MEASURES ONCE EVERY SEVEN (7) CALENDAR DAYS OR ONCE EVERY FOURTEEN (14) DAYS AND WITHIN 24 HOURS OF ANY STORM EXCEEDING 1/2 INCH PRECIPITATION, IN ACCORDANCE WITH THE NPDES REQUIREMENTS. DAMAGED AND INEFFECTIVE EROSION CONTROL MEASURES SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS.

14.

WATER PUMPED OR OTHERWISE DISCHARGED FROM THE SITE DURING CONSTRUCTION DEWATERING, IF REQUIRED, SHALL BE FILTERED.

15.

WHEN TEMPORARY DRAINAGE IS ESTABLISHED, EROSION/SEDIMENTATION CONTROL MEASURES MAY BE REQUIRED BY CONTRACTOR/CEOR.

16.

GRAVEL ROADS, ACCESS DRIVES, PARKING AREAS OF SUFFICIENT WIDTH AND LENGTH, AND VEHICLE WASH DOWN FACILITIES, SHALL BE PROVIDED TO PREVENT SOIL FROM BEING TRACKED ONTO PUBLIC OR PRIVATE ROADWAYS. ANY SOIL REACHING A PUBLIC OR PRIVATE ROADWAY SHALL BE REMOVED BEFORE THE END OF EACH WORKDAY.

17.

NECESSARY MEASURES SHALL BE TAKEN TO CONTAIN ANY FUEL OR POLLUTION RUNOFF. NO RE-FUELING SHALL OCCUR WITHIN 100 FEET OF ANY WETLAND RESOURCE AREA AND 200 FEET FROM RIVERFRONT. LEAKING EQUIPMENT OR SUPPLIES SHALL BE IMMEDIATELY REPAIRED OR REMOVED FROM THE SITE.

18.

THE COST OF REPAIRING EROSION CONTROL MEASURES OR REMOVING SEDIMENT FROM EROSION CONTROL SYSTEMS SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE FOR THE APPLICABLE EROSION CONTROL ITEM.

19.

EROSION CONTROL MEASURES SHALL BE KEPT OPERATIONAL AND MAINTAINED CONTINUOUSLY THROUGHOUT THE PERIOD OF LAND DISTURBANCE UNTIL PERMANENT SEDIMENT AND EROSION CONTROL MEASURES ARE OPERATIONAL.

20.

CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DUST FROM FORMING.

21.

EROSION CONTROL MEASURES AS SHOWN ON THESE DRAWINGS IS INTENDED TO CONVEY MINIMUM REQUIREMENTS. THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES AS NECESSARY TO PREVENT SOIL EROSION AND TO COMPLY WITH THE PROJECT'S NPDES PERMIT STORMWATER POLLUTION PREVENTION PLAN.

LAYOUT AND MATERIAL NOTES

1.

THE CONTRACTOR SHALL HAVE PERIMETER FENCE, ELECTRICAL TRENCHES, AND PAD LIMITS STAKED OUT BY A LICENSED LAND SURVEYOR PRIOR TO ANY INSTALLATION OF EQUIPMENT PADS OR TRENCHES.

2.

EXCESS TRENCH MATERIAL SHALL BE PLACED ON THE SIDES OF THE TRENCH AND PLACED AT OR NEAR THE SAME LOCATION AS WHERE EXCAVATED. TOPSOIL REMOVED SHALL BE PLACED ON TOP AND LIGHTLY COMPACTED.

3.

SUBCONTRACTOR SHALL INSTALL CONDUITS FOR ALL ELECTRIC CONDUIT CROSSINGS PRIOR TO INSTALLATION OF THE GEOGRID MATERIAL. THE GEOGRID SHALL NOT BE HORIZONTALLY CUT ONCE INSTALLED.

GRADING NOTES

1.

WHERE PROPOSED GRADES MEET EXISTING GRADES, SUBCONTRACTOR(S) SHALL BLEND GRADES TO PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING AND NEW WORK. PONDING AT TRANSITION AREAS WILL NOT BE ALLOWED.

2.

CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE AWAY FROM ALL BUILDING FOUNDATIONS, STRUCTURES, PUBLIC ROADWAYS, AND ELECTRICAL EQUIPMENT AREAS.

ABBREVIATIONS

BIT

BITUMINOUS

BMP

BEST MANAGEMENT PRACTICE

BVW

BORDERING VEGETATED WETLANDS

CB

CONCRETE BOUND

CONC

CONCRETE

CMP

CORRUGATED METAL PIPE

CPP

CORRUGATED PLASTIC PIPE

DH

DRILL HOLE

DIP

DUCTILE IRON PIPE

DMH

DRAIN MANHOLE

ECB

EROSION CONTROL BARRIER

FES

FLARED END SECTION

FH

FIRE HYDRANT

FND

FOUND

GG

GAS GATE

HDPE

HIGH-DENSITY POLYETHYLENE

HW

HEADWALL

ILSF

ISOLATED LANDS SUBJECT TO FLOODING

IP

IRON PIPE

ISW

ISOLATED WETLANDS (FEDERAL JURISDICTION)

LA

LANDSCAPED AREA

LOW

LIMIT OF WORK

N/F

NOW OR FORMERLY

NTS

NOT TO SCALE

OCS

OUTLET CONTROL STRUCTURE

OHW

OVERHEAD WIRE

RCP

REINFORCED CONCRETE PIPE

RET

RETAINING

ROW

RIGHT-OF-WAY

SB

STONE BOUND

TEL

TELEPHONE CABLE

TYP

TYPICAL

UP

UTILITY POLE

WG

WATER GATE

REV 1.1

LEGEND

ROAD (GRAVEL)

FENCE LINE

PROPERTY LINE

FLOW DIRECTION

BANK LINE/FLAG

WETLAND LINE/FLAG

(E) MAJOR CONTOUR

(E) MINOR CONTOUR

PROPOSED MAJOR CONTOUR

PROPOSED MINOR CONTOUR

WETLAND BUFFER ZONE

RIVERFRONT AREA

100-YEAR FLOOD HAZARD AREA

LIMIT OF DISTURBANCE

TREELINE

SILT FENCE

SILT SOCK

STORM PIPE

MEDIUM VOLTAGE ELECTRICAL TRENCH

LOW VOLTAGE ELECTRICAL TRENCH

OVERHEAD ELECTRIC

SEWER LINE

WATER LINE

GAS MAIN

ASSESSORS MAP-LOT

SIGN

UTILITY POLE (WITH GUY ANCHOR)

HYDRANT

WATER VALVE

INDIVIDUAL TREE

PROPERTY MARKERS

NOTE: ITALIC FONTS INDICATE EXISTING CONDITIONS.  
STANDARD FONTS INDICATE PROPOSED CONDITIONS.

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new leaf energy

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WWW.NEWLEAFENERGY.COM

NOT FOR CONSTRUCTION

COMMONWEALTH OF MASSACHUSETTS  
MELINDA COSTELLO  
CIVIL  
No. 52956  
PROFESSIONAL ENGINEER  
Melinda Costello  
3/16/2025

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PROJECT NUMBER:  
120-0339

REV

DATE

DRAWN

CHECKED

RELEASE LEVEL

0

02/24/25

AM&WP

NP&DL

BID SET

1

10/17/24

FWG

MPC

SPR FIRE DEPARTMENT COMMENTS

2

10/25/24

DED

MPC

SPR ENGINEERING COMMENTS

3

05/16/25

DED

RJB

BESS PERMIT SET

SCALES STATED ON DRAWINGS  
ARE VALID ONLY WHEN PLOTTED  
ASCH 8.24" X 36"

C-0.0

CIVIL NOTES

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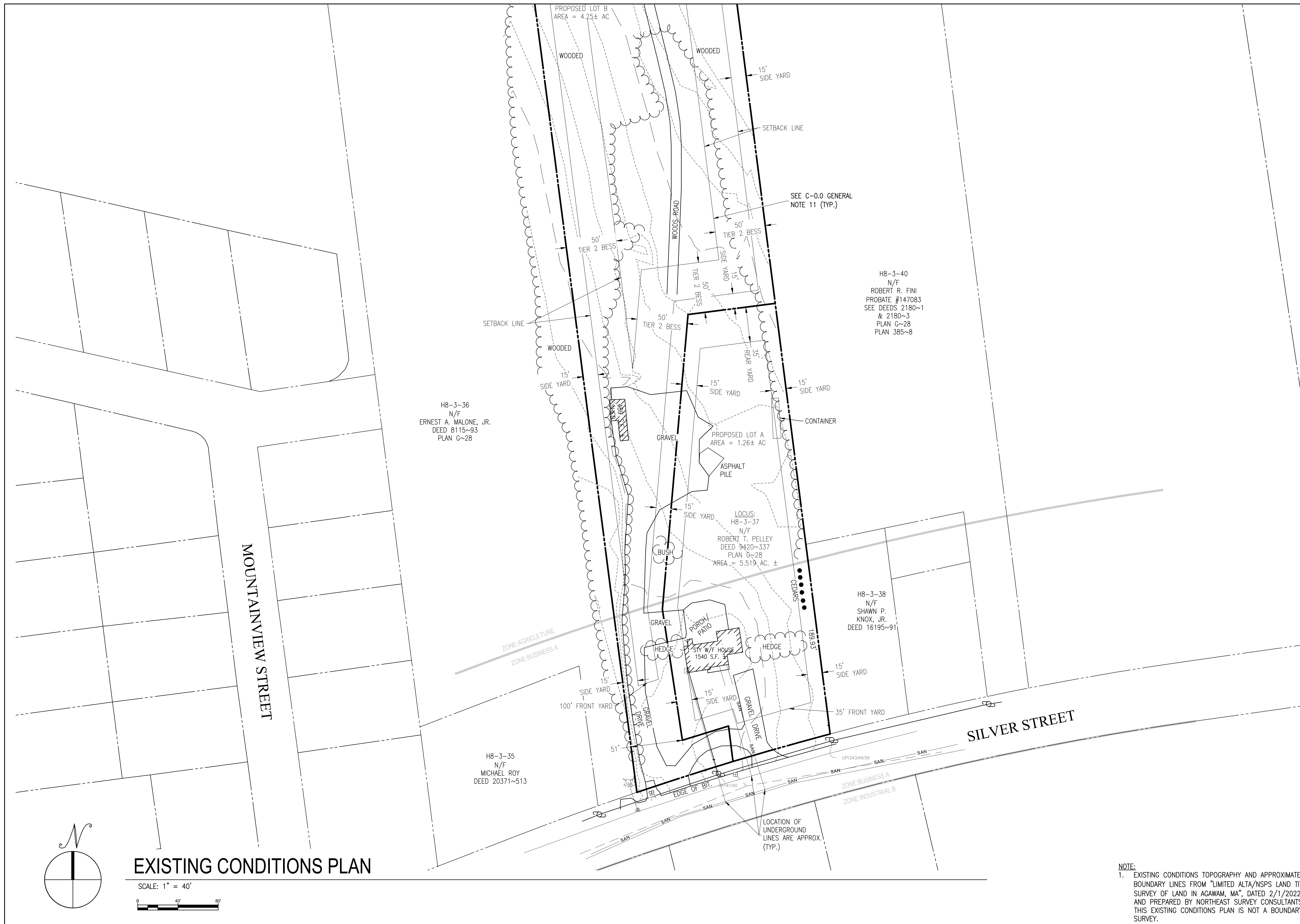
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120-0339

| REV | DATE     | DRAWN | CHECKED | RELEASE LEVEL                |
|-----|----------|-------|---------|------------------------------|
| 0   | 02/24/25 | AM&WP | NP&DL   | BID SET                      |
| 1   | 10/17/24 | RWG   | MRC     | SPR FIRE DEPARTMENT COMMENTS |
| 2   | 10/25/24 | DED   | MRC     | SPR ENGINEERING COMMENTS     |
| 3   | 05/16/25 | DED   | RUB     | BESS PERMIT SET              |
|     |          |       |         |                              |
|     |          |       |         |                              |

SCALES STATED ON DRAWINGS  
ARE VALID ONLY WHEN PLOTTER  
ARCH D 24" X 36"

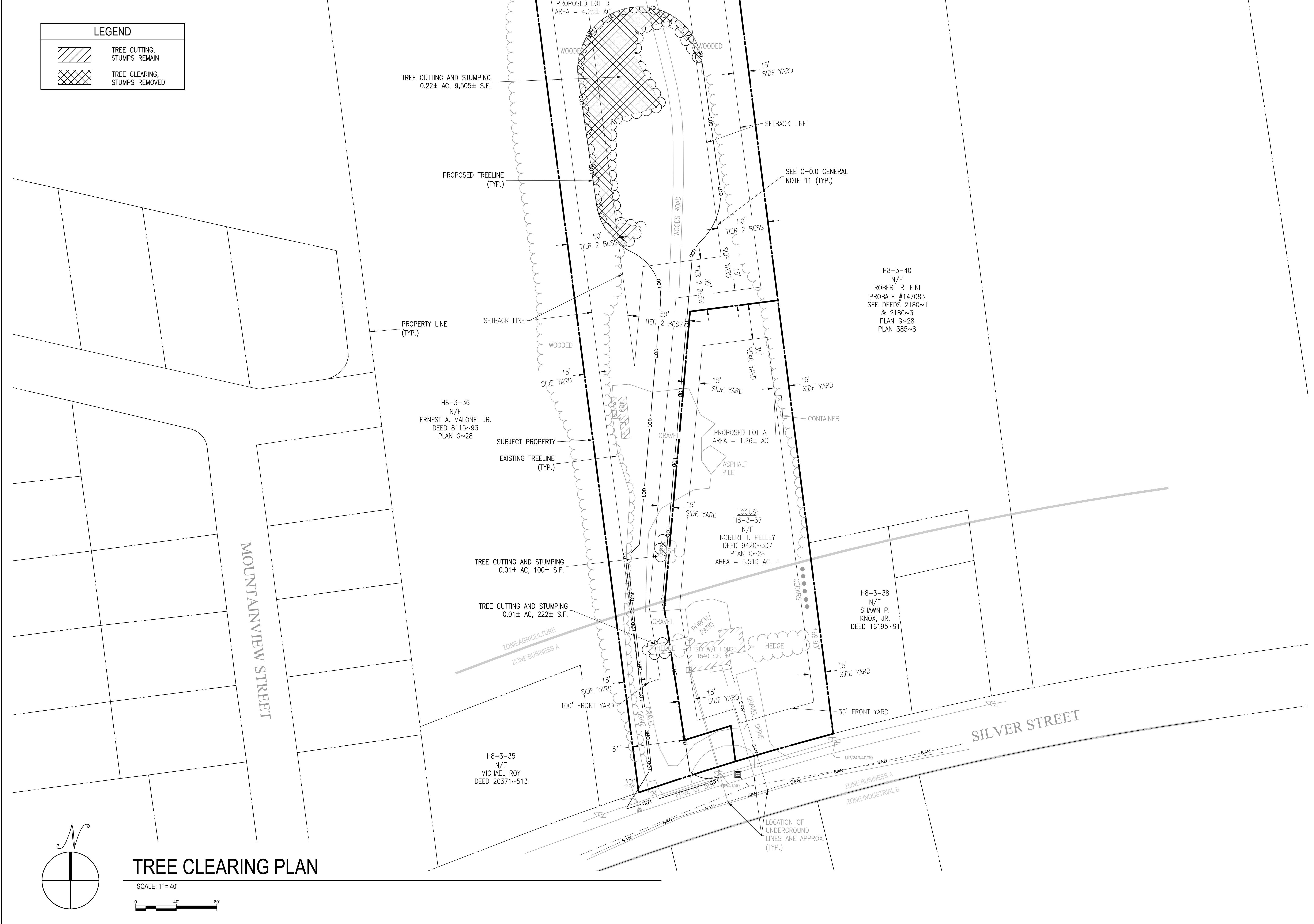
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## EXISTING CONDITIONS PLAN



NOTE:  
1. EXISTING CONDITIONS TOPOGRAPHY AND APPROXIMATE  
BOUNDARY LINES FROM "LIMITED ALTA/NSPS LAND TITLE  
SURVEY OF LAND IN AGAWAM, MA", DATED 2/1/2022  
AND PREPARED BY NORTHEAST SURVEY CONSULTANTS.  
THIS EXISTING CONDITIONS PLAN IS NOT A BOUNDARY  
SURVEY.





| LEGEND |                               |
|--------|-------------------------------|
|        | TREE CUTTING, STUMPS REMAIN   |
|        | TREE CLEARING, STUMPS REMOVED |

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*Melinda Costello*  
5/16/2025

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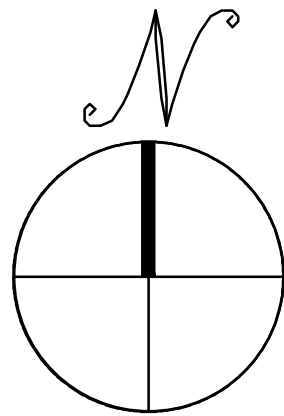
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| REV | DATE     | DRAWN | CHECKED | RELEASE LEVEL                |
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| 0   | 02/24/25 | AM&WP | NP&DL   | BID SET                      |
| 1   | 10/17/24 | RWG   | MRC     | SPR FIRE DEPARTMENT COMMENTS |
| 2   | 10/25/24 | DED   | MRC     | SPR ENGINEERING COMMENTS     |
| 3   | 05/16/25 | DED   | RJB     | BESS PERMIT SET              |

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TREE CLEARING PLAN



# TREE CLEARING PLAN

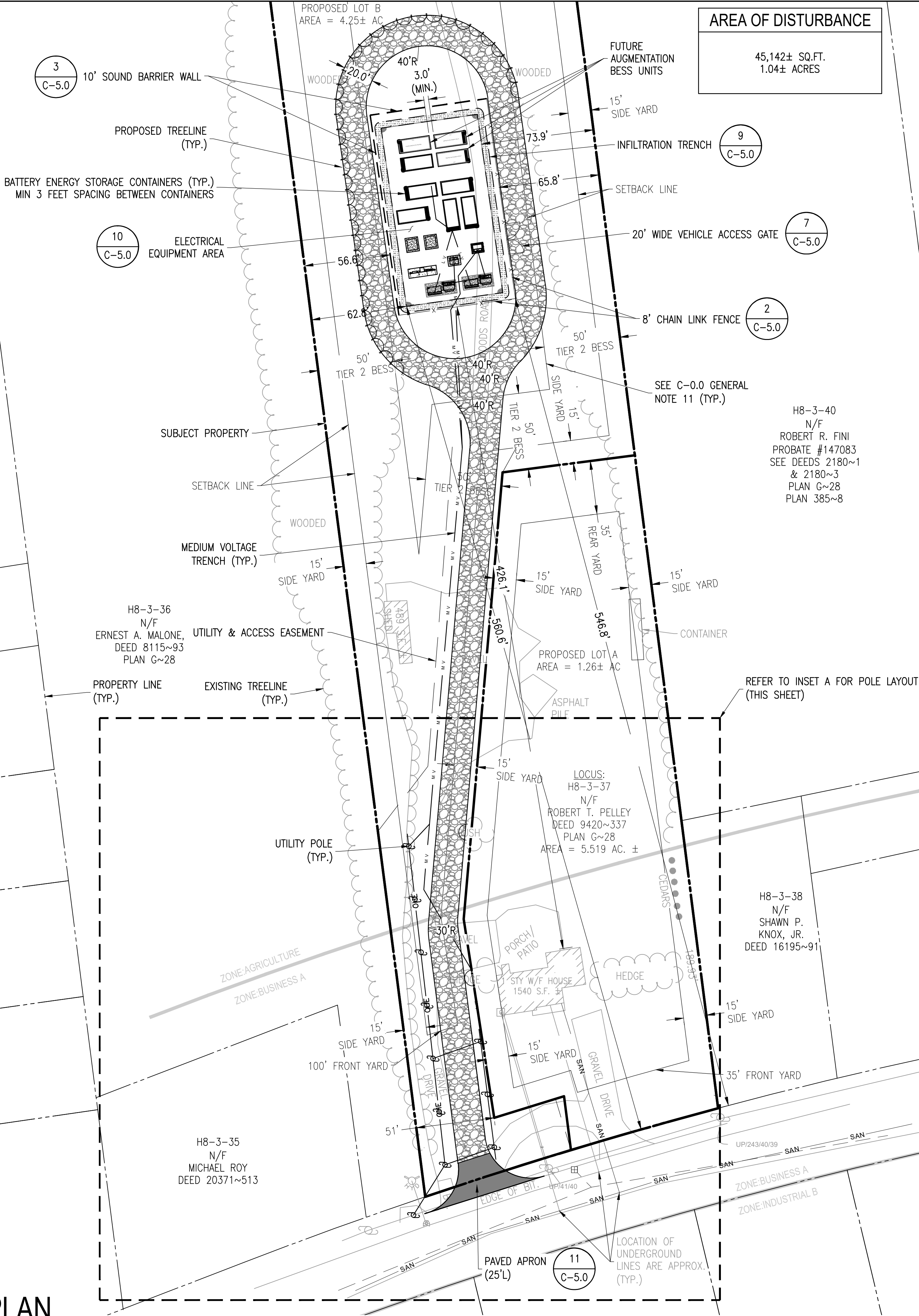
SCALE: 1" = 40'



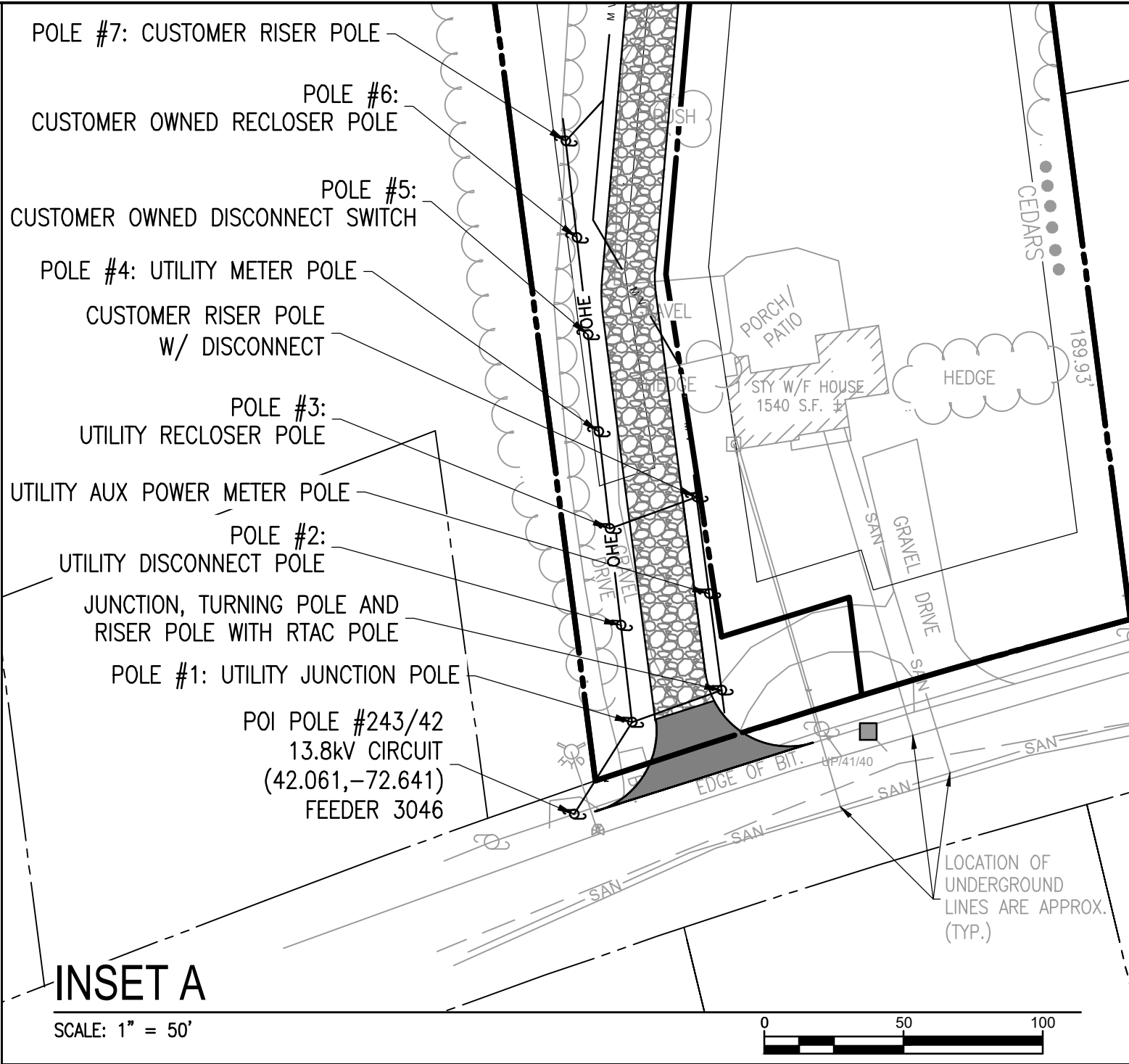


| ZONING SUMMARY TABLE                                           |        |          |          |                      |
|----------------------------------------------------------------|--------|----------|----------|----------------------|
| PARCEL NUMBER(S): H8-3-37                                      |        |          |          |                      |
| ZONING DISTRICT: AGRICULTURAL                                  |        |          |          |                      |
| PROPOSED LOT B                                                 |        |          |          |                      |
| BYLAW SECTION                                                  | UNITS  | REQUIRED | PROPOSED | NOTES                |
| MIN. LOT AREA                                                  | SQ.FT. | 20,000   | 185,130± | NONE                 |
| LOT FRONTAGE                                                   | FT.    | 100      | 100      | NONE                 |
| FRONT YARD                                                     | FT.    | 100      | 546±     | FROM PAD             |
| SIDE YARD                                                      | FT.    | 15       | 56±      | FROM FENCE           |
| REAR YARD                                                      | FT.    | 20       | 518±     | FROM FENCE           |
| MAX. BUILDING HEIGHT                                           | FT.    | 15       | <15      | TOP OF SOUND BARRIER |
| MAX. LOT COVERAGE                                              | %      | N/A      | --       | NONE                 |
| ZONING DISTRICT: BUSINESS A (RES-B ZONING REQUIREMENTS LISTED) |        |          |          |                      |
| PROPOSED LOT A                                                 |        |          |          |                      |
| BYLAW SECTION                                                  | UNITS  | REQUIRED | PROPOSED | NOTES                |
| MIN. LOT AREA                                                  | SQ.FT. | 12,000   | 54,886±  | NONE                 |
| LOT FRONTAGE                                                   | FT.    | 100      | 100      | NONE                 |
| FRONT YARD                                                     | FT.    | 30       | --       | NONE                 |
| SIDE YARD                                                      | FT.    | 15       | --       | NONE                 |
| REAR YARD                                                      | FT.    | 20       | --       | NONE                 |
| MAX. BUILDING HEIGHT                                           | FT.    | 35       | --       | NONE                 |
| MAX. LOT COVERAGE                                              | %      | 40       | --       | NONE                 |

ARTICLE XXIII BATTERY ENERGY STORAGE SYSTEM REQUIRES A MINIMUM SETBACK OF 50 FEET FROM ALL SIDE, REAR, AND FRONT LOT LINES FOR TIER II BATTERY ENERGY STORAGE SYSTEMS (BESS).



AREA OF DISTURBANCE  
45,142± SQ.FT.  
1.04± ACRES



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NOT FOR CONSTRUCTION

**MELINDA COSTELLO CIVIL**  
No. 52956  
PROFESSIONAL ENGINEER

It is a violation of law for any person to alter any document which bears the seal of a professional engineer, unless they are acting under the direction of a licensed professional engineer.

SITE USE PERMIT SET  
404 SILVER ST  
AGAWAM, MA 01001

PROJECT NUMBER:  
120-0339

| REV | DATE     | DRAWN | CHECKED | RELEASE                      | LEVEL |
|-----|----------|-------|---------|------------------------------|-------|
| 0   | 02/24/25 | AM&WP | NP&DL   | BID SET                      |       |
| 1   | 10/17/24 | RWG   | MRC     | SPR FIRE DEPARTMENT COMMENTS |       |
| 2   | 10/25/24 | DED   | MRC     | SPR ENGINEERING COMMENTS     |       |
| 3   | 05/16/25 | DED   | RUB     | BESS PERMIT SET              |       |

SCALES SHOWN ON DRAWINGS  
ARE VALID ONLY WHEN PLOTTED  
ARCH D 24" X 36"

**C-3.0**  
LAYOUT AND MATERIALS  
PLAN

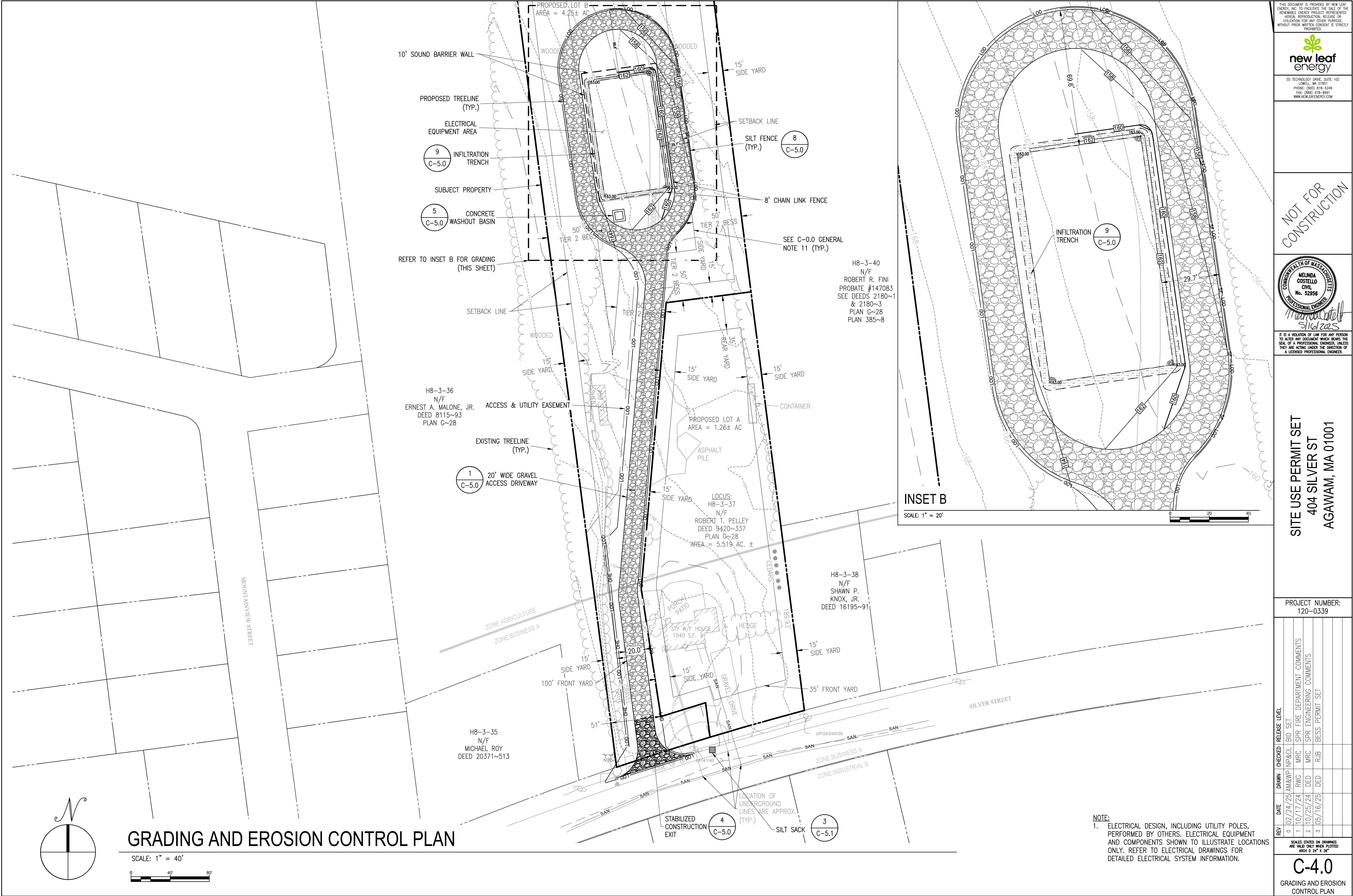
- NOTE:
- ELECTRICAL DESIGN, INCLUDING UTILITY POLES, PERFORMED BY OTHERS. ELECTRICAL EQUIPMENT AND COMPONENTS SHOWN TO ILLUSTRATE LOCATIONS ONLY. REFER TO ELECTRICAL DRAWINGS FOR DETAILED ELECTRICAL SYSTEM INFORMATION.
  - PER THE TOWN OF AGAWAM ENGINEERING DEPARTMENT, THE PROJECT SHALL HAVE AN E911 ADDRESS OF 408 SILVER STREET.

## LAYOUT AND MATERIALS PLAN

SCALE: 1" = 40'







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*Melinda Costello*  
5/16/2025

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**SITE USE PERMIT SET**  
**404 SILVER ST**  
**AGAWAM, MA 01001**

PROJECT NUMBER:  
120-0339

| REV | DATE     | DRAWN | CHECKED | RELEASE LEVEL                |
|-----|----------|-------|---------|------------------------------|
| 0   | 02/24/25 | AM&WP | NP&DL   | BID SET                      |
| 1   | 10/17/24 | RWG   | MRC     | SPR FIRE DEPARTMENT COMMENTS |
| 2   | 10/25/24 | DED   | MRC     | SPR ENGINEERING COMMENTS     |
| 3   | 05/16/25 | DED   | RUB     | BESS PERMIT SET              |

SCALES STATED ON DRAWINGS ARE VALID ONLY WHEN PLOTTED ARCH D 24" X 36"

**C-4.0**  
GRADING AND EROSION CONTROL PLAN

NOTE:  
1. ELECTRICAL DESIGN, INCLUDING UTILITY POLES, PERFORMED BY OTHERS. ELECTRICAL EQUIPMENT AND COMPONENTS SHOWN TO ILLUSTRATE LOCATIONS ONLY. REFER TO ELECTRICAL DRAWINGS FOR DETAILED ELECTRICAL SYSTEM INFORMATION.









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SITE USE PERMIT SET  
404 SILVER ST  
AGAWAM, MA 01001

PROJECT NUMBER:  
120-0339

| REV | DATE     | DRAWN | CHECKED | RELEASE LEVEL                |
|-----|----------|-------|---------|------------------------------|
| 0   | 02/24/25 | AM&WP | NP&DJ   | BID SET                      |
| 1   | 10/17/24 | RWG   | MRC     | SPR FIRE DEPARTMENT COMMENTS |
| 2   | 10/25/24 | DED   | MRC     | SPR ENGINEERING COMMENTS     |
| 3   | 05/16/25 | DED   | RUB     | BESS PERMIT SET              |
|     |          |       |         |                              |
|     |          |       |         |                              |

SCALES STATED ON DRAWINGS  
ARE VALID ONLY WHEN PLOTTED  
ARCH D 24" X 36"

C-5.1

CIVIL DETAILS

The diagram illustrates a vertical pile with a hollow interior. The top section is labeled 'CONCRETE' and contains 'RAGS'. Below this is a 'HOLLOW' section. The pile is shown relative to 'FINISHED GRADE'. Dimensions include a total height of 42'-0" from the top of the pile to the finished grade, and a section height of 3'-0" from the finished grade to the bottom of the pile. A note indicates '6.0" OR 12" CONCRETE' for the pile wall thickness. A detail view shows a cross-section of the top with a minimum dimension of  $\phi_c$  MIN.

CONCRETE

RACS

HOLLOW

5" SCH 80 PVC CONDUIT SLEEVE

FINISHED GRADE

6.0" OR 12" CONCRETE

4" MIN.

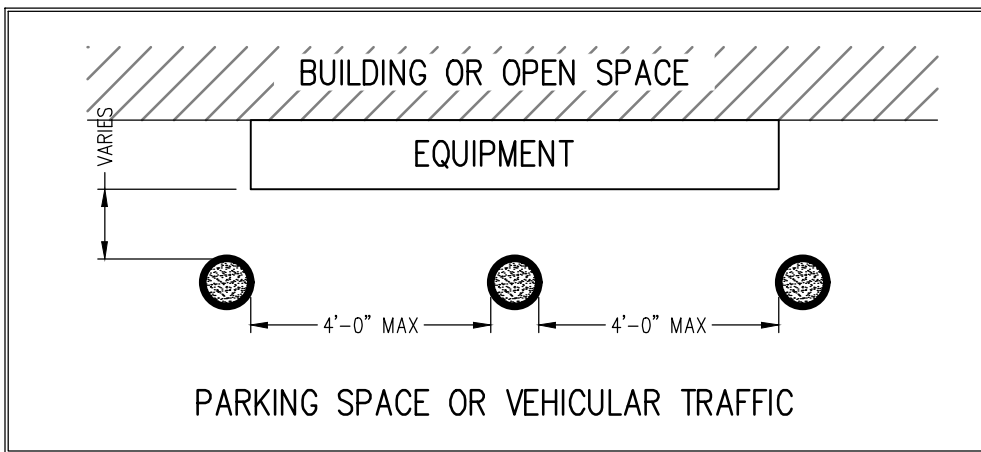
24.0"

36.0"

43.0"

4'-0"

1. BOLLARDS SHOWN FOR ILLUSTRATIVE PURPOSES ONLY,  
FINAL DESIGN SHALL BE PROVIDED PRIOR TO CONSTRUCTION.

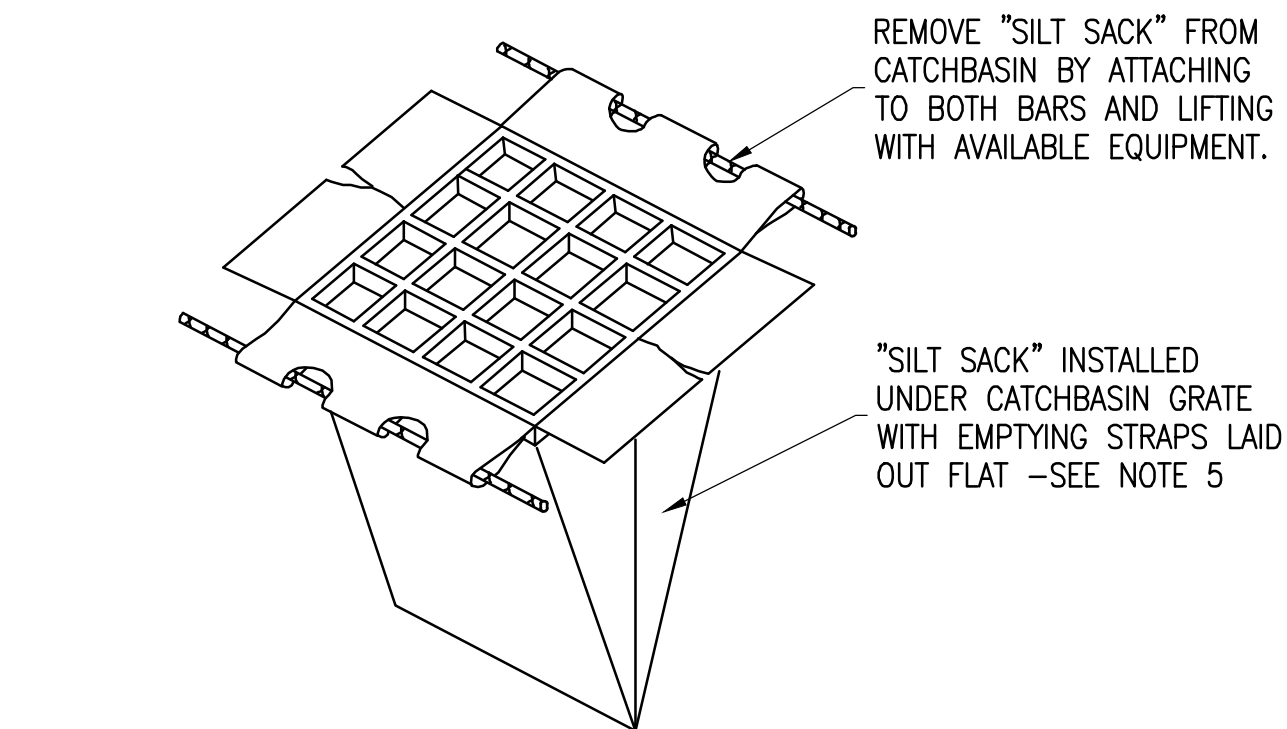


1

SCALE: N.T.S.

2

SCALE: NTS  
2023-12-07

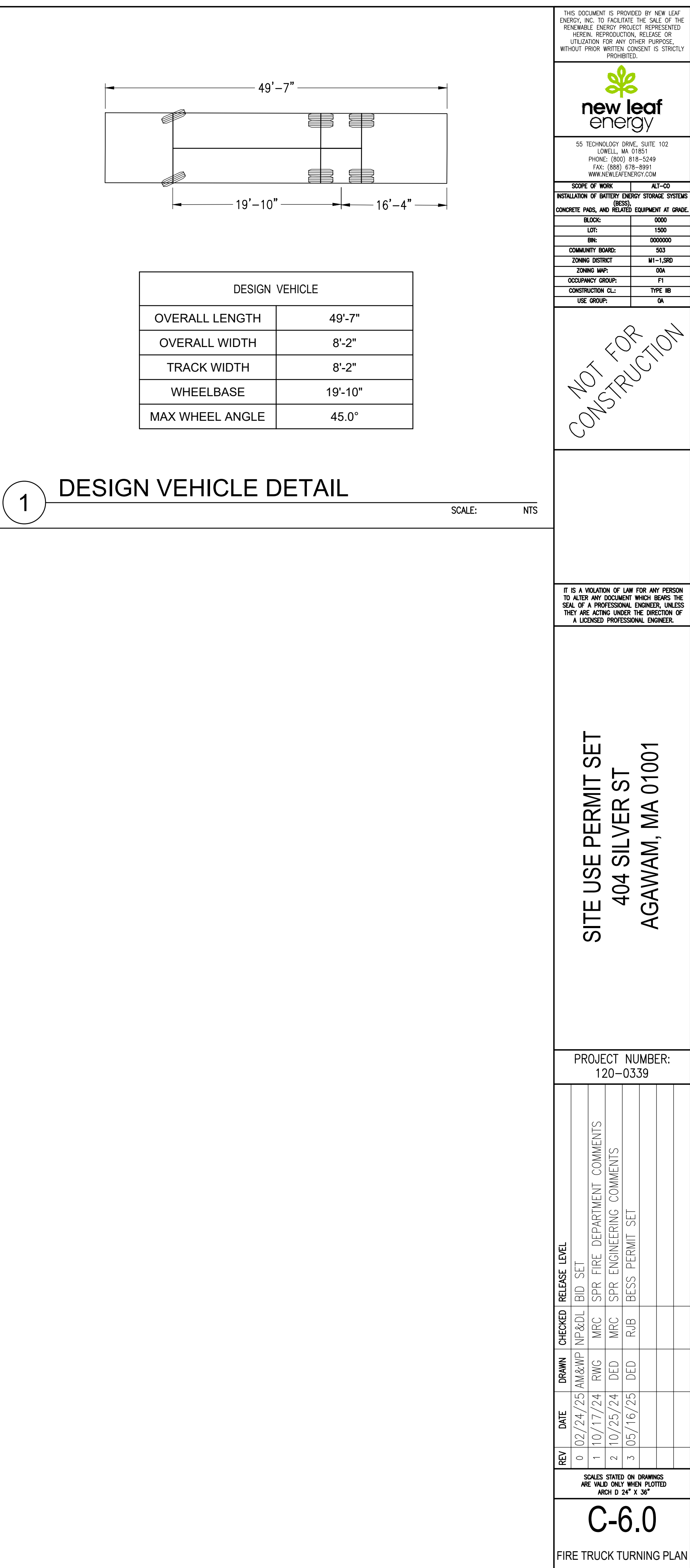


1. REMOVE DRAIN GRATE AND INSERT "SILT SACK", MAKING SURE EMPTYING STRAPS ARE LAID FLAT OUTSIDE OF BASIN.
2. REPLACE DRAIN GRATE TO HOLD "SILT SACK" INTO POSITION.
3. AS "SILT SACK" BECOMES FULL OF SEDIMENT, REMOVE WITH FRONT END LOADER (OR OTHER SUITABLE EQUIPMENT) AND EMPTY IN AN APPROVED LOCATION.
4. REPLACE EMPTYED "SILT SACK" BACK INTO CATCH BASIN.
5. PRODUCT SHALL BE ACF ENVIRONMENTAL TYPE A SILT SACK OR APPROVED EQUIV. INSTALL PER MANUFACTURER'S SPECIFICATIONS.

3

SCALE: NTS











## Appendix D – Operations and Maintenance Manual



# User Manual

Energy Storage System

ESS Container (INF5015K050PG1-US&INF4179K050PG1-US)

Version: V2.5



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# 1. Introduction

---

## 1.1. Acronym and Abbreviation

|                |                                                                |
|----------------|----------------------------------------------------------------|
| <b>Hithium</b> | Xiamen Hithium Energy Storage Technology Co., Ltd.             |
| AC             | Alternating Current                                            |
| DC             | Direct Current                                                 |
| HV             | High Voltage                                                   |
| LV             | Low Voltage                                                    |
| PCS            | Power Conversion System                                        |
| EMS            | Energy Management System                                       |
| BMS            | Battery Management System                                      |
| BMU            | Battery Management Unit                                        |
| CBMU           | Cluster Battery Management Unit (also referred to as Rack BMU) |
| SBMU           | System Battery Management Unit                                 |
| ESS            | Energy Storage System                                          |
| BOL            | Begin of Life                                                  |
| EOL            | End of Life                                                    |
| CAN            | Controller Area Network                                        |
| I/O            | Input/Output                                                   |
| MSD            | Manual Service Disconnect                                      |
| IP             | Ingress Protection                                             |
| UPS            | Uninterruptible Power Supply                                   |

## 1.2. About this Manual

The purpose of this document is to specify the main information for the transportation and installation for the Liquid Cooling Energy Storage System (ESS) Container supplied by Hithium.

The configurations of the ESS Container: 10P416S LFP 314Ah--LX417901, 12P416S LFP 314Ah--LX501501. The product has a symmetrical design, including A and B version.

The fire protection system of the the ESS Container consists of automatic alarm system, ventilation system, addressable module box, water spray system, power supply box (optional).

Table 1-1 PN of the ESS Container

| No. | Option                                                         | ESS Container Configuration | PN           |
|-----|----------------------------------------------------------------|-----------------------------|--------------|
| 1   | Option 1 (for fire protection system without power supply box) | 5 Racks-A                   | 101400000048 |
| 2   |                                                                | 5 Racks-B                   | 101400000051 |
| 3   |                                                                | 6 Racks-A                   | 101400000042 |
| 4   |                                                                | 6 Racks-B                   | 101400000045 |
| 5   | Option 2 (for fire protection system with power supply box)    | 5 Racks-A                   | 101400000047 |
| 6   |                                                                | 5 Racks-B                   | 101400000050 |
| 7   |                                                                | 6 Racks-A                   | 101400000041 |
| 8   |                                                                | 6 Racks-B                   | 101400000044 |

The content of these documents is supposed to be periodically checked and updated where necessary. During the project design phase, either the project electrical design or the civil design shall be based on the relevant electrical and civil drawings provided by Hithium and signed by both parties (Hithium and the Buyer). In case there're any deviations between the signed drawings and this manual, the signed drawings shall always prevail.

Readers should have the basic knowledge in terms of the electrical safety, the electrical principles and electrical components.

## 2. Safety Instructions

### 2.1. Symbols

To ensure users' personal and property safety during the installation process of this product, or to use this product effectively and optimally, this manual provides relevant information and highlights the important information with appropriate symbols.

Below is a list of symbols that may be used in our product or this manual to describe the hazards to equipment or personnel. Relevant procedures or practices should be followed. Failure to perform or follow such symbols properly may lead to damage or destruction of the equipment in part or whole and/or other related equipment, and even personal injuries.

| Symbol/ Symbole                                                                     | Description/Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | This symbol indicates a hazard, which will result in injury risks if not avoided.<br>Ce symbole indique un danger qui entraînera des risques de blessures s'il n'est pas évité.                                                                                                                                                                                                                                                                                                                                    |
|    | This symbol indicates high voltage in the machine, with potential electric shock risks upon touching.<br>Ce symbole indique une haute tension dans la machine, avec des risques potentiels de choc électrique au toucher.                                                                                                                                                                                                                                                                                          |
|    | This symbol indicates that the temperature of the place where it appears on is higher than the acceptable range of a human body. Please refrain from touching it to avoid personal injuries.<br>Ce symbole indique que la température de l'endroit où il apparaît est supérieure à la plage acceptable du corps humain. Veuillez vous abstenir de le toucher pour éviter des blessures corporelles.                                                                                                                |
|   | This symbol indicates that the place where it appears is the protective earthing (PE) point, which needs to be securely earthed to ensure operators' safety.<br>Ce symbole indique que l'endroit où il apparaît est le point de mise à la terre de protection (PE), qui doit être solidement mis à la terre pour garantir la sécurité des opérateurs.                                                                                                                                                              |
|  | This way up<br>This is the correct upright position of the distribution packages for the transport and/or storage.<br>Par ici vers le haut<br>Voici la position verticale correcte des emballages de distribution pour le transport et/ou le stockage.                                                                                                                                                                                                                                                             |
|  | Read operator's manual<br>To indicate that the operator's manual or card should be read before continuing the operation.<br>Lire le manuel de l'opérateur<br>Indique qu'il faut lire le manuel ou la carte de l'opérateur avant de poursuivre.                                                                                                                                                                                                                                                                     |
|  | Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC)<br>To indicates that when the end user intends to discard this product, it must be taken to an appropriate facility for recovery and recycling.<br>Directive relative aux déchets d'équipements électriques et électroniques (DEEE) (2002/96/CE)<br>Indique que lorsque l'utilisateur final a l'intention de se débarrasser de ce produit, il doit le confier à une installation appropriée en vue de sa récupération et de son recyclage. |
|  | 3 chasing arrows recycling symbol<br>Battery must be recycled or disposed of properly.<br>3 flèches de chasse symbole de recyclage<br>La batterie doit être recyclée ou éliminée de manière appropriée.                                                                                                                                                                                                                                                                                                            |
|  | UN3536<br>Indicate that the goods are Class 9 hazardous materials with UN number 3536.<br>UN3536<br>Indique que les marchandises sont des matières dangereuses de classe 9 portant le numéro UN 3536.                                                                                                                                                                                                                                                                                                              |



|                                                                                   |                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>No access for forklift truck<br/>It is prohibited to use forklifts to operate and transport containers (or container products).<br/>Accès interdit aux chariots élévateurs<br/>Il est interdit d'utiliser des chariots élévateurs pour manœuvrer et transporter des conteneurs.</p> |
|  | <p>Supper Heavy<br/>The container (or container product) is heavy, reminding operators to handle it carefully.<br/>Souper lourd<br/>Le contenant (ou le produit du contenant) est lourd, ce qui rappelle aux opérateurs de le manipuler avec précaution.</p>                           |

Definition of the "Danger", "Warning" and "Caution" symbols:

|                                                                                                                                                                                                                                                               |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  <b>DANGER/DANGER</b>                                                                                                                                                        |  |
| <p><b>Danger</b> Indicates a hazardous situation that, if not avoided, will result in death or serious injury.<br/><b>Danger</b> Indique une situation dangereuse qui, si elle n'est pas évitée, entraînera la mort ou des blessures graves.</p>              |  |
|  <b>WARNING/AVERTISSEMENT</b>                                                                                                                                                |  |
| <p><b>Warning</b> Indicates a hazardous situation that, if not avoided, could result in death or serious injury.<br/><b>Avertissement</b> Indique une situation dangereuse qui, si elle n'est pas évitée, peut entraîner la mort ou des blessures graves.</p> |  |
|  <b>CAUTION/ATTENTION</b>                                                                                                                                                    |  |
| <p><b>Caution</b> Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.<br/><b>Attention</b> Indique une situation dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures mineures ou modérées.</p> |  |

For safety reasons, installers have the responsibility to familiarize themselves with the content and all the warnings in this manual before the installation process.

## 2.2. Instructions

### 2.2.1. General Safety

The "Danger", "Warning" and "Caution" statements in this manual do not cover all the safety instructions that should be followed. They are only supplements to the safety instructions. Hithium will not be liable for any consequences caused by the violation of general safety requirements or safety standards for equipment design, production, and usage.

This product should be used in environments that meet its design specifications. Otherwise, the equipment may become faulty, and the resulting equipment malfunctions, parts damage, personal injuries, or property damage are not covered under the warranty.

Local laws, regulations, and standards should be observed during the installation, operation, and maintenance process of the equipment. The safety precautions in this manual only serve as supplements to local laws, regulations, and standards.

Hithium will not be liable for any consequences of the following circumstances:

- 1) Operation beyond the conditions specified in this document.
- 2) The installation and use environments are not specified in relevant international and national standards.
- 3) Unauthorized disassembly, product alteration, or software code changes.
- 4) Failure to operate in accordance with the operating instructions and safety warnings for the product and in relevant documentation.
- 5) Equipment damage caused by abnormal natural environment (force majeure such as earthquakes, fires, and typhoons).
- 6) Transit damage caused by the client's failure to comply with the shipping requirements.
- 7) Damage caused by storage conditions not fulfilling requirements in the product documentation.

## General requirements

### **DANGER/DANGER**

#### **General safety:**

- 1) Do not install, use, or operate outdoor equipment and cables (including but not limited to handling the equipment, operating the equipment and cables, plugging and connecting to outdoor signal interfaces, working at heights, and outdoor installation) under severe weather conditions such as lightning, rain, snow, and strong wind.
- 2) Voltage must be measured before touching any conductor surface or terminal to make sure that there is no electric shock hazard.
- 3) In case of fire, you should evacuate from the building or the equipment area and ring the fire alarm bell or call the fire department. Do not re-enter the burning building under any circumstances.
- 4) Do not disable any protective devices.
- 5) Man-made alterations of, damage to or blockages of the identifications and nameplates on the equipment are strictly prohibited.
- 6) Live-line working is strictly prohibited during the installation process.
- 7) Do not clean the electrical parts inside and outside the cabinet with water.
- 8) Do not change the structure and the installation sequence of the equipment without authorization.
- 9) You are not allowed to reverse engineer, decompile, disassemble, tear down, adapt, implant or otherwise derive the equipment software. You are also not allowed to research the internal implementation of the equipment, obtain equipment software source code, steal intellectual property rights or disclose any results of equipment software performance tests.

#### **Sécurité générale:**

- 1) N'installez pas, n'utilisez pas et ne faites pas fonctionner les équipements et les câbles extérieurs (y compris, mais sans s'y limiter, la manipulation de l'équipement, le fonctionnement de l'équipement et des câbles, le branchement et la connexion aux interfaces de signaux extérieurs, le travail en hauteur et l'installation extérieure) dans des conditions météorologiques sévères telles que la foudre, la pluie, la neige et le vent fort.
- 2) La tension doit être mesurée avant de toucher une surface conductrice ou une borne pour s'assurer qu'il n'y a aucun risque de choc électrique.
- 3) En cas d'incendie, vous devez évacuer le bâtiment ou la zone d'équipement et sonner l'alarme incendie ou appeler les pompiers. Ne rentrez en aucun cas dans le bâtiment en feu.
- 4) Ne désactivez pas les dispositifs de protection.
- 5) Il est strictement interdit d'altérer, d'endommager ou de bloquer les identifications et les plaques signalétiques des équipements.
- 6) Il est strictement interdit de travailler sous tension pendant l'installation.
- 7) Ne pas nettoyer à l'eau les parties électriques à l'intérieur et à l'extérieur de l'armoire.
- 8) Ne pas modifier la structure et la séquence d'installation de l'équipement sans autorisation.
- 9) Vous n'êtes pas autorisé à faire de l'ingénierie inverse, à décompiler, à désassembler, à démonter, à adapter, à implanter ou à dériver de toute autre manière le logiciel de l'équipement. Vous n'êtes pas non plus autorisé à effectuer des recherches sur la mise en œuvre interne de l'équipement, à obtenir le code source du logiciel de l'équipement, à voler les droits de propriété intellectuelle ou à divulguer les résultats des tests de performance du logiciel de l'équipement.

#### **Personal safety:**

- 1) If there is a probability of personal injury or equipment damage during operations on the equipment, you should stop the operations immediately, report the case to the supervisor, and take feasible protective measures.
- 2) Do not touch energized equipment to avoid shock and burn injuries.
- 3) Do not energize the equipment before the installation process has completed or the equipment has been confirmed by professionals.

#### **Sécurité personnelle:**

- 1) S'il existe une probabilité de blessure personnelle ou de dommage matériel pendant les opérations sur l'équipement, vous devez arrêter immédiatement les opérations, signaler le cas au superviseur et prendre les mesures de protection possibles.
- 2) Ne touchez pas les équipements sous tension pour éviter les chocs et les brûlures.
- 3) Ne mettez pas l'équipement sous tension avant que le processus d'installation soit terminé ou que l'équipement ait été confirmé par des professionnels.

 **WARNING/AVERTISSEMENT**

- 1) Do not wear watches, bracelets, bangles, rings, necklaces, and other conductive objects to avoid electric shock and burns during the installation, operation, and maintenance.
  - 2) Special protective apparatuses such as insulation gloves, goggles, protective clothing, safety helmets and safety shoes must be worn during the installation, operation and maintenance process.
  - 3) The installation, operation and maintenance must be performed according to the steps and order described in the instruction
  - 4) Do not neglect any warnings, cautions or precautionary measures in the manual or on the equipment.
  - 5) Replace any hazard signs that have become indistinguishable due to long-term use in a timely manner.
  - 6) Keep out unauthorized personnel during installation.
  - 7) Tools used should have insulated handles for protection, or you should use insulated tools.
  - 8) All the wiring holes shall be sealed. Those with wires inside should be blocked with fireproof sealant.
  - 9) Torque wrenches with appropriate ranges shall be selected to tighten the screws with a torque specified in the instruction during the installation process.
  - 10) Master the correct usage of the tools before using to avoid hurting people or damaging the equipment.
- 
- 1) Ne pas porter de montres, bracelets, bangles, bagues, colliers et autres objets conducteurs afin d'éviter les chocs électriques et les brûlures pendant l'installation, le fonctionnement et l'entretien.
  - 2) Des appareils de protection spéciaux tels que des gants isolants, des lunettes, des vêtements de protection, des casques et des chaussures de sécurité doivent être portés pendant l'installation, le fonctionnement et la maintenance.
  - 3) L'installation, le fonctionnement et l'entretien doivent être effectués conformément aux étapes et à l'ordre décrits dans les instructions.
  - 4) Ne négligez aucun des avertissements, mises en garde ou mesures de précaution figurant dans le manuel ou sur l'équipement.
  - 5) Remplacez en temps utile tout panneau de danger devenu indiscernable en raison d'une utilisation prolongée.
  - 6) Tenir à l'écart le personnel non autorisé pendant l'installation.
  - 7) Les outils utilisés doivent avoir des poignées isolées pour la protection, ou vous devez utiliser des outils isolés.
  - 8) Tous les trous de câblage doivent être scellés. Ceux avec des fils à l'intérieur doivent être bloqués avec un scellant ignifuge.
  - 9) Des clés dynamométriques avec des plages appropriées doivent être sélectionnées pour serrer les vis avec un couple spécifié dans les instructions pendant le processus d'installation.
  - 10) Maîtrisez l'utilisation correcte des outils avant de les utiliser pour éviter de blesser des personnes ou d'endommager l'équipement.

 **CAUTION/ATTENTION**

- 1) The empty packaging materials, such as cartons, foam, plastic and cable ties, should be cleared from the equipment area after installation.
  - 2) Paint scratches occurred during the equipment transportation and installation process must be fixed in a timely manner. Do not expose the scratches to an outdoor environment for a long time.
  - 3) The equipment should be securely fixed on the floor or other stable objects before operation.
- 
- 1) Les matériaux d'emballage vides, tels que les cartons, la mousse, le plastique et les attaches de câbles, doivent être retirés de la zone de l'équipement après l'installation.
  - 2) Les rayures de peinture survenues pendant le transport et l'installation de l'équipement doivent être réparées rapidement. N'exposez pas les rayures à un environnement extérieur pendant une longue période.
  - 3) L'équipement doit être solidement fixé au sol ou à d'autres objets stables avant d'être utilisé.



## 2.2.2. Personnel Safety

### **WARNING/AVERTISSEMENT**

#### **Safety PPE:**

1) During operation and maintenance with voltage presence, it is required to use relative Personal Protection Equipment (PPE) to prevent arc flash injuries. The following listed PPEs are for reference only, always follow local and national regulations about PPEs.

- Safety Boots – S3 class (comply with BS EN ISO 20345:2011)
- Electric gloves – Low/high voltage gloves (ASTM D120 specifications, NFPA 70E)
- Safety glasses – Inertia safety glasses
- Helmet – Arc flash protective helmet (fire resistant 100cal/cm<sup>2</sup>)
- Face shield – Arc flash protective face shield (fire resistant 100cal/cm<sup>2</sup>)
- High visibility vest
- Rescue pole – Insulated pole

#### **EPI de sécurité:**

1) Lors de l'utilisation et de la maintenance en présence de tension, il est nécessaire d'utiliser l'équipement de protection individuelle (EPI) approprié pour éviter les blessures dues à l'éclair d'arc électrique. Les EPI énumérés ci-dessous sont donnés à titre de référence uniquement. Il convient de toujours respecter les réglementations locales et nationales en matière d'EPI.

- Bottes de sécurité - classe S3 (conformes à la norme BS EN ISO 20345:2011)
- Gants électriques - Gants basse/haute tension (spécifications ASTM D120, NFPA 70E)
- Lunettes de sécurité - Lunettes de sécurité Inertia
- Casque - Casque de protection contre les éclairs d'arc électrique (résistant au feu à 100cal/cm<sup>2</sup>)
- Écran facial - Écran facial de protection contre les éclairs d'arc électrique (résistant au feu à 100cal/cm<sup>2</sup>)
- Gilet de haute visibilité
- Perche de sauvetage - Perche isolée

2) Be thoroughly familiar with the compositions and working principles of this product, and relevant standards in the country or region where the project is located.

3) Personnel who is responsible to install or maintain Hithium's equipment must receive thorough training, understand all necessary safety precautions, and be able to correctly perform all operations.

4) Only qualified professionals or trained personnel are allowed to install, operate, and maintain the equipment.

5) Only qualified professionals are allowed to remove safety covers and inspect the equipment.

6) Personnel who will operate the equipment, including operators, trained personnel, and professionals, should possess the local national required qualifications in special operations such as high-voltage operations, working at heights, and operations of special equipment.

7) Only professionals or authorized personnel are allowed to replace the equipment or parts (including software).

2) Connaître parfaitement les compositions et les principes de fonctionnement de ce produit, ainsi que les normes applicables dans le pays ou la région où se situe le projet.

3) Le personnel chargé d'installer ou d'entretenir les équipements de la société doit recevoir une formation approfondie, comprendre toutes les mesures de sécurité nécessaires et être capable d'effectuer correctement toutes les opérations.

4) Seuls des professionnels qualifiés sont autorisés à retirer les capots de sécurité et à inspecter l'équipement.

5) Seuls des professionnels qualifiés sont autorisés à retirer les dispositifs de sécurité et à inspecter l'équipement.

6) Le personnel chargé de faire fonctionner l'équipement, y compris les opérateurs, le personnel formé et les professionnels, doit posséder les qualifications locales et nationales requises pour les opérations spéciales telles que les opérations à haute tension, le travail en hauteur et l'utilisation d'équipements spéciaux.

7) Seuls les professionnels ou le personnel autorisé sont autorisés à remplacer l'équipement ou les pièces (y compris les logiciels).

**Professionals:** Personnel who are trained or experienced in equipment operations and are clear of the sources and degree of various potential hazards in equipment installation, operation, and maintenance.

**Trained personnel:** Personnel who are technically trained, have required experience, are aware of possible hazards on themselves in certain operations, and are able to take protective measures to minimize the hazards on themselves and other people.

**Operators:** Operation personnel who may come in contact with the equipment, except trained personnel and professionals.

### 2.2.3. Electrical Safety

#### **DANGER/DANGER**

##### **Lock Out / Tag Out:**

- 1) Always follow the lock out / tag out procedure before servicing ESS to ensure that personal do not encounter incidents caused by unintended energization and get exposed to harmful energy.
- 2) To prevent personal injuries or even death that may result from unintended use, defective or maintenance-related conditions, or unauthorized persons, **DO NOT** touch any device within enclosure and keep the enclosure door closed unless you are authorized employee with proper clothing and shoes that meets PPE requirements. And ensure that all equipment is properly grounded.
- 3) Isolate and keep energy devices of ESS in a locked or off position, unless the authorized person can unlock it when there is a need. These restraints are impossible to remove without a key or by special means such as through a bolt cutter.

##### **Verrouillage / Etiquetage:**

- 1) Suivez toujours la procédure de verrouillage/étiquetage avant de procéder à l'entretien de l'ESS afin de garantir que le personnel ne soit pas confronté à des incidents causés par une mise sous tension involontaire et ne soit pas exposé à des énergies dangereuses.
- 2) Pour éviter les blessures ou même la mort qui peuvent résulter d'une utilisation non intentionnelle, de conditions défectueuses ou liées à la maintenance, ou de personnes non autorisées, **NE TOUCHEZ AUCUN** dispositif à l'intérieur du boîtier et gardez la porte fermée à moins que vous ne soyez un employé autorisé portant des vêtements et des chaussures conformes aux exigences de l'EPI. Et assurez-vous que tous les équipements sont correctement mis à la terre.
- 3) Isolez et gardez les dispositifs d'énergie de l'ESS en position verrouillée ou éteinte, sauf si la personne autorisée peut les déverrouiller en cas de besoin. Ces dispositifs sont impossibles à enlever sans une clé ou par des moyens spéciaux tels qu'un coupe-boulons.

##### **Grounding requirements:**

- 1) For equipment that has to be grounded, install the ground cable first when installing the equipment and remove the ground cable last when removing the equipment.
- 2) Do not damage the ground conductor.
- 3) Do not operate the equipment before the grounding conductor is installed.
- 4) The equipment should be connected permanently to the protective ground. Before operating the equipment, check its electrical connection to ensure that it is securely grounded.
- 5) The equipment grounding requirement is  $<4\Omega$ .

##### **Exigences de mise à la terre:**

- 1) Pour les équipements qui doivent être mis à la terre, installez le câble de mise à la terre en premier lors de l'installation de l'équipement et retirez le câble de mise à la terre en dernier lors du retrait de l'équipement.
- 2) Ne pas endommager le conducteur de mise à la terre.
- 3) Ne faites pas fonctionner l'équipement avant que le conducteur de mise à la terre ne soit installé.
- 4) L'équipement doit être connecté en permanence à la terre de protection. Avant d'utiliser l'équipement, vérifiez sa connexion électrique pour vous assurer qu'il est bien mis à la terre.
- 5) L'exigence de mise à la terre de l'équipement est  $<4\Omega$ .

**General requirements:**

Please ensure that the equipment is intact before electrical connection. Otherwise, electric shocks or fire may occur.

- 1) All electrical connections must comply with local electrical standards.
- 2) A permit must be obtained from the local electric power department before grid connection is performed.
- 3) The cables you prepared should meet the requirements of the local laws and regulations.
- 4) Special insulated tools must be used in high voltage operations.
- 5) Do not connect or disconnect power cables when energized. Transient contact between the core of the power cable and the conductor will generate electric arcs or sparks, which may cause fire or personal injuries.
- 6) Power switch must be turned off before connecting or disconnecting the power cables.
- 7) Check that the label on the power cable is correct before connecting a power cable.
- 8) If the equipment has multiple inputs, disconnect all the inputs and wait till the equipment is completely de-energized before operating the equipment.
- 9) If parts damage occur, it must be replaced by a professional to avoid risks.
- 10) The model selection, support and connection, and wiring of cables must comply with local laws, regulations and standards.

**Exigences générales:**

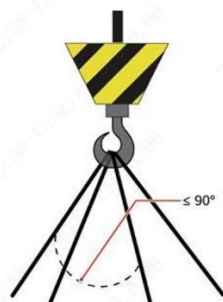
Veuillez vous assurer que l'équipement est intact avant le raccordement électrique. Dans le cas contraire, des chocs électriques ou un incendie peuvent se produire.

- 1) Toutes les connexions électriques doivent être conformes aux normes électriques locales.
- 2) Un permis doit être obtenu auprès du service local de l'électricité avant de procéder au raccordement au réseau.
- 3) Les câbles que vous avez préparés doivent répondre aux exigences des lois et réglementations locales.
- 4) Des outils spéciaux isolés doivent être utilisés pour les opérations à haute tension.
- 5) Ne pas connecter ou déconnecter les câbles électriques lorsqu'ils sont sous tension. Un contact transitoire entre l'âme du câble électrique et le conducteur génère des arcs électriques ou des étincelles, qui peuvent provoquer un incendie ou des blessures corporelles.
- 6) L'interrupteur d'alimentation doit être éteint avant de connecter ou de déconnecter les câbles d'alimentation.
- 7) Vérifiez que l'étiquette sur le câble d'alimentation est correcte avant de connecter un câble d'alimentation.
- 8) Si l'équipement possède plusieurs entrées, déconnectez toutes les entrées et attendez que l'équipement soit complètement hors tension avant de le faire fonctionner.
- 9) Si des pièces sont endommagées, elles doivent être remplacées par un professionnel pour éviter tout risque.
- 10) Le choix du modèle, le support et la connexion, ainsi que le câblage des câbles doivent être conformes aux lois, réglementations et normes locales.

**2.2.4. Mechanical Safety** **WARNING/AVERTISSEMENT****Hoisting:**

- 1) Do not walk under the jibs and the hoisted object when a heavy object is hoisted.
- 2) The personnel carrying out the hoisting operation need to receive relevant training and pass the assessment before they can perform hoisting operation.
- 3) The hoisting apparatus needs to be checked. Only use undamaged and complete hoisting materials.
- 4) Before hoisting, ensure that the hoisting apparatus is securely fixed on a load-bearing fixture or wall.
- 5) During hoisting, ensure that the angle between the two ropes is not greater than 90°, as shown in the following figure.

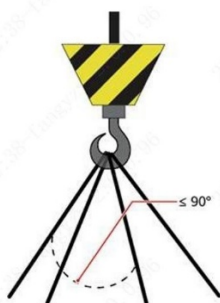




- 6) Do not drag the steel wire rope and slings or hit against hard objects during hoisting.
- 7) When installing or removing equipment from the cabinet, consider that the cabinet may be top-heavy. Avoid the area during hoisting to prevent crushing injuries.
- 8) When handling heavy objects, you should prepare for the lift to avoid getting crushed or sprained.
- 9) Select appropriate crane or lifting tool according to the site conditions. The lifting tool used shall have a sufficient load bearing capacity, boom length and radius of rotation. Before moving, secure the equipment to the crane using ropes, and ensure dedicated personnel supervise the process.

**Levage:**

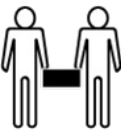
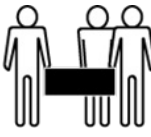
- 1) Ne pas marcher sous les flèches et l'objet soulevé lorsqu'un objet lourd est soulevé.
- 2) Le personnel effectuant l'opération de levage doit recevoir une formation appropriée et passer l'évaluation avant de pouvoir effectuer l'opération de levage.
- 3) L'appareil de levage doit être vérifié. Utilisez uniquement du matériel de levage intact et complet.
- 4) Avant de procéder au levage, assurez-vous que l'appareil de levage est solidement fixé sur une fixation ou un mur porteur.
- 5) Pendant le levage, veillez à ce que l'angle entre les deux câbles ne soit pas supérieur à 90°, comme indiqué sur la figure suivante.



- 6) Ne traînez pas le câble d'acier et les élingues et ne heurtez pas d'objets durs pendant le levage.
- 7) Lors de l'installation ou du retrait d'un équipement de l'armoire, tenez compte du fait que la partie supérieure de l'armoire peut être lourde. Évitez la zone pendant le levage pour éviter les blessures par écrasement.
- 8) Lorsque vous manipulez des objets lourds, vous devez vous préparer au levage pour éviter d'être écrasé ou de vous faire une entorse.
- 9) Sélectionnez la grue ou l'outil de levage approprié en fonction des conditions du site. L'outil de levage utilisé doit avoir une capacité de charge, une longueur de flèche et un rayon de rotation suffisants. Avant de déplacer, fixez l'équipement à la grue à l'aide de cordes et assurez-vous que du personnel dédié supervise le processus.

 **CAUTION/ATTENTION**

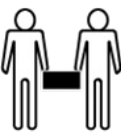
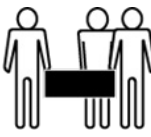
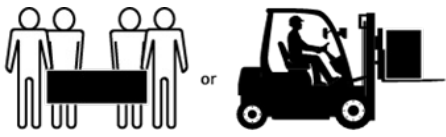
- 1) When handling heavy objects by hand, you should wear protective gloves to avoid injuries.
- 2) During the equipment handling, be sure to avoid scratches on the surface of the equipment and damage to parts and cables.
- 3) The equipment must be handled with care to avoid equipment damage caused by any collision, fall and the like.

|                                                                                   |                                                                                   |                                                                                   |                                                                                    |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|  |  |  |  |
| <18kg<br>(<40lb)                                                                  | 18kg-32kg<br>(40lb-70lb)                                                          | 32kg-55kg<br>(70lb-121lb)                                                         | >55kg<br>(>121lb)                                                                  |

1) Lorsque vous manipulez des objets lourds à la main, vous devez porter des gants de protection pour éviter les blessures.

2) Pendant la manipulation de l'équipement, veillez à éviter les rayures sur la surface de l'équipement et les dommages aux pièces et aux câbles.

3) L'équipement doit être manipulé avec précaution pour éviter tout dommage causé par une collision, une chute ou autre.

|                                                                                   |                                                                                   |                                                                                   |                                                                                    |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|  |  |  |  |
| <18kg<br>(<40lb)                                                                  | 18kg-32kg<br>(40lb-70lb)                                                          | 32kg-55kg<br>(70lb-121lb)                                                         | >55kg<br>(>121lb)                                                                  |

## 2.2.5. Product safety

### DANGER/DANGER

- 1) Do not short-circuit the positive and negative pole of the product. Otherwise, the strong current and high temperature may cause personal injuries or fire. During the assembly and connection of the battery system, there shall be enough safety protection to prevent short circuits.
  - 2) Do not overcharge or over discharge the product. Otherwise, it may cause cell overheating in the module and fire incidents. During the installation and use of the product, multiple fail-safe protection measures against overcharge and over discharge of hardware and software should be implemented.
  - 3) The positive and negative poles of the product should be connected in strict accordance with the signs and instructions. Reverse or string connection is not allowed.
  - 4) Client should securely fix the product on a solid plane. The power cables should be safely bound in the right place to avoid electric arcs and sparks caused by friction.
  - 5) Protective measures should be implemented during the use of the product to protect it from mechanical vibration, collision and pressure impact. Otherwise, a short circuit may occur inside the product and leading to high temperature and fire. Product has potential risks. Appropriate safety measures must be adopted during its operation and maintenance. Improper operation during the safety performance test may cause cell fire or explosion in the module. The safety performance test can only be carried out by professionals with suitable protective equipment in a specialized laboratory. Otherwise, serious personal injuries and property damage may be caused. Non-compliance with the above cautions may result in different serious incidents.
  - 6) The client is aware that the following risks may occur during the use and operation of the product: The operator may be injured by chemicals, electric shock or electric arcs during the operation. Although human bodies react differently to direct current and alternating current, a direct current and alternating current with voltage over 50 V can both bring serious harm to human bodies. Therefore, client must adopt a conservative approach during operation to avoid harm from the current. During product operation and personal protective equipment selection, client and its employees must consider the above potential risks to prevent unexpected short circuits and resultant electric arcs, explosion or thermal runaway.
- 1) Ne pas court-circuiter le pôle positif et le pôle négatif du produit. Sinon, le courant fort et la température élevée peuvent provoquer des blessures ou un incendie. Pendant l'assemblage et la connexion du système de batterie, il doit y avoir suffisamment de protection de sécurité pour éviter les courts-circuits.
  - 2) Ne surchargez pas ou ne déchargez pas trop le produit. Sinon, cela peut provoquer une surchauffe des cellules dans le module et des incendies. Pendant l'installation et l'utilisation du produit, plusieurs mesures de protection contre la surcharge et la décharge excessive du matériel et du logiciel doivent être mises en œuvre.
  - 3) Les pôles positifs et négatifs du produit doivent être connectés en respectant strictement la signalisation et les instructions. La connexion inversée ou en chaîne n'est pas autorisée.

- 4) Le client doit fixer solidement le produit sur un plan solide. Les câbles d'alimentation doivent être attachés en toute sécurité au bon endroit pour éviter les arcs électriques et les étincelles provoqués par la friction.
- 5) Des mesures de protection doivent être mises en œuvre pendant l'utilisation du produit pour le protéger des vibrations mécaniques, des collisions et des impacts de pression. Sinon, un court-circuit peut se produire à l'intérieur du produit et entraîner une température élevée et un incendie. Le produit présente des risques potentiels. Des mesures de sécurité appropriées doivent être adoptées pendant son utilisation et sa maintenance. Une opération incorrecte pendant le test de performance de sécurité peut provoquer un incendie ou une explosion de la cellule dans le module. Le test de performance de sécurité ne peut être effectué que par des professionnels disposant d'un équipement de protection approprié dans un laboratoire spécialisé. Dans le cas contraire, des blessures graves et des dommages matériels peuvent être causés. Le non-respect des précautions ci-dessus peut entraîner différents incidents graves.
- 6) Le client est conscient que les risques suivants peuvent survenir lors de l'utilisation et du fonctionnement du produit: L'opérateur peut être blessé par des produits chimiques, des chocs électriques ou des arcs électriques pendant l'opération. Bien que le corps humain réagisse différemment au courant continu et au courant alternatif, un courant continu et un courant alternatif avec une tension supérieure à 50 V peuvent tous deux causer de graves dommages au corps humain. Par conséquent, le client doit adopter une approche conservatrice pendant l'opération afin d'éviter les dommages causés par le courant. Lors de l'utilisation du produit et du choix de l'équipement de protection individuelle, le client et ses employés doivent tenir compte des risques potentiels susmentionnés pour éviter les courts-circuits inattendus et les arcs électriques, les explosions ou les emballements thermiques qui en résultent.

 **WARNING/AVERTISSEMENT**

- 1) Do not immerse the product in water.
  - 2) Incorrect use and inappropriate storage of the product can pose risks of fire, explosion and burn. Do not disassemble, crush, incinerate or heat the product.
  - 3) Do not expose the product to fire or a high temperature environment that exceeds the temperature range specified in this Specification for a long period of time. Otherwise, a fire may be caused. Under any normal using conditions, the cell temperature in the module shall not exceed 50°C (122°F). If the temperature exceeds 50°C (122°F), the product should be turned off and stop operating.
  - 4) Keep the product out of the reach of children. Do not remove the original packaging prior to use. The dispose of used products shall be settled in accordance with local recycling or waste regulations in a timely manner.
  - 5) Do not disassemble, dismantle or repair the product in any way without authorization.
  - 6) Do not mix products with different specifications, brands and batches together.
  - 7) Do not expose the product to fire or a high temperature environment that exceeds the temperature range specified in this Specification for a long period of time.
  - 8) If the product gives off a peculiar smell or heat, distorts, or discolors or any other abnormal phenomenon occurs, the product shall not be used and should be moved to a safe place instead.
  - 9) Improper termination of charging may occur during product charging process. If the charge is terminated due to the allowable charging time is exceeded, the charging voltage is too high or the charging current is too strong, the phenomenon will be defined as an "improper termination of charging". When any of the above phenomena occur, it may mean that leakage happens in the battery system or some parts malfunction. Before the fundamental cause is identified and completely settled, continue to charge the product may lead to cell overheating in the module or a fire.
  - 10) In case of electrolyte leakage, the skin and eyes should be protected from contact with electrolyte. In case of contact, clean the contact area with plenty of clean water and consult a doctor for help. Any parts of the product should not be swallowed by any person or animal.
  - 11) Client should stop using the product when its capacity is not greater than 65% of the nominal capacity. Otherwise, Hithium shall not be liable for product parameter discrepancies, quality issues, cell failures and any losses.
- 
- 1) Ne pas immerger le produit dans l'eau.
  - 2) Une utilisation incorrecte et un stockage inapproprié du produit peuvent présenter des risques d'incendie, d'explosion et de brûlure. Ne pas démonter, écraser, incinérer ou chauffer le produit.
  - 3) N'exposez pas le produit au feu ou à un environnement à haute température qui dépasse la plage de température spécifiée dans cette spécification pendant une longue période. Sinon, un incendie pourrait se produire. Dans toute condition d'utilisation normale, la température de la cellule dans le module ne doit pas dépasser 50°C (122°F). Si la température dépasse 50°C (122°F), le produit doit être mis hors tension et cesser de fonctionner.
  - 4) Gardez le produit hors de portée des enfants. Ne pas retirer l'emballage d'origine avant l'utilisation. L'élimination des produits usagés doit être réglée conformément aux réglementations locales en matière de recyclage ou de déchets en temps opportun.
  - 5) Ne pas désassembler, démonter ou réparer le produit de quelque manière que ce soit sans autorisation.



- 6) Ne pas mélanger des produits ayant des spécifications, des marques et des lots différents.
- 7) N'exposez pas le produit au feu ou à un environnement à haute température dépassant la plage de température spécifiée dans cette spécification pendant une longue période.
- 8) Si le produit dégage une odeur ou une chaleur particulière, se déforme ou se décolore ou si tout autre phénomène anormal se produit, le produit ne doit pas être utilisé et doit plutôt être déplacé dans un endroit sûr.
- 9) Une fin de charge incorrecte peut se produire pendant le processus de charge du produit. Si la charge est interrompue en raison d'un dépassement du temps de charge autorisé, d'une tension de charge trop élevée ou d'un courant de charge trop fort, le phénomène sera défini comme une "interruption inappropriée de la charge". Lorsque l'un des phénomènes ci-dessus se produit, cela peut signifier qu'une fuite se produit dans le système de batterie ou que certaines pièces fonctionnent mal. Avant que la cause fondamentale ne soit identifiée et complètement réglée, continuer à charger le produit peut entraîner une surchauffe des cellules dans le module ou un incendie.
- 10) En cas de fuite d'électrolyte, la peau et les yeux doivent être protégés du contact avec l'électrolyte. En cas de contact, nettoyez la zone de contact avec beaucoup d'eau propre et consultez un médecin pour obtenir de l'aide. Aucune partie du produit ne doit être avalée par une personne ou un animal.
- 11) Le client doit cesser d'utiliser le produit lorsque sa capacité n'est pas supérieure à 65% de la capacité nominale. Dans le cas contraire, Hithium ne sera pas responsable des divergences des paramètres du produit, des problèmes de qualité, des pannes de cellules et de toute perte.

## 3. Product Overview

### 3.1. Description

The ESS Container is mainly composed of several key components, including ESS Modules, the control panel, HV boxes, the thermal management system and the fire protection system. With a configuration design featuring five/six racks in parallel, the container's energy capacity can reach up to 4180kWh/5016kWh. This design offers numerous advantages, including a long service life, high energy density, easy wiring, and exceptional safety performance, as shown below.

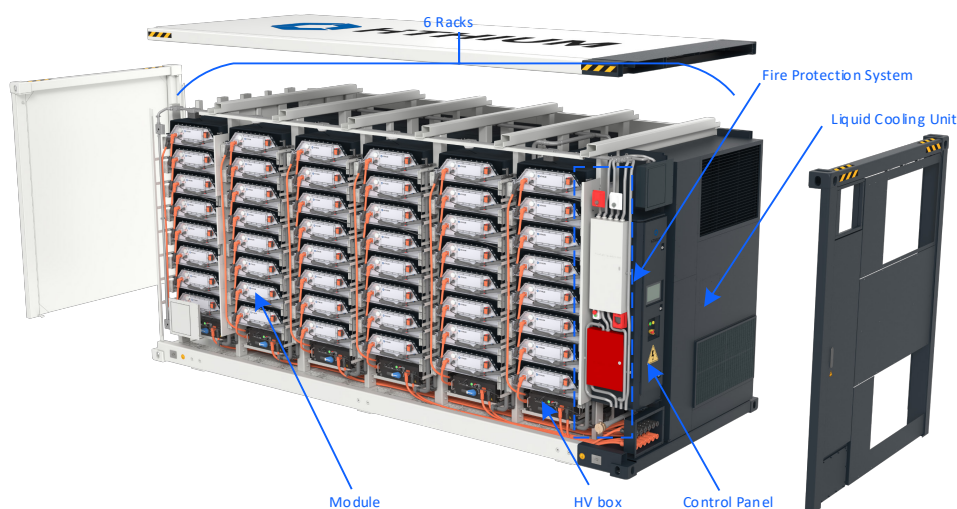


Fig 3-1 ESS Container (for 6 Racks System)

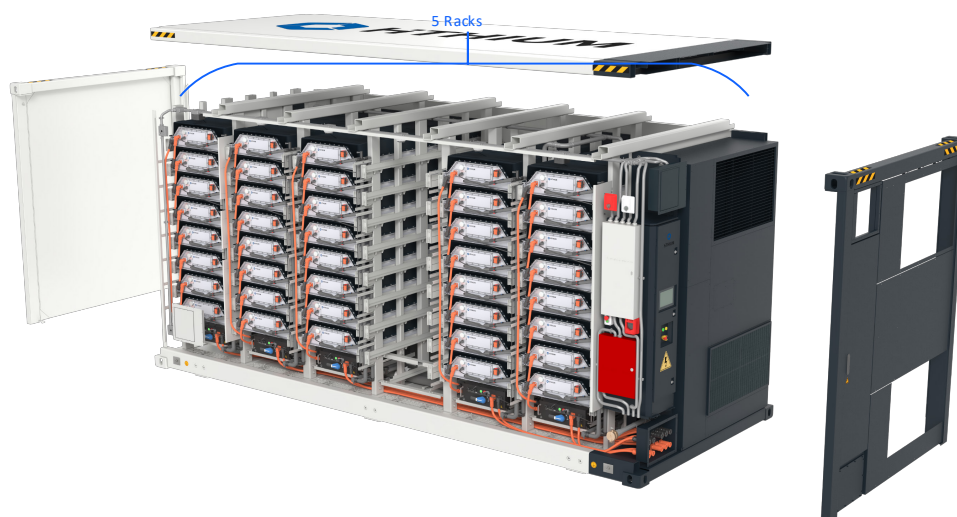


Fig 3-2 ESS Container (for 5 Racks System)

### 3.1.1. ESS Module

The ESS module is mainly composed of 104 cells, HV busbars, a venting device, a Fuse, an MSD, a liquid cooling plate, and a V-T measurement board. It is arranged in a 2P52S configuration, forming a 166.4V/628Ah system with a total energy capacity of 104.5kWh. The ESS Module features high energy density, a wide operating temperature range, a long lifespan, light weight, and high safety. It also boasts a modular design for easy transportation, installation, and maintenance, as shown below.

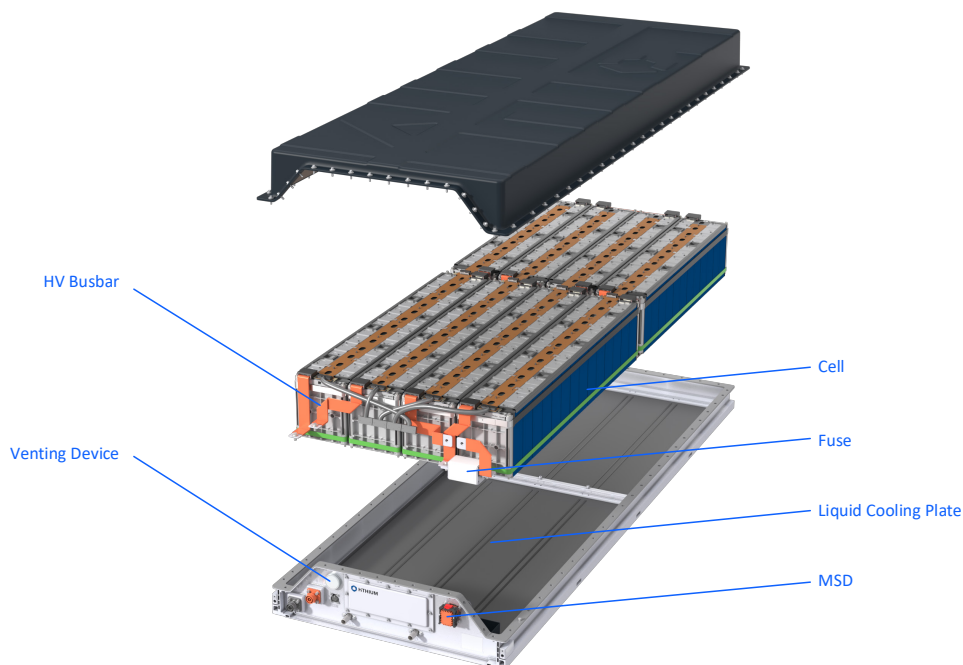


Fig 3-3 ESS Module

### 3.1.2. HV Box

The HV box is on the bottom of the rack, which includes CBMU and electrical units in HV circuit to manage and control each rack. It is mainly composed of HV connectors, LV interfaces, and a disconnecter, as shown below.

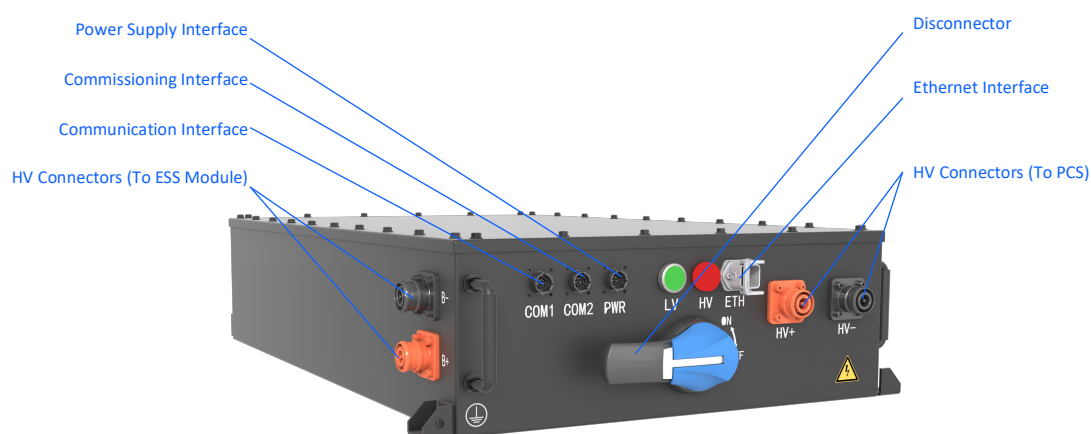


Fig 3-4 HV Box



### 3.1.3. Control Panel

The control panel is integrated inside the ESS Container. The control panel has the function of auxiliary power supply, master communication and fire alarm control. It is mainly composed of the auxiliary transformer, energy meter, UPS and UPS battery, and SBMU, as shown below.

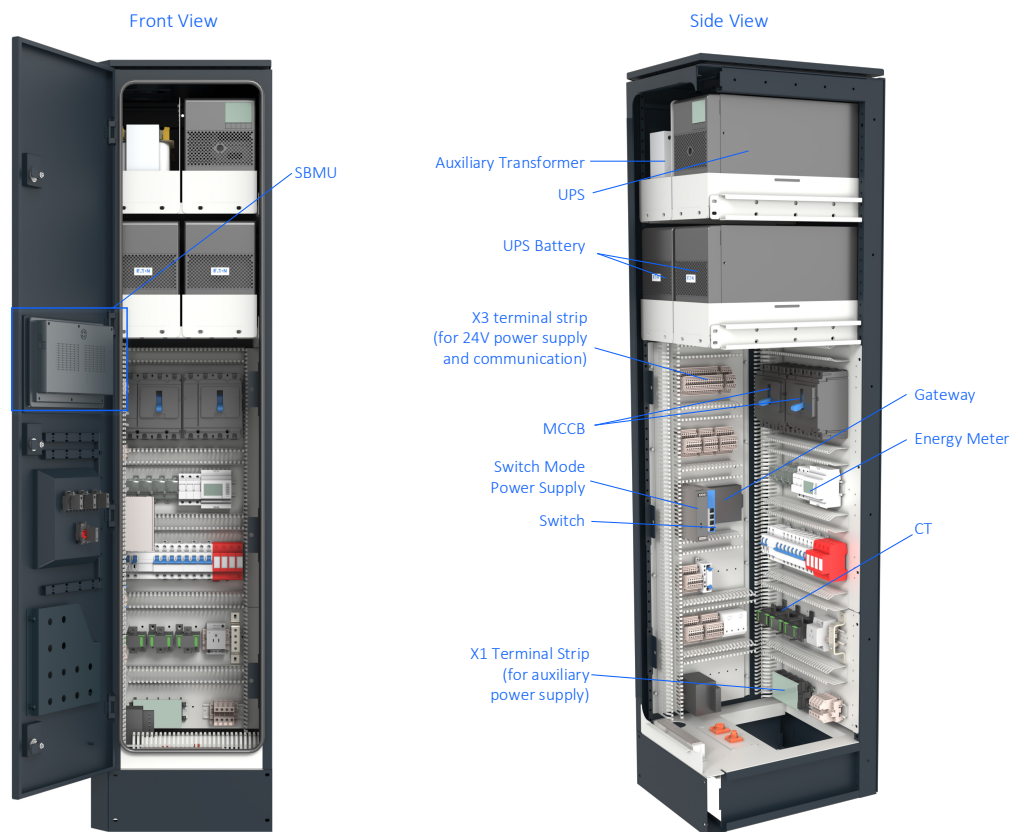


Fig 3-5 Control Panel Design

### 3.1.4. Liquid Cooling Unit

The liquid cooling unit is mainly composed of heater, compressor, condenser, water pump and condenser fan. The parameters of liquid cooling unit as shown below.

| No. | Item                  | Parameters                                         |
|-----|-----------------------|----------------------------------------------------|
| 1   | Operating temperature | -30°C ~55°C (-22°F~131°F)                          |
| 2   | Operating altitude    | ≤4000m (≤13123 ft)                                 |
| 3   | Coolant               | Glycol-water coolant solution                      |
| 4   | Type of refrigerant   | R410A                                              |
| 5   | Supply voltage        | 480VAC±10%, 60±3Hz                                 |
| 6   | Cooling capacity      | Rated value ≥60kW@45°C (113°F) ambient temperature |
| 7   | Heating capacity      | Rated value ≥12kW@10°C (50°F) ambient temperature  |
| 8   | Weight                | ≤485kg (≤1069.2 lbs)                               |
| 9   | Dimension (W*D*H)     | 1600mm*510mm*2580mm (63.0 in * 20.1 in * 101.6 in) |

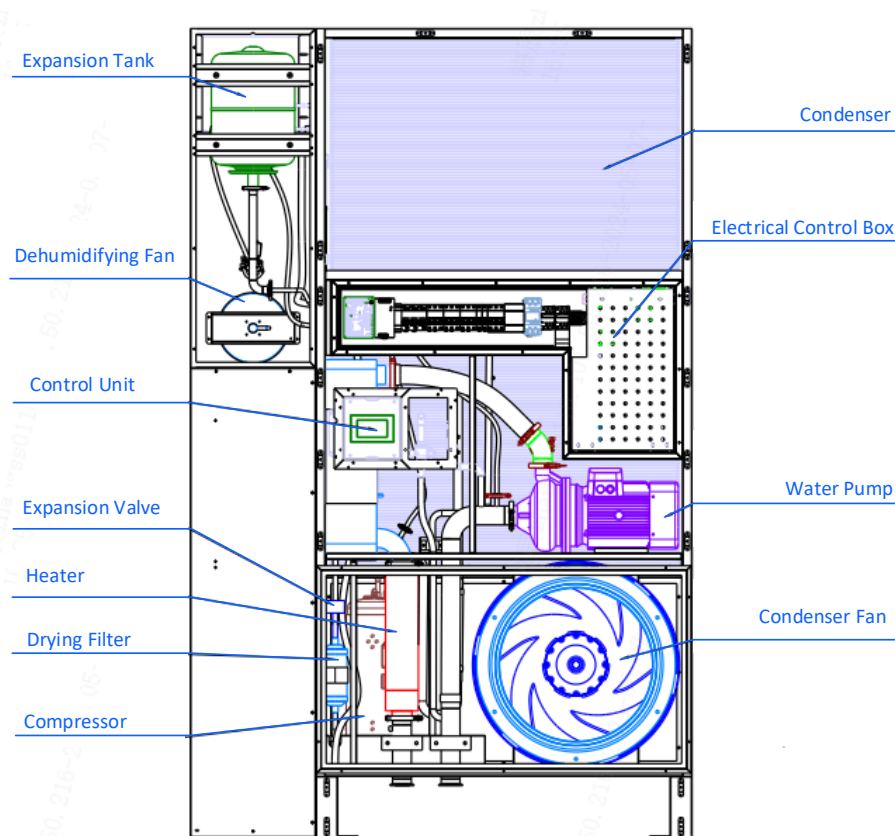


Fig 3-6 Liquid Cooling Unit

### 3.1.5. Fire Protection System

The fire protection system is mainly composed of heat detector, smoke detector, horn/strobe, addressable manual pull station, power supply box (optional), addressable module box, combustible gas detector, ventilation system and water spray system, as shown below.

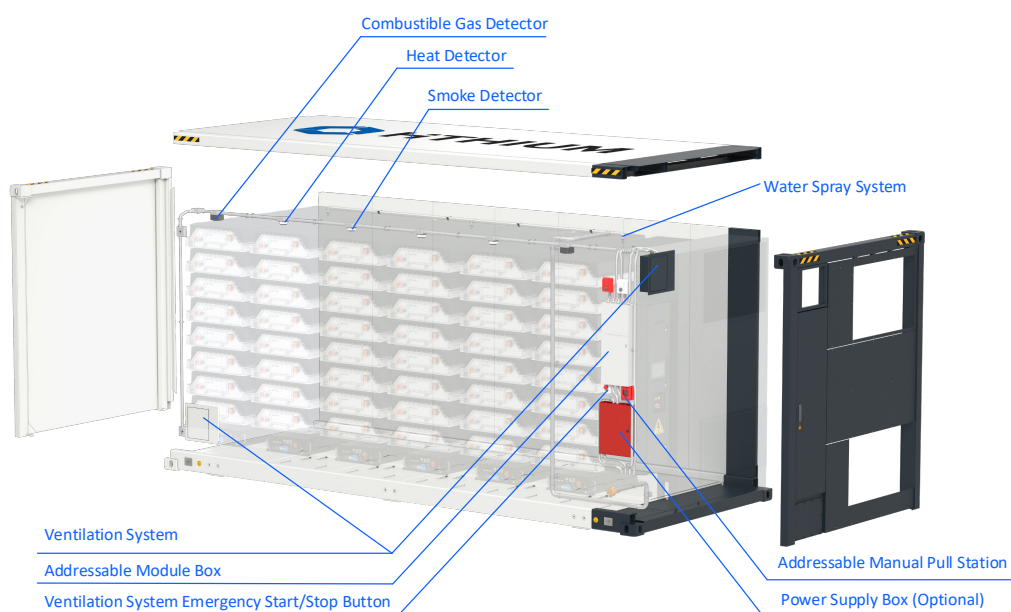


Fig 3-7 Fire Protection System

## 3.2. Technical Parameters

Table 3-1 The key parameters of ESS Container

| Item          |                                | Parameter                                                             | Remark                          |
|---------------|--------------------------------|-----------------------------------------------------------------------|---------------------------------|
| Cell          | Chemistry                      | LFP                                                                   |                                 |
|               | Nominal capacity               | 314Ah                                                                 | 0.5P, 25°C (77°F)               |
|               | Nominal energy                 | 1004.8Wh                                                              | 0.5P, 25°C (77°F)               |
|               | Nominal voltage                | 3.2V                                                                  |                                 |
| ESS Module    | Configuration                  | 2P52S                                                                 |                                 |
|               | Nominal energy                 | 104.5kWh                                                              | 0.5P, 25°C (77°F)               |
|               | Nominal voltage                | 166.4V                                                                |                                 |
| ESS Container | Configuration                  | 5 racks: 5*2P416S<br>6 racks: 6*2P416S                                |                                 |
|               | Nominal energy                 | 5 racks: 4180kWh<br>6 racks: 5016kWh                                  | 0.5P, 25°C (77°F)               |
|               | Nominal voltage                | 1331.2V                                                               |                                 |
|               | Operating voltage              | 1040V-1500V                                                           |                                 |
|               | Maximum charge/discharge power | 0.5P                                                                  |                                 |
|               | Energy density                 | 5 racks: ≥119Wh/kg (≥54.0Wh/lbs)<br>6 racks: ≥125Wh/kg (≥56.7 Wh/lbs) |                                 |
|               | Communication interface        | CAN, RS485, Ethernet                                                  |                                 |
|               | Communication protocol         | CAN, Modbus RTU,<br>Modbus TCP, IEC61850 (optional)                   |                                 |
|               | Thermal management             | Liquid cooling                                                        |                                 |
|               | Coolant                        | Glycol-water coolant solution                                         |                                 |
|               | IP level                       | ESS Container: IP55<br>ESS Module: IP67                               |                                 |
|               | Corrosion protection level     | C5-M                                                                  |                                 |
|               | Operating ambient temperature  | -30°C ~55°C (-22°F~131°F)                                             | Ambient temperature             |
|               | Storage temperature            | -20°C ~35°C (-4°F~95°F)                                               | Recommended                     |
|               | Operating humidity             | 0~100%                                                                | Non-condensing                  |
|               | Max. operating altitude        | ≤4000m (≤13123 ft)                                                    |                                 |
|               | Enclosure Color                | RAL9003+RAL7016                                                       |                                 |
|               | Dimension (W*D*H)              | 6058mm*2438mm*2896mm<br>(238.5 in * 96.0 in * 114.0 in)               | Standard sea-shipping container |
|               | Total weight                   | 5 racks: <35000kg (<77161.8 lbs)<br>6 racks: <40000kg (<88184.9 lbs)  |                                 |



Table 3-2 The key parameters of HV box and control panel in the ESS Container

| Item          |                                  | Parameter                                           | Remark |
|---------------|----------------------------------|-----------------------------------------------------|--------|
| HV Box        | Nominal voltage                  | 1331.2V                                             |        |
|               | Nominal current                  | 314A                                                |        |
|               | IP level                         | IP65                                                |        |
|               | Dimension (W*D*H)                | 564mm*850mm*180mm<br>(22.2 in * 33.5 in * 7.1 in)   |        |
| Control Panel | IP level                         | IP54                                                |        |
|               | Nominal auxiliary system voltage | 480Vac                                              |        |
|               | Dimension (W*D*H)                | 400mmx490mmx1700mm<br>(15.7 in * 19.3 in * 66.9 in) |        |

## 4. Packaging, Transportation and Storage

### CAUTION/ATTENTION

It will result in equipment or property damage if not avoided.

Si vous ne l'évitez pas, vous risquez d'endommager votre équipement ou vos biens.

### 4.1. Packaging

ESS Container is international standard 20ft high-cube sea-shipping container, which can be transported directly without package. However, the air inlet and air exhaust of the liquid cooling unit shall be covered with 3M stickers before transportation, which can be removed before operation.

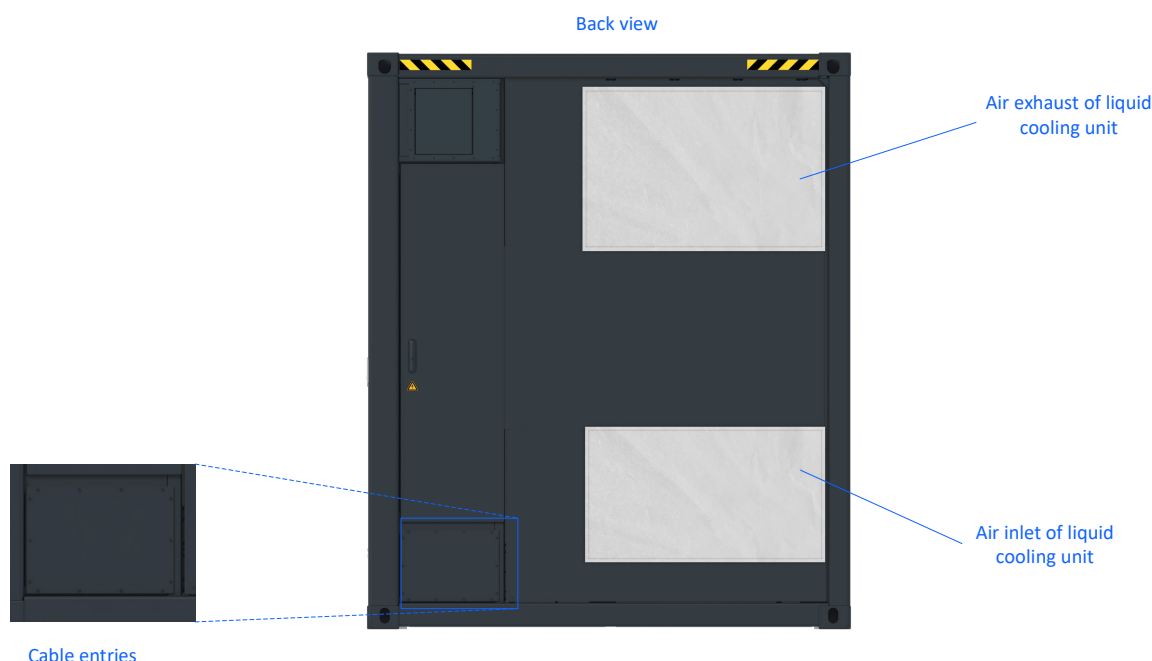


Fig 4-1 Coverage with Stickers

### 4.2. Transportation

This product has attained the certificates for transportation. (UN38.3: Section 38.3 of the sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria) and SN/T 0370.2-2009 (Part 2: Performance Test of the Rules for the Inspection of Packaging for Exporting Dangerous Goods). It belongs to Class 9 dangerous goods.

#### 4.2.1. Precautions for Transportation

The product is standard sea-shipping container based, can be transported by vehicles or ships, and delivered to the site for installation directly. The container must be secured for transportation.

Check to ensure the intactness of the packing before loading and check the cargo information including the labels.

Avoid mechanical impacts for container during transportation.

Avoid inverting, inclining and rolling for the container during transportation.

The loading capacity of hoist shall consider the total weight of container.

In most cases, the total weight of the truck and the cargo exceeds the limits allowed by general roads. In such cases, an overweight permit from the country or region of transport may be required.

The container's stacking capacity is 213360kg (470378.3 lbs), stack number of ESS Container shall be less than 4.

#### 4.2.2. Hoisting and Unloading

Enough safety precautions shall be strictly implemented on site during the whole unloading and installation process, the installer and project owner shall be responsible for personal injury or property damage resulting from the violation of precautions stated in the user manual.

All container doors are locked.

Select appropriate crane or lifting tool according to the site conditions. The lifting tool used shall have a sufficient load bearing capacity, boom length and radius of rotation.

Remove all obstacles that exist or may exist on the way, such as tree branches, cables, etc.

The ESS Container should be lifted vertically.

Ensure that the ESS Container is steady and not tilting during lifting.

When the ESS Container is in place, place it lightly and smoothly. It is strictly forbidden to throw it to places outside the vertical landing place.

Additional traction may be required if ESS Container needs to be transported on slopes.

The ESS Container should be transported and moved under good weather conditions.

Be sure to set up warning signs or warning area to prevent non-staff from entering the lifting area to avoid accidents.

Consult with HITHIUM for mechanical drawings during the design stage.

#### 4.2.3. Operation Steps

**Step 1** Lift from the lifting holes, and ensure on-site safety during lifting. It is recommended to lift the ESS Container from the top. The lifting points are at the four corners on the top of the container, and it is recommended that the lifting steel wire rope be lifted vertically. The lifting method is for reference purposes only. The lifting equipment including slings and ropes that are used on the actual project should be determined by the lifting company based on the product's weight and center of gravity.

**Note:** When lifting loads exceeding 40t (88184.9 lbs) using a single-hook hoist, stability may be difficult to control. During the lifting process, please be aware of the risk of tilting.



Fig 4-2 Lifted via Crane

**Step 2** Hoist the ESS Container to the transport vehicle.



Fig 4-3 Hoist the ESS Container to the Transport Vehicle

**Step 3** Place ESS Container lightly and smoothly at the target position. Ensure proper connection of the container to the fixed points on the transport vehicle.



Fig 4-4 Place ESS Container to the Target Position

**Step 4** Upon arrival at the destination, repeat the above steps, hoist the ESS Container to a firm, flat and well-drained site by proper hoisting machines and slings.

#### 4.2.4. Inspection on Arrival

The ESS Container has been fully inspected by Hithium quality control personnel before shipping and is securely packaged. Nevertheless, collision or damage may occur during the transportation. Upon receiving the ESS Container, carefully check in accordance with the shipping list and verify and record the intactness of each item; the above arrival inspection should be conducted in the presence of a representative from Hithium, and in case of any abnormalities, please contact Hithium promptly.



### 4.3. Storage

If it is not to be installed or commissioned immediately upon reception, the ESS Container should be stored appropriately.

- 1) The ESS Container must be stored on an even foundation, which must be solid enough to support the ESS Container.
- 2) The ESS Container must be stored in a clean and dry place to prevent dust and moisture.
- 3) The recommended storage temperature should be always between -20°C (-4°F) and +35°C (95°F). The recommended storage relative humidity should be always less than or equal to 95% without condensation.
- 4) It is very important to keep the ESS Container away from harsh environment, for example thermal shock, cold shock or any collision.
- 5) Before storage, make sure all the doors of the ESS containers are securely locked, and all the air inlets&outlets, cable entries are securely sealed to prevent any animals from entering. Check periodically for visible damages by rodents.

To install the ESS Container after long-term storage, open the cabinet door and check thoroughly to make sure the ESS Container is intact. Test by professional personnel if necessary before installation.

During storage, it is necessary to provide relevant records that meet the product storage requirements, such as temperature and humidity log data, storage environment photos and inspection reports.

In principle, long-term storage of batteries is not recommended, and they should be used in a timely manner. Long term storage of lithium batteries will lead to capacity loss. If the product is stored for more than 6 months, Hithium recommends performing charging and discharging maintenance.

## 5. Installation

### **WARNING/AVERTISSEMENT**

For safety reasons, all the installation process (include mechanical installation, electrical installation, power on and shutdown) shall always follow the Safety Instructions in this manual.

Pour des raisons de sécurité, tous les processus d'installation (y compris l'installation mécanique, l'installation électrique, la mise sous tension et la mise hors tension) doivent toujours respecter les consignes de sécurité de ce manuel.

### 5.1. Preparation

Table 5-1 Recommended installation tools list

| No. | Name                       | Picture                                                                             | Function                                        |
|-----|----------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------|
| 1   | Multimeter                 |    | For measuring resistance, voltage, and current. |
| 2   | Insulation glove           |    | For preventing electric shock.                  |
| 3   | Digital torque wrench      |  | For torque value measurement.                   |
| 4   | Screwdriver                |  | For connecting shielded twisted pair.           |
| 5   | Network cable pliers       |  | For crimping network cable.                     |
| 6   | Wire stripper              |  | For stripping shielded twisted pair.            |
| 7   | Crimping plier             |  | For crimping shielded twisted pair.             |
| 8   | Manual hydraulic crimper   |  | For crimping auxiliary power cable.             |
| 9   | Electric hydraulic crimper |  | For crimping DC cable.                          |

Note: The pictures of the above tools are for reference only.

Table 5-2 Recommended external cables

| No. | Name                                                             | Interface                                                            | Quantity (pcs)                                                               | Specification                                                                                | Function                                                                                                                                    |
|-----|------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Preparation for external DC cable connection                     | 5 Racks<br>(Rack 1+/-~Rack 5+/-)<br>6 Racks<br>(Rack 1+/-~Rack 6+/-) | 5 racks: 10<br>(5 for each polarity)<br>6 racks: 12<br>(6 for each polarity) | Cable: Cu,<br>300MCM~500MCM (Cable external dimensions range: OD22mm~29mm (0.87 in~1.14 in)) | Power cables from the PCS to the ESS Container                                                                                              |
| 2   | Preparation for external AC cable connection                     | Control Panel X1 terminal strip 1~4                                  | 1                                                                            | Cable: Cu, 3 phases<br>3AWG~2/0AWG                                                           | Auxiliary power cable from external power to the ESS Container                                                                              |
| 3   | Preparation for fire protection system external 24V power supply | Control Panel X3 terminal strip 3~4                                  | 1                                                                            | Cable: Power cable,<br>20AWG~11AWG                                                           | Power cable from the external 24V power to the ESS Container (Optional: for fire protection system without Power Supply Box)                |
| 4   | Preparation for external communication connection                | Control Panel X3 terminal strip 21~22                                | 1                                                                            | Dry Contact:<br>Cable: shielded twisted pair,<br>20AWG~11AWG                                 | Communication cable from the PCS to the BMS                                                                                                 |
|     |                                                                  | Control Panel X3 terminal strip 23~26                                | 1                                                                            | RS485/CAN Communication:<br>Cable: shielded twisted pair,<br>20AWG~11AWG                     | Communication cable from the PCS to the BMS (Reserved)                                                                                      |
|     |                                                                  | Control Panel X3 terminal strip 29~30                                | 1                                                                            | Dry Contact:<br>Cable: shielded twisted pair,<br>20AWG~11AWG                                 | Communication cable from the PCS to the ESS Container emergency stop button                                                                 |
|     |                                                                  | SBMU LAN0 or LAN1                                                    | 1                                                                            | Ethernet Communication:<br>Cable: Cat5e shielded ethernet cable                              | Communication cable from the EMS/Block Controller to the BMS (Reserved)                                                                     |
|     |                                                                  | Gateway LAN1                                                         | 1                                                                            | Ethernet Communication:<br>Cable: Cat5e shielded ethernet cable                              | Communication cable from the Local Network to the ESS Container (Reserved)                                                                  |
|     |                                                                  | Control Panel X3 terminal strip 31~32 and 41~42                      | 1                                                                            | SLC Communication:<br>Cable: shielded twisted pair,<br>20AWG~11AWG                           | Communication cables from the ESS Container fire protection system to the zone/station level FACP or previous/next ESS Container (Reserved) |
| 5   | Preparation for grounding connection                             | ESS enclosure                                                        | 1                                                                            | Connected by M12 bolt<br>50mm*4 mm (1.969 in*0.16 in)<br>grounding flat steel                | Grounding                                                                                                                                   |

## 5.2. Mechanical Installation

### 5.2.1. Site Requirement

The selection of an installation site for the ESS Container demands careful consideration of various ambient conditions, including but not limited to the following factors: geological conditions, underground water levels, wind load, snow load, and history of flooding.

- 1) Ideally, the air surrounding the installation site should be clean, non-erosive, and free from obstructing airflow.
- 2) The installation site must be positioned away from vegetation or any objects that could potentially obstruct airflow.
- 3) The site should be distanced from concentrations of toxic, inflammable, explosive, corrosive and harmful gases and materials.
- 4) Ensure the installation site is sufficiently distant from residential areas or fenced in to prevent access by unauthorized personnel.

### 5.2.2. Foundation Requirement

The foundation for the ESS Container must be designed by professional civil engineers, adhering to local standards, and the construction process should strictly follow the design specifications. Consider the following factors during both the design and construction phases:

- 1) The foundation's bearing layer should consist of undisturbed soil. In cases where the foundation support layer comprises weak soil, graded sandstone should be used for replacement. The replacement soil layer must be compacted in layers.
- 2) The foundation should be elevated appropriately to prevent rain from eroding the container's foundation, base and interior.
- 3) Design and implement an appropriate drainage system.
- 4) The cross-sectional area and height of the foundation must align with relevant requirements.
- 5) Consider cable routing and related work when constructing the foundation.
- 6) Ensure all cables are sealed with fireproof sealant or suitable materials at the cable inlet, outlet, and connectors.
- 7) It is required to level the roadway or surface up to the edge of the container, ensuring it is suitable for forklift trucks.
- 8) Determine the distance between the container's bottom and the ground level based on flood surveys.

#### 5.2.2.1. Fixation Part Installation

Secure the fixing points at the bottom of the ESS Container to the foundation using fixation parts. There are three fixing points on both the left and right sides of the container, as shown below.



Fig 5-1 Fixing Points of the ESS Container



The steps of fixing the fixation parts are shown below. It is recommended to use M20 expansion bolts for locking.

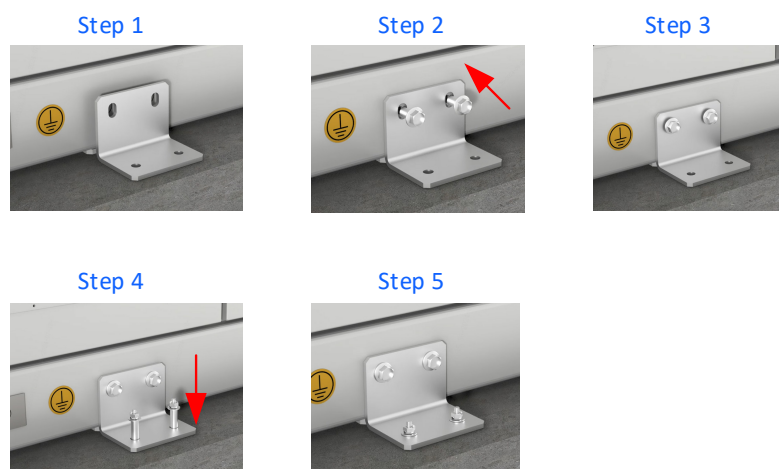


Fig 5-2 Install the Fixation Parts

### 5.2.3. Fencing Requirement

ESS shall be installed in a manner that deters access by persons who are not qualified. When deterring access, fences, screens, walls, or barriers no shorter than 2.1m (6.9 ft) in height are suggested. Fencing shall be locked and posted with a placard stating “Authorized Users Only,” or similar.

Note: If the installation is located within a property that already contains perimeter fencing to prevent unauthorized public access, additional fencing might not be required.

### 5.2.4. Product Dimensions

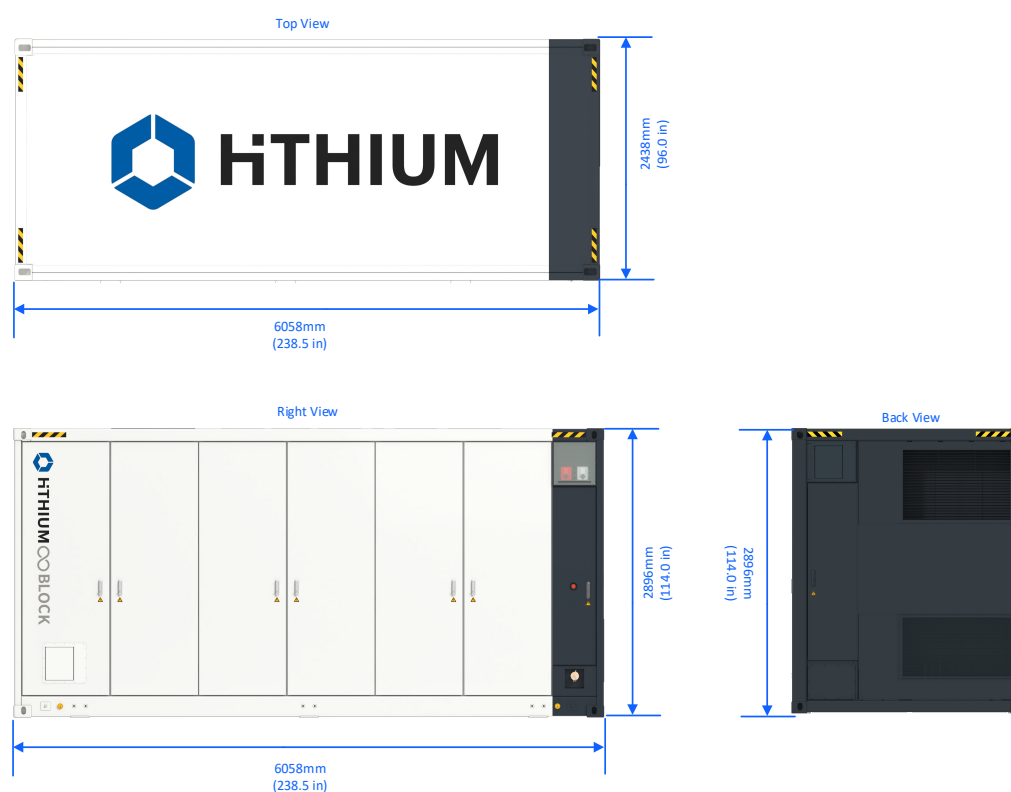


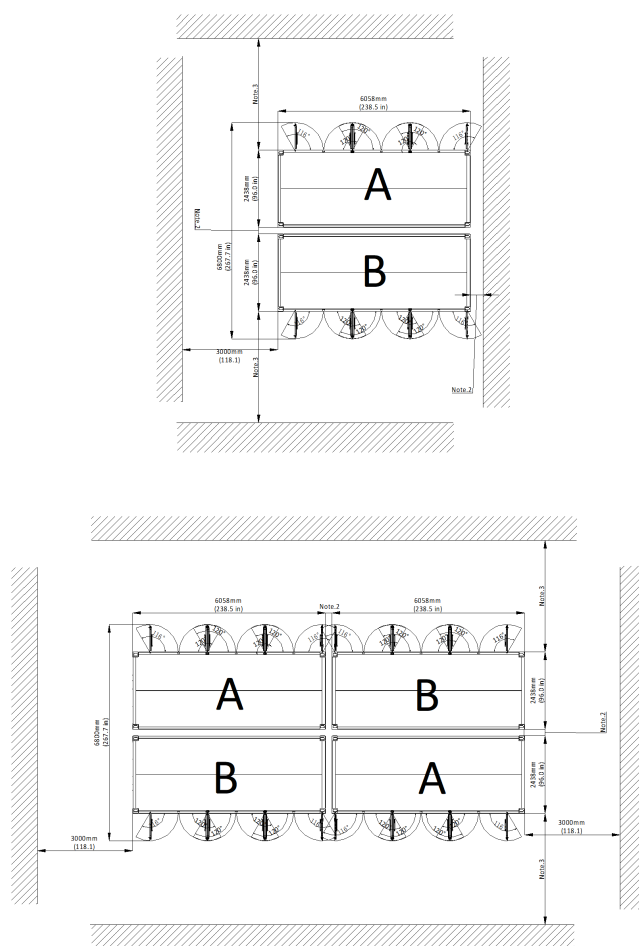
Fig 5-3 Dimensions of ESS Container

### 5.2.5. Minimum Clearance

 **CAUTION/ATTENTION**

- Local firefighting requirements and user convenience shall be taken into consideration when designing the clearance for each side of the ESS Container.
- To optimize space utilization without compromising functionality, two versions, A and B, of the ESS Containers have been developed, each featuring internally mirrored layout structures.
- Les exigences locales en matière de lutte contre les incendies et la commodité de l'utilisateur doivent être prises en compte lors de la conception de la marge de chaque côté du conteneur de stockage d'énergie (ESS).
- Afin d'optimiser l'utilisation de l'espace sans compromettre la fonctionnalité, deux versions, A et B, du conteneur de stockage d'énergie (ESS) ont été développées, chacune présentant des structures de disposition internes en miroir.

The minimum clearance between the wall of the containers and the nearest equipment or internal road should be determined with consideration for the travel area of each door, as shown below.



Note:

Note.1: Hithium provides two forms of containerized energy storage systems: Type-A and Type-B. You can clearly see that through such optimized design, it is possible to maximize the savings in your project's land area. For the differences between these two products, please contact Hithium's technical personnel, and we would be more than happy to provide you with the corresponding solutions.

Note.2: There are no specific requirements for the spacing between the short side (non-door side) of the containers. Please consider the spacing based on the actual on-site conditions and relevant laws and regulations in the project's location.

**Note.3:** These distances represent the net spacing requirement to be reserved in front of the long side of the container foundations. The minimum spacing requirement is 3.5m (137.8 in) when using Hithium specialized installation equipment. If on-site conditions allow, Hithium recommends increasing the spacing for easier maintenance.

**Fig 5-4 Spacing for Clearance**

## 5.2.6. Water Supply Connection for Firefighting

### **WARNING/AVERTISSEMENT**

- The water firefighting system used for this ESS Container is an open system, which means once supplied with water, the sprinklers along with the firefighting water pipe will spray the water over the batteries immediately.
- Therefore, it's **FORBIDDEN** to connect the water firefighting system with any water supply unless there's a fire occurring.
- In case of fire, only professional firefighters are allowed to connect the water firefighting system with the firefighting water supply.
- **DO NOT** connect the water firefighting system with any external water supply during the installation, commissioning, and operation.
- Le système de lutte contre l'incendie à eau utilisé pour ce conteneur ESS est un système ouvert, ce qui signifie qu'une fois alimentés en eau, les gicleurs et la conduite d'eau de lutte contre l'incendie pulvérisent immédiatement l'eau sur les batteries.
- Par conséquent, il est **INTERDIT** de connecter le système de lutte contre l'incendie à toute source d'eau, sauf en cas d'incendie.
- En cas d'incendie, seuls les pompiers professionnels sont autorisés à raccorder le système de lutte contre l'incendie à l'alimentation en eau de lutte contre l'incendie.
- **NE PAS** raccorder le système de lutte contre l'incendie à une source d'eau externe pendant l'installation, la mise en service et le fonctionnement.

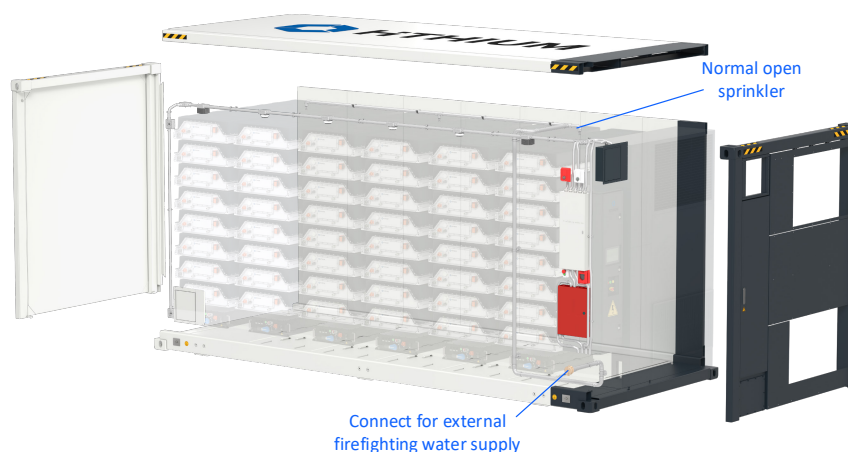


Fig 5-5 Water Spray System Schematic Diagram

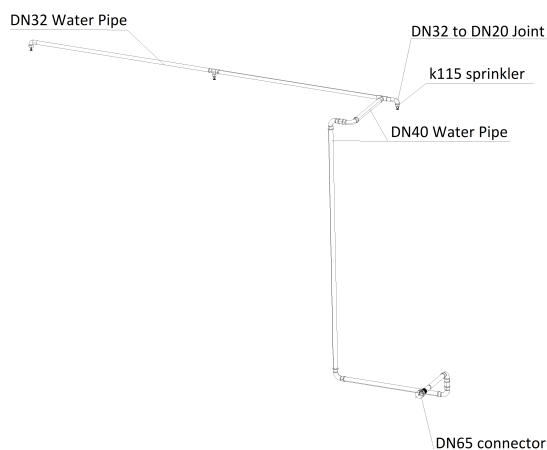


Fig 5-6 Water Spray System Dimensions Diagram

The water supply for firefighting of the ESS Container and the necessary response procedures should be designed in accordance with the firefighting agreement or guidelines from the fire department before installation, rather than waiting for an emergency to occur.

A water pipe inlet is located on the side of the container, and a water pipe with sprinklers at various positions extends from the water inlet to the top of the ESS Container.

A DN65 connector is designated for the exclusive purpose of connecting to an outdoor water source for firefighting.

The Installation steps of the Connection for Water Spray System are as shown below.

- 1) Remove the cap of the DN65 connector.
- 2) Connect the external fire protection pipeline to the connector.
- 3) Tighten by rotating.

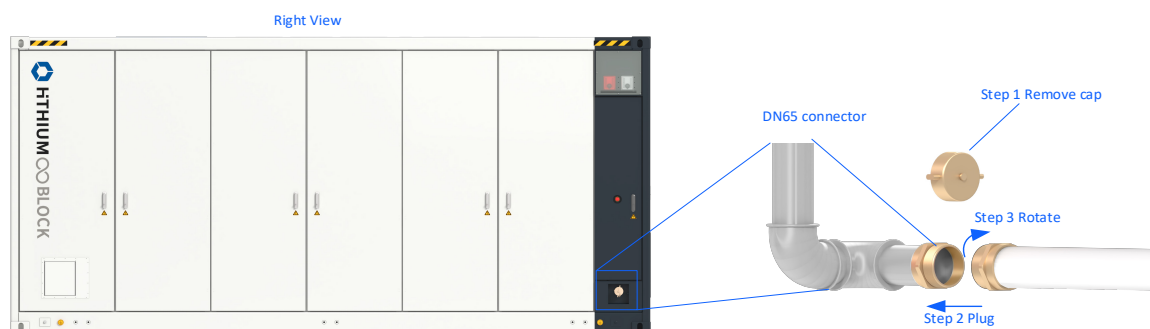


Fig 5-7 Installation of the Connection Point for Water Firefighting

The water supply must be provided externally following the directives of the fire department, if required, and should only be applied if the unit is on fire. The container is designed to accommodate a direct connection from a fire hose. The interface for the fire hose should match the connection point of the container.

Water pressure and flow rate requirements: The specified requirements are 1.2 bar water pressure and 207L/min flow rate at the inlet of the Container.



## 5.3. Electrical Installation

### 5.3.1. Electrical Diagram

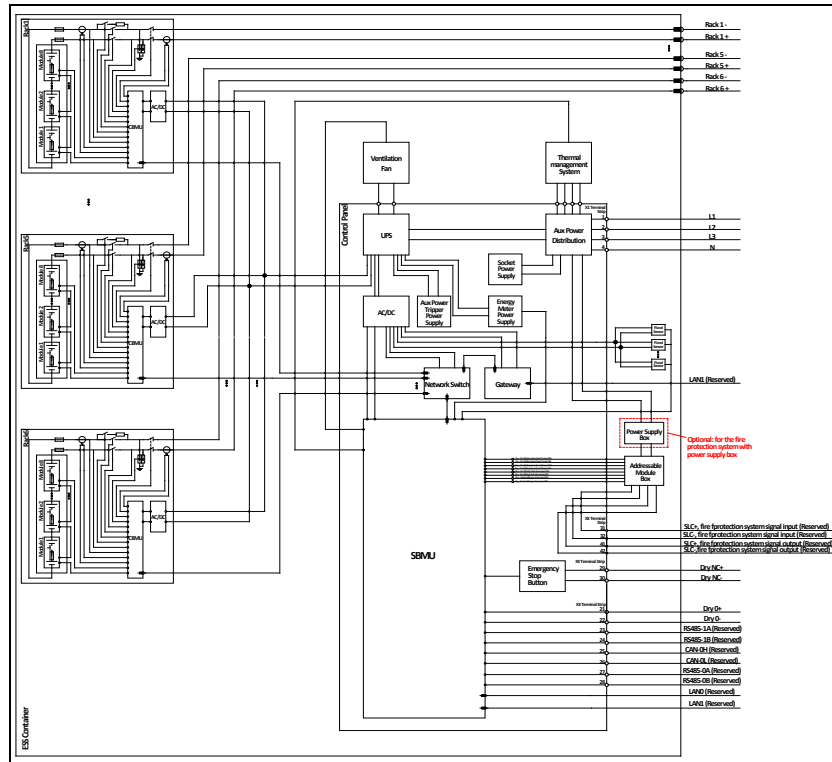


Fig 5-8 ESS Container System Schematic Diagram (for Fire Protection System with Power Supply Box)

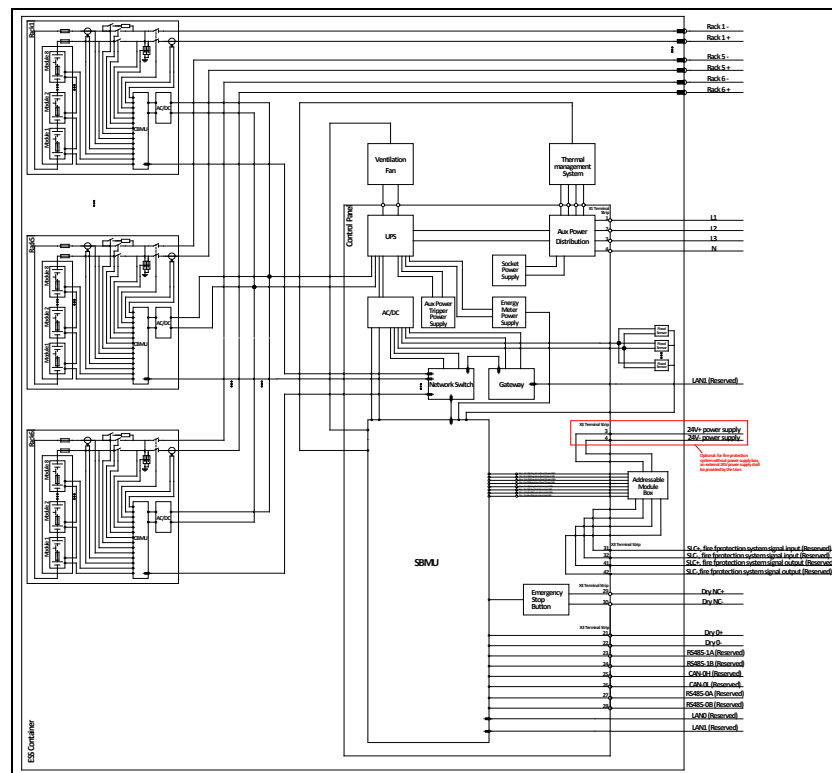


Fig 5-9 ESS Container System Schematic Diagram (for Fire Protection System without Power Supply Box)

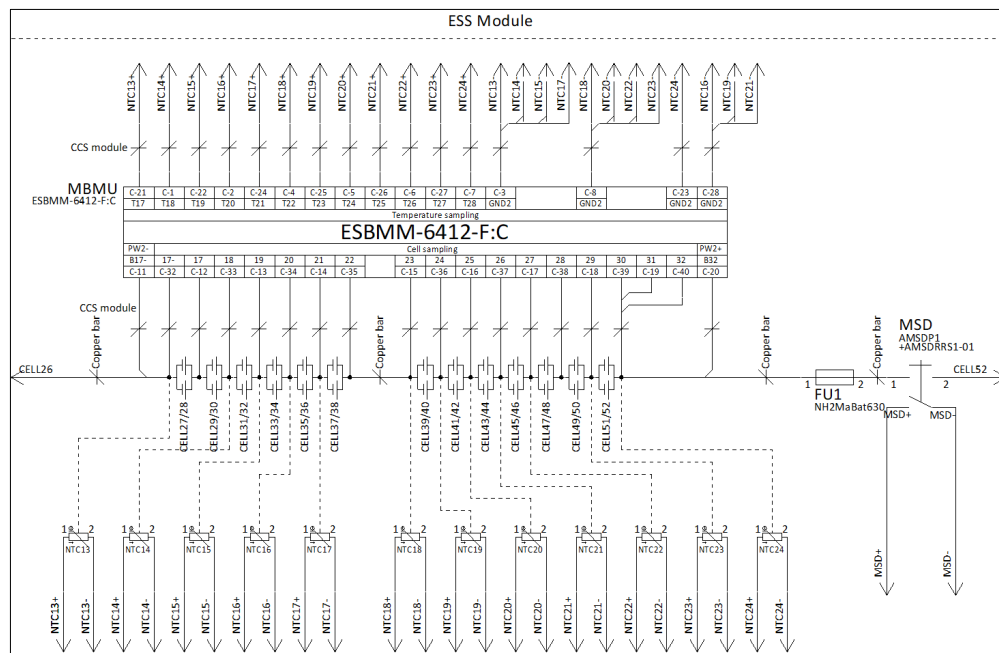


Fig 5-10 ESS Module Electrical Diagram

For each rack, the switching on and off of the rack circuit is managed via the DC relay, which is controlled by the CBMU. The CBMU communicates with the V-T measurement board and the SBMU.

The main circuit is protected against overcurrent using DC fuses. Each rack is equipped with a disconnecter for electrical isolation.

A pre-charge circuit runs in parallel with the DC positive circuit to enable pre-charge functionality.

In each 2P52S module, there are 48 temperature sampling points and 52 voltage sampling points that transmit temperature signals and voltage signals to the V-T measurement board, respectively.

### 5.3.2. DC Connection

The connections between the ESS Container and the external equipment, including the DC power cable connection, AC auxiliary power cable connection, communication cable connection, as shown below.

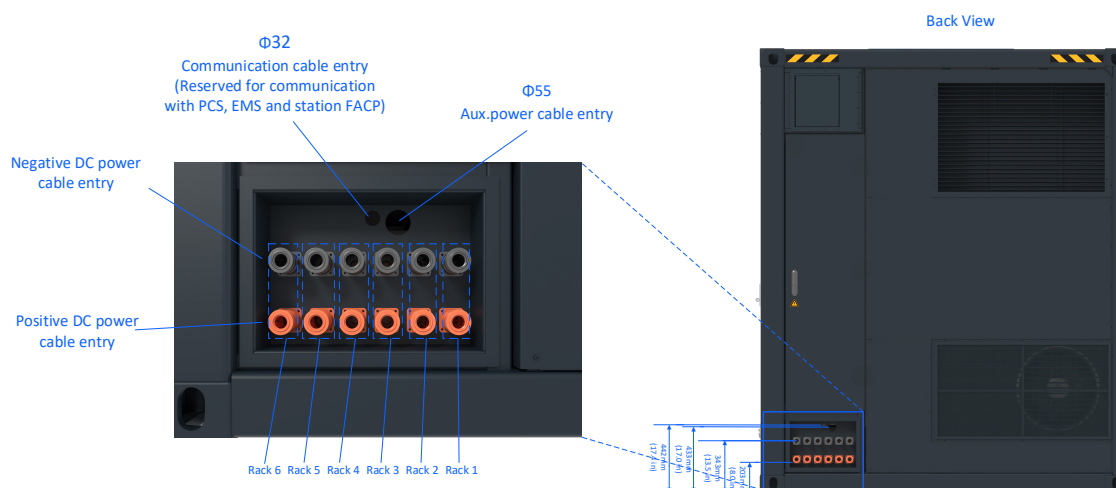
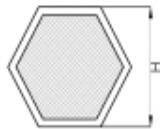


Fig 5-11 Cable Entries

Note: If it is a 5-rack system, 'Rack 4' in the diagram above shall not be connected.

The external DC cables are connected to the PTH (Pass Through) receptacle on the ESS Container, with 6 PTH receptacles for both the positive and negative poles. The specific assembly instructions are as shown below.

Table 5-3 Cable crimping parameters

| Cable Dimensions          | Crimping Length H            | Lug pull-out force | Applicable wire outside diameter range | Hexagonal Crimping Cross-Section Diagram                                              |
|---------------------------|------------------------------|--------------------|----------------------------------------|---------------------------------------------------------------------------------------|
| 300MCM/150mm <sup>2</sup> | 16.6±0.3mm (0.64 in~0.67 in) | 4100N              | 22~23mm (0.86 in~0.90 in)              |  |
| 500MCM/240mm <sup>2</sup> | 20.0±0.3mm (0.78 in~0.80 in) | 4600N              | 26.5~29mm (1.04 in~1.14 in)            |                                                                                       |

- 1) Select the appropriate cable specifications according to the connector specifications (refer to above table for cable dimensions). Insert the cable through the rubber sleeve, and then strip 20±1mm (0.75 in~0.83 in) of the cable insulation.

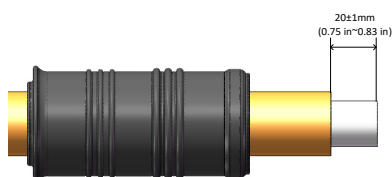


Fig 5-12 Insert the Rubber Sleeve and Strip Cable Insulation

- 2) After installing the crimping terminal onto the cable, crimping should be conducted using electric hydraulic crimping tools. The details of the requirements for the crimping can refer to above table.



Fig 5-13 Crimp the Crimping Terminal



Fig 5-14 Electric Hydraulic Crimper (For Indication only)

- 3) Insert the crimped cable into the PTH receptacle assembly until it is fully seated. Ensure that the crimping terminal hole is approximately aligned with the hole on the PTH receptacle. Then, insert the M8 screw assembly through the PTH receptacle hole. Tighten the M8 screw with the internal nut from a direction perpendicular to the axis of the PTH receptacle. The tightening torque is  $13 \pm 1$  N·m.

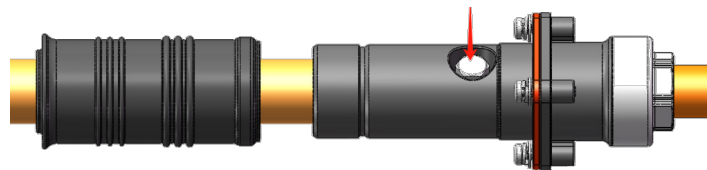


Fig 5-15 Tighten the M8 Screw with the Internal Nut

- 4) Push the rubber sleeve onto the PTH receptacle until it is fully seated and cannot be pushed further. Ensure that there are no abnormal protrusions in the appearance.

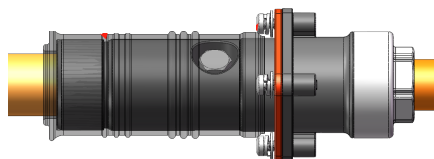


Fig 5-16 Push the Rubber Sleeve onto the PTH Receptacle

The connection details of the DC power cable are as shown below.

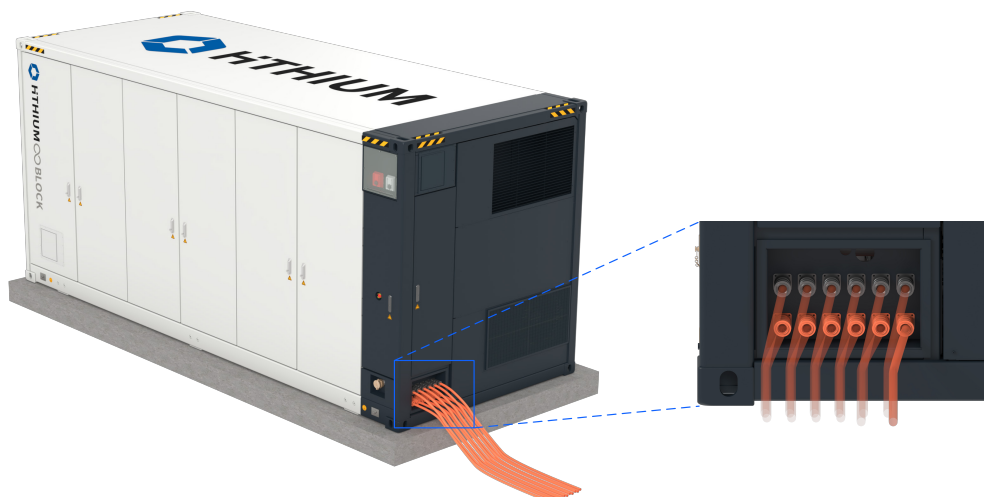


Fig 5-17 The Connection Details of the DC Power Cable

Note: If using side outlet cable, a support bracket should be added 280-320mm from the outlet to prevent an excessive bending radius from damaging the cable.



### 5.3.3. Connection for Grounding

The ESS Container provides two grounding points for effective grounding. Grounding for the ESS Container can be achieved using either a flat steel bar or a cable. The cross-section of the steel bar or cable for grounding should be calculated in accordance with the standards set by local authorities, typically following the American National Electrical Code (NEC).

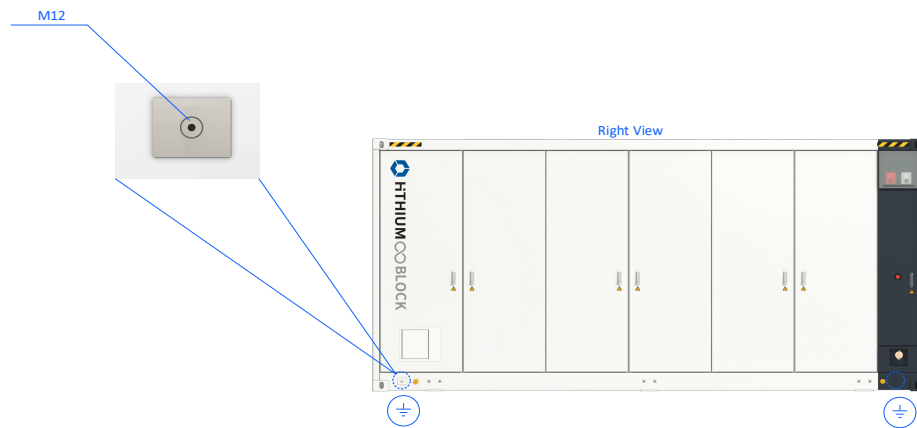


Fig 5-18 Grounding Points

The grounding flat steel or cable can be connected with the ground point either by M12 bolt with a tightening torque of 84N·m or directly welded, in the case of welding, the anti-corrosion processing shall be conducted for the welding area.



Fig 5-19 Grounding Either with Flat Steel or with Cable

Note: The grounding flat steel come covered with protective tape. Before making any cable connections, ensure to remove the protective tape and clean all contact surfaces in the connection area.

### 5.3.4. Connection for Auxiliary Power Supply

The external power supply should typically be a 3L/N system.

The power consumption shall be specified during the project design phase.

The auxiliary power is sourced from the external local power supply. The cable enters the ESS Container through the cable entry, connects to the reserved terminal at the bottom of the control panel, and subsequently links to the circuit breaker after passing through the power monitoring module.

The external power supply is distributed to various systems, including the thermal management system, sockets, environment control system of the control panel, the fire protection system (optional), and UPS.

In case of loss of external power supply, it will automatically switch to UPS power supply.

The UPS delivers DC power to the instruments as listed below.

Table 5-3 UPS power supply

| No. | Power Supply | Power Load                         |
|-----|--------------|------------------------------------|
| 1   | UPS          | CBMU                               |
| 2   |              | SBMU                               |
| 4   |              | Flood sensor                       |
| 5   |              | Explosion-proof fans               |
| 6   |              | Meter (for auxiliary power supply) |
| 7   |              | Circuit breaker QF1 trip coil      |

The auxiliary power supply cable connection is shown below.

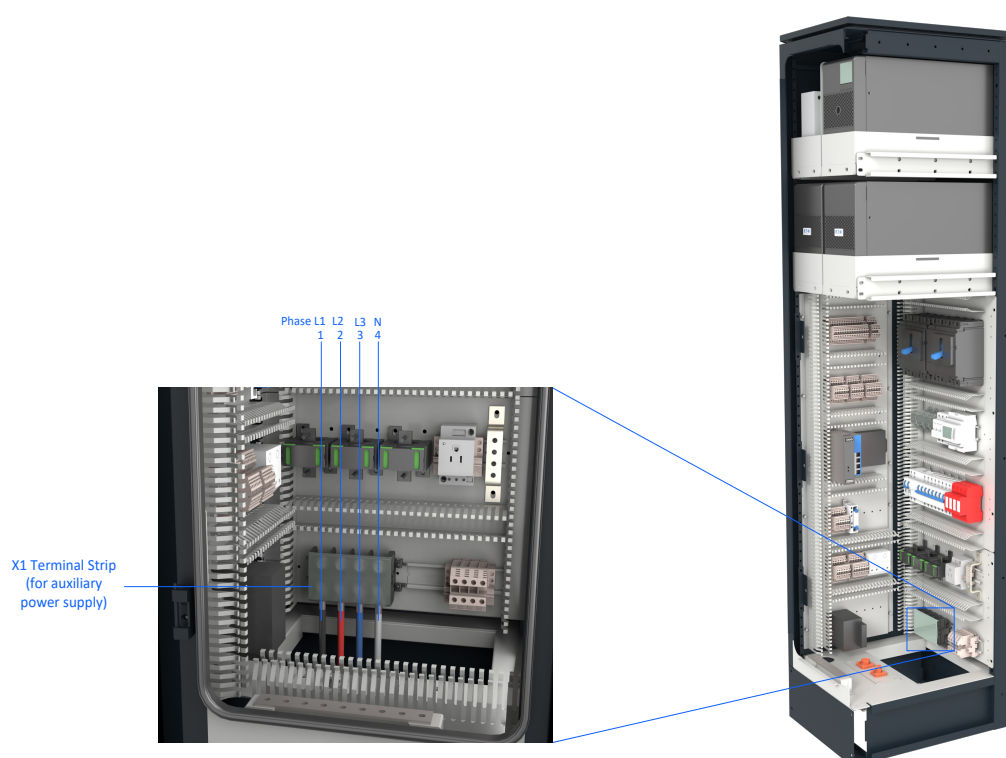


Fig 5-20 Auxiliary Power Cable Connection (X1 Terminal Strip)

The fabrication and installation procedures of the auxiliary power cable are as shown below.

Note: The wire color is not specifically required. It will be determined based on the requirements of the User.

1) Step 1: Cable stripping

- Strip the jacket of the cable: 8mm (0.31 in)



Fig 5-21 Strip the Auxiliary Power Cable (for Reference only)

2) Step 2: Install the cable lug



Fig 5-22 Install the Auxiliary Power Cable Lug (for Reference only)

3) Step 3: Crimp the cable

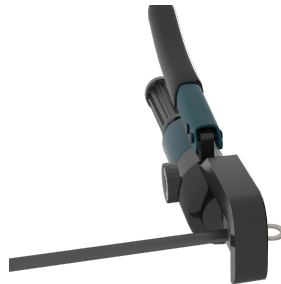


Fig 5-23 Crimp the Auxiliary Power Cable (for Reference only)



Fig 5-24 Manual Hydraulic Crimper (for reference only)

4) Step 4: Open the cover of the auxiliary power supply X1 terminal strip.

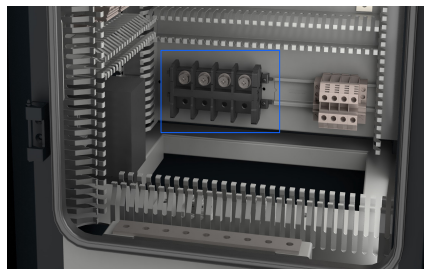


Fig 5-25 Open the Cover of X1 Terminal Strip

- 5) Step 5: Connect the auxiliary power supply cables and secure with M8 bolts. The tightening torque for M8 bolt is 4.5 N·m.

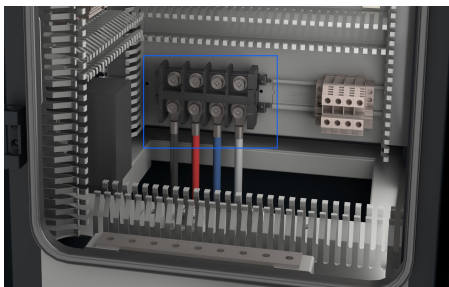


Fig 5-26 Connect the Cables and Secure with M8 Bolts

- 6) Step 6: Close the auxiliary power X1 terminal strip with its cover.

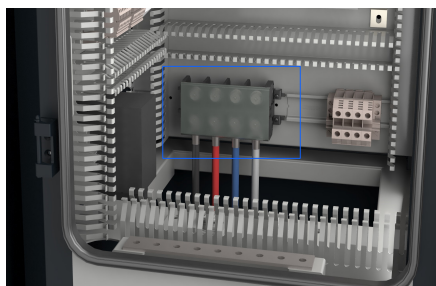


Fig 5-27 Close the Cover on the X1 Terminal Strip



### 5.3.5. Connection for Communication

There is a SBMU in the control panel of the ESS Container, serving as the communication interface.

The SBMU communicates internally with CBMU, UPS, thermal management system, fire protection system, emergency stop button on the container, and externally with the PCS, EMS and Station FACP.

The gateway of the control panel is reserved for connecting to the local network.



Fig 5-28 SBMU & Gateway Position



Fig 5-29 SBMU Communication Interfaces (Reserved)

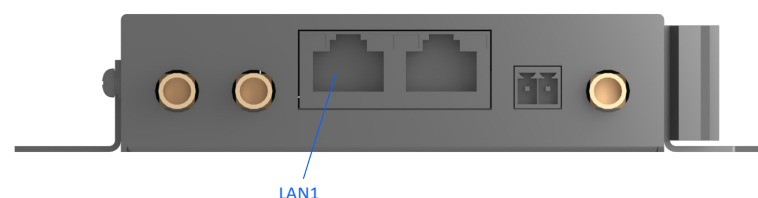


Fig 5-30 Gateway Communication Interface (Reserved)

The fabrication procedures of the network cable are as shown below.

Note: Network cables must be terminated according to the T568B Wiring Standard.

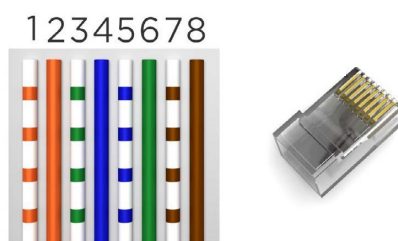


Fig 5-31 T568B Wiring Standard

1) Step 1: Cable stripping

- Strip the jacket of the cable: 13mm~16mm (0.5 in ~ 0.6 in)



Fig 5-32 Strip the Network Cable (for Reference only)

2) Step 2: Install the cable plug



Fig 5-33 Install the Network Cable PLug (for Reference only)

3) Step 3: Crimp the cable



Fig 5-34 Crimp the Network Cable (for Reference only)



Fig 5-35 Network Cable Pliers (for reference only)

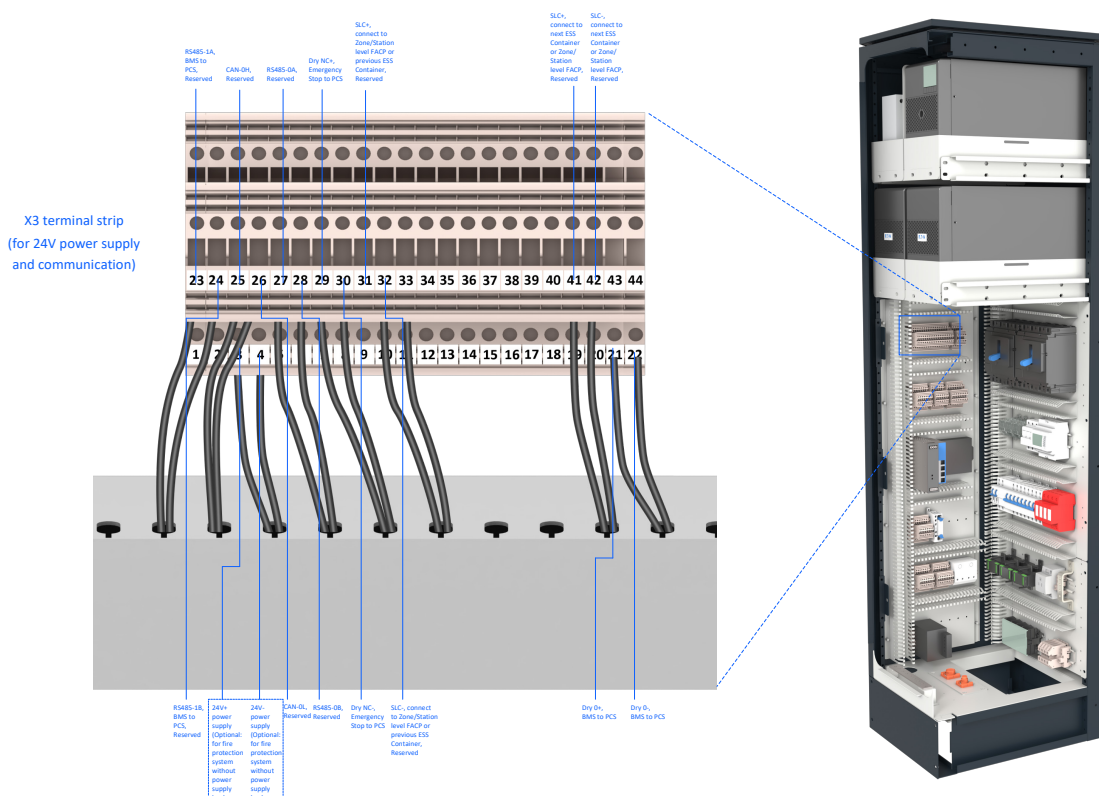


Fig 5-36 Detail of External Connections (X3 Terminal Strip)

Table 5-4 External interfaces

| Item                            | Descriptions       | Communication Protocol | Remarks                                                                           |
|---------------------------------|--------------------|------------------------|-----------------------------------------------------------------------------------|
| Control panel X3 terminal strip | X3-3               | N/A                    | 24V+ power supply (Optional: for fire protection system without power supply box) |
|                                 | X3-4               | N/A                    | 24V- power supply (Optional: for fire protection system without power supply box) |
|                                 | X3-21, Dry contact | N/A                    | Dry 0+, BMS to PCS                                                                |
|                                 | X3-22, Dry contact | N/A                    | Dry 0-, BMS to PCS                                                                |
|                                 | X3-23, RS485       | Modbus RTU             | RS485-1A, BMS to PCS, Reserved                                                    |
|                                 | X3-24, RS485       | Modbus RTU             | RS485-1B, BMS to PCS, Reserved                                                    |
|                                 | X3-25, CAN         | CAN                    | CAN-0H, Reserved                                                                  |
|                                 | X3-26, CAN         | CAN                    | CAN-0L, Reserved                                                                  |
|                                 | X3-27, RS485       | Modbus RTU             | RS485-0A, Reserved                                                                |
|                                 | X3-28, RS485       | Modbus RTU             | RS485-0B, Reserved                                                                |
|                                 | X3-29, Dry contact | N/A                    | Dry NC+, Emergency Stop to PCS                                                    |
|                                 | X3-30, Dry contact | N/A                    | Dry NC-, Emergency Stop to PCS                                                    |
|                                 | X3-31              | N/A                    | SLC+, connect to Zone/Station level FACP or previous ESS Container, Reserved      |
|                                 | X3-32              | N/A                    | SLC-, connect to Zone/Station level FACP or previous ESS Container, Reserved      |
|                                 | X3-41              | N/A                    | SLC+, connect to next ESS Container or Zone/Station level FACP, Reserved          |
|                                 | X3-42              | N/A                    | SLC-, connect to next ESS Container or Zone/Station level FACP, Reserved          |
| SBMU                            | LAN0, Ethernet     | Modbus TCP             | External Communication, Reserved                                                  |
|                                 | LAN1, Ethernet     | Modbus TCP             | External Communication, Reserved                                                  |
| Gateway                         | LAN1, Ethernet     | Modbus TCP             | External Communication, Reserved                                                  |

The fabrication procedures of the shielded twisted pair as shown below.

1) Step 1: Wire stripping

- Cut the jacket of the wire: 12mm (0.5 in)



Fig 5-37 Strip the Shielded Twisted Pair (for Reference only)



Fig 5-38 Wire Stripper (for Reference only)

2) Step 2: Install the cable lug



Fig 5-39 Install the Shielded Twisted Pair Lug (for Reference only)

3) Step 3: Crimp the cable

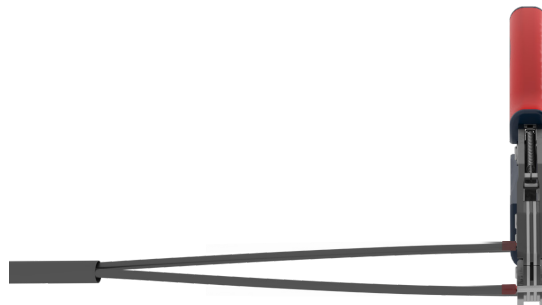


Fig 5-40 Crimp the Shielded Twisted Pair Lug (for Reference only)



Fig 5-41 Crimping Plier (for reference only)



### 5.3.6. Connection for Batteries

The wiring between ESS Modules has been pre-installed at the factory. To ensure the safety issue during transportation, the MSD has not been pre-installed and the Buyer shall complete the installation on-site.

Module 1 (-) <-----> HV box input (-)

Module 1 (+) <-----> Module 2 (-)

Module 2 (+) <-----> Module 3 (-)

Module 3 (+) <-----> Module 4 (-)

Module 4 (+) <-----> Module 5 (-)

Module 5 (+) <-----> Module 6 (-)

Module 6 (+) <-----> Module 7 (-)

Module 7 (+) <-----> Module 8 (-)

Module 8 (+) <-----> HV box input (+)

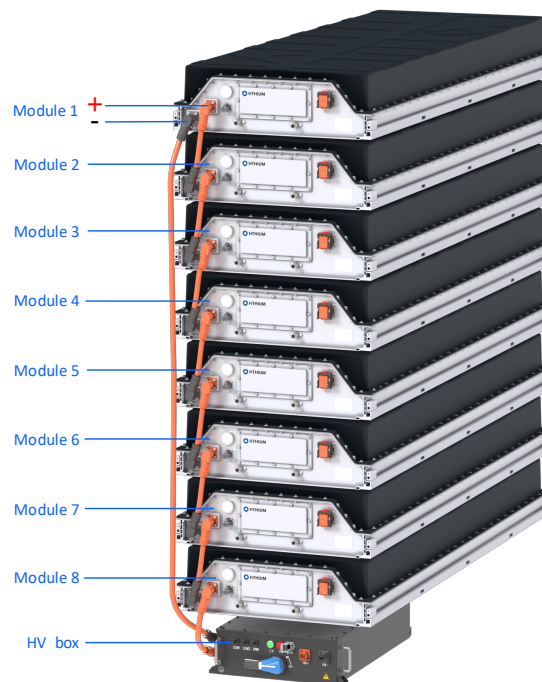


Fig 5-42 Battery Connection

**MSD installation steps:**

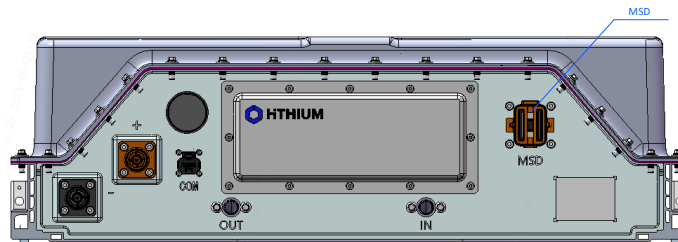


Fig 5-43 MSD is Uninstalled Status

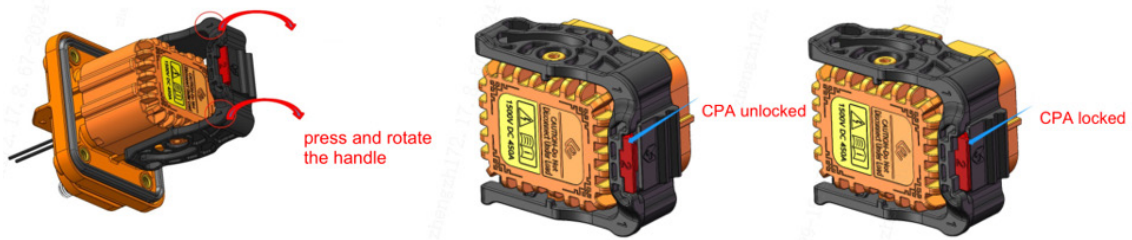


Fig 5-44 Install of MSD

- 1) Make sure the MSD plug and socket are matched in the correct direction, and simultaneously press down the MSD handle until you hear a "click" sound, indicating that the handles fully locked.
- 2) After the handle is fully locked, press down on the MSD CPA until the CPA is aligned with the unlock-ing slider, achieving the secondary locking effect of the MSD CPA.
- 3) Check whether the MSD is installed in place.

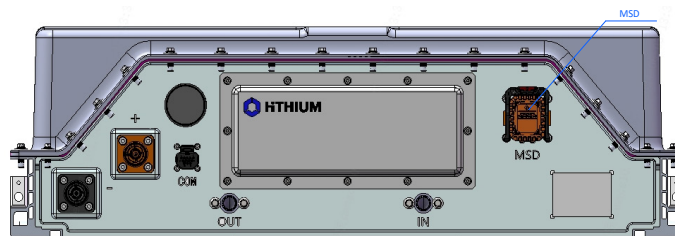


Fig 5-45 MSD is Installed in Place

## 6. Operation

### DANGER/DANGER

For safety reasons, always follow the power on and shutdown Instructions in this manual.

Pour des raisons de sécurité, suivez toujours les instructions de mise sous tension et d'arrêt de ce manuel.

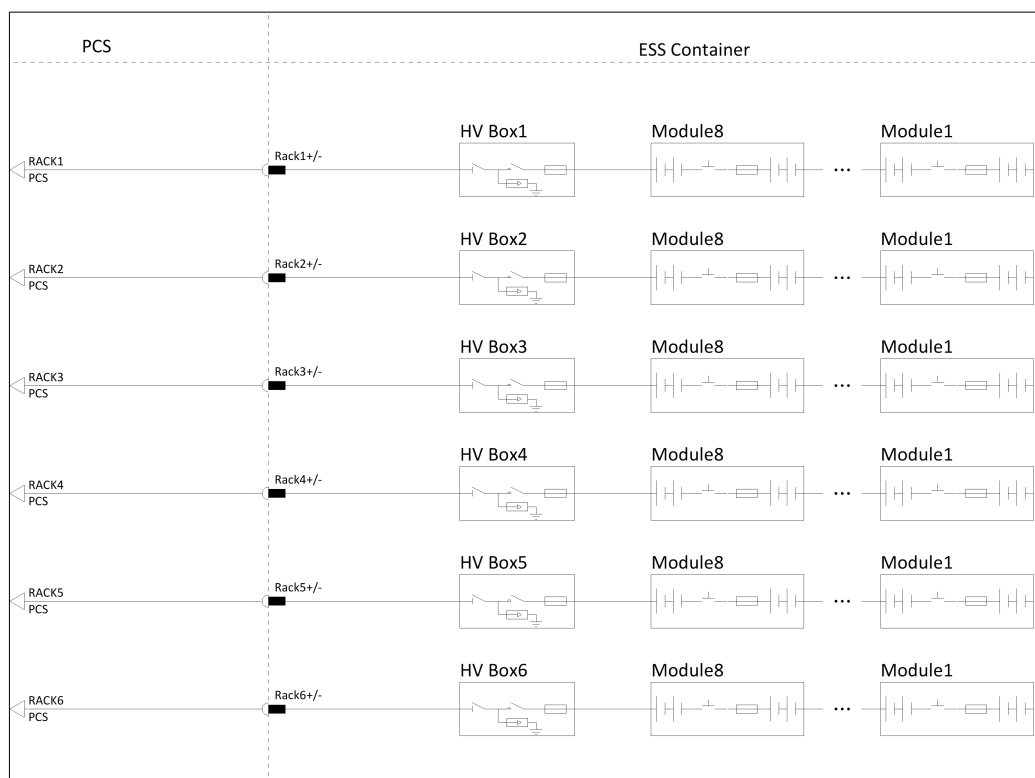


Fig 6-1 Single Line Diagram of ESS System (for 6 Racks System)

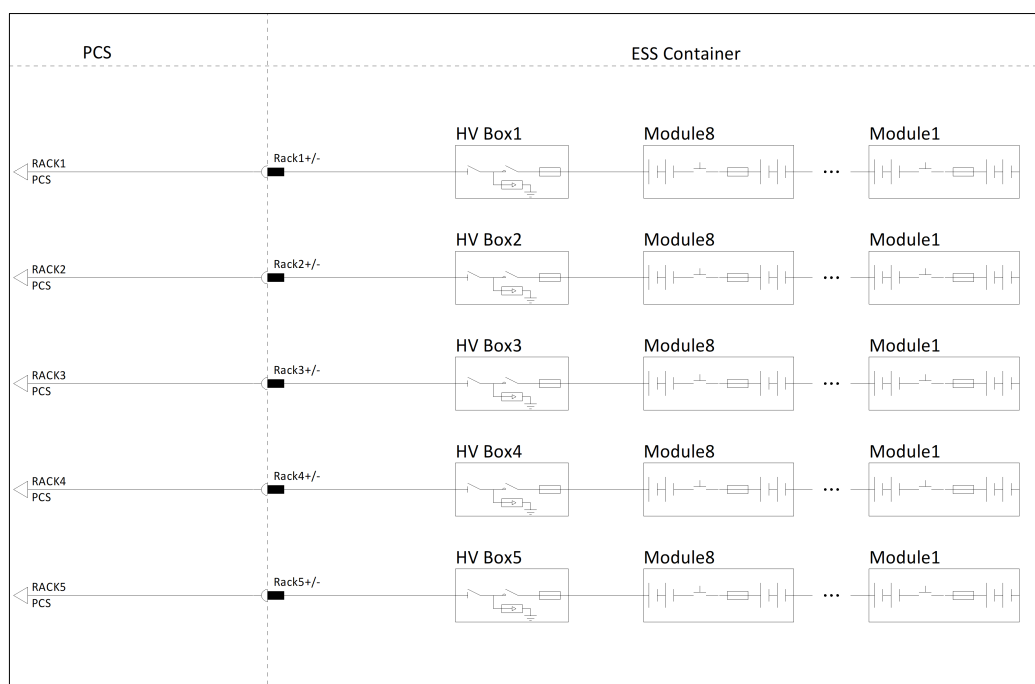


Fig 6-2 Single Line Diagram of ESS System (for 5 Racks System)

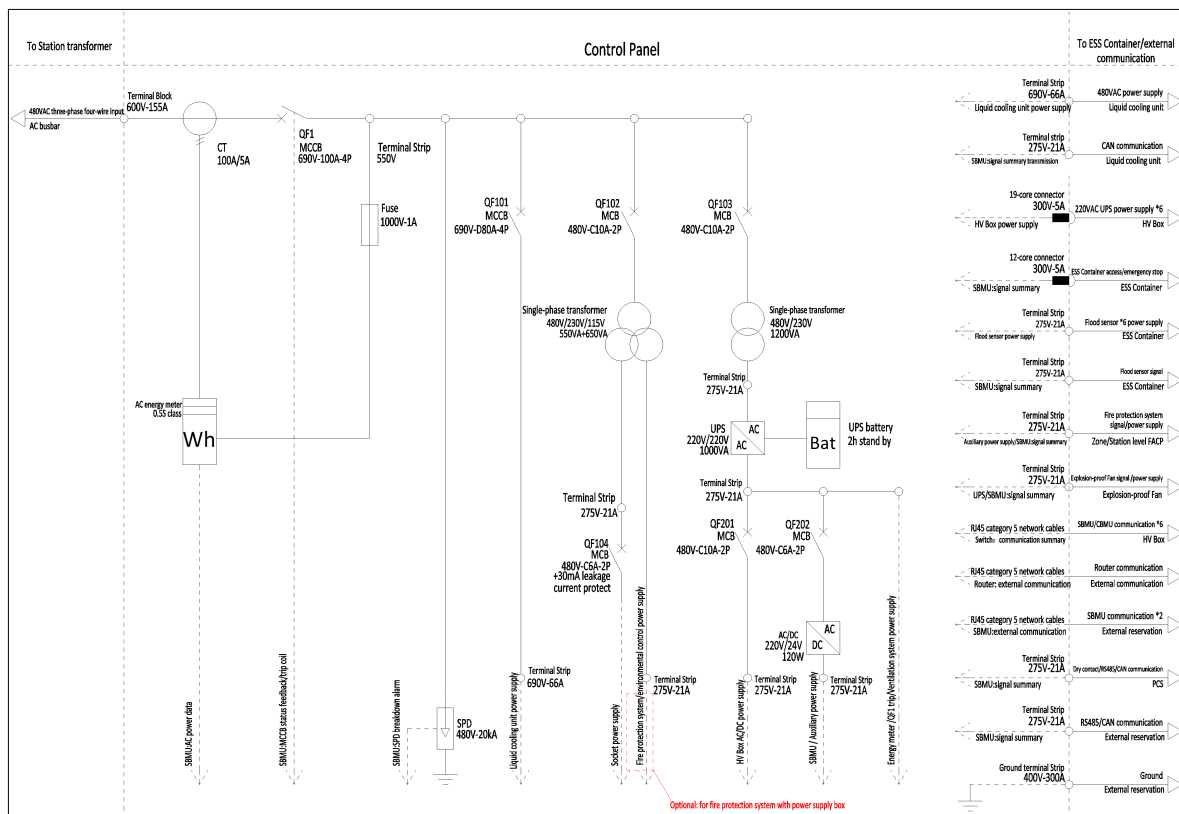


Fig 6-3 Single Line Diagram of Auxiliary Power Supply System



## 6.1. Power on

### 1) Inspections before power on

Inspections below shall be carefully performed before energizing the equipment:

- Check if all the wirings are correctly connected.
- Ensure the emergency stop button is off.
- Check if all the groundings are properly connected.
- Ensure all the circuit breakers and disconnectors are open.
- Ensure that no tools or parts are left behind in the container.

### 2) Power on the aux. circuit of the control panel

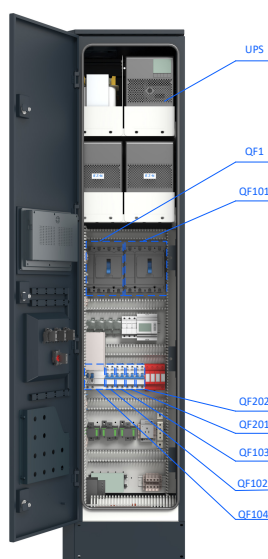


Fig 6-4 UPS and Circuit Breakers in the Control Panel

- Total distribution power supply: Close the QF1 circuit breaker.
- Liquid cooling unit power supply: Close the QF101 circuit breaker.
- Fire protection system (optional) and environment control system power supply: Close the QF102 circuit breaker.
- Input power supply of UPS: Close QF103 circuit breaker.
- Socket power supply: Close the QF104 circuit breaker.
- HV box power supply: Close QF201 circuit breaker.
- 24V auxiliary power supply: Close the QF202 circuit breaker.

### 3) Power on the UPS of the control panel

After powering on the aux. circuit of the rack, press the power button on the front panel of the UPS for at least 2 seconds to power on the UPS.

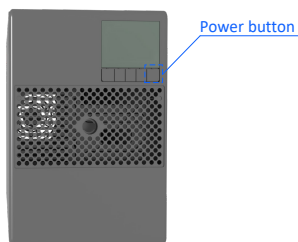


Fig 6-5 Power Button of the UPS

#### 4) Power on the aux. circuit of the rack

After powering on the UPS of the control panel, power on the auxiliary circuit of each rack (HV box) in turn. Press the LV button and check the indicator status to confirm that the LV button is on, as shown below.

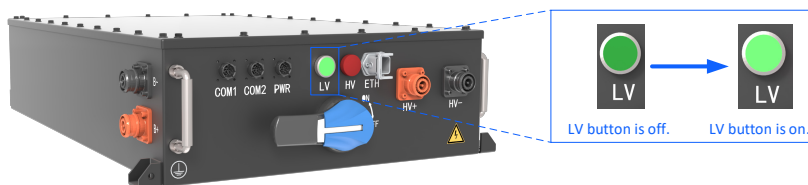


Fig 6-6 Press the LV Button and Confirm the LV Button is on

#### 5) Power on the main circuit of the rack

After powering on the auxiliary circuit of all racks, manually close the disconnecter in the HV box, as shown below.

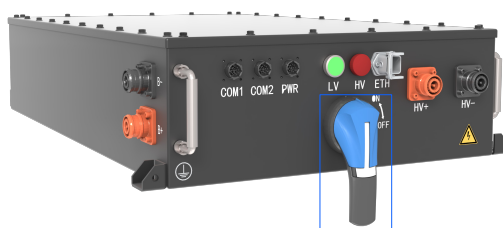


Fig 6-7 Manually Close the Disconnecter

#### 6) Power on the system

The BMS powers on and performs self-checks within and between racks. If the voltage difference between the racks is less than 20V and no faults are reported, the self-check is completed.

After self-checking, SBMU will send a power on command to the CBMU. The BMS will check the total voltage of each rack, and if the pre-charge conditions are met, it will enter the pre-charge phase. After the pre-charge is completed, the ESS Container will automatically close the HV relay and check the indicator status to confirm that the HV indicator light is on. After the DC system powered on, the PCS could start charging and discharging.

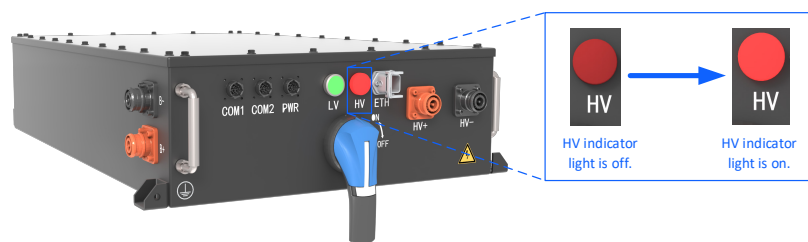


Fig 6-8 Confirm that the HV Indicator Light is on

If the circuit/system cannot be properly powered on, please contact the manufacturer for system troubleshooting.

## 6.2. Shutdown

### 1) Shut down the system

The SBMU sends a shutdown command to the CBMU. The CBMU will automatically control the disconnection of the HV relays for each rack and check the indicator status to confirm that the HV indicator light is off.

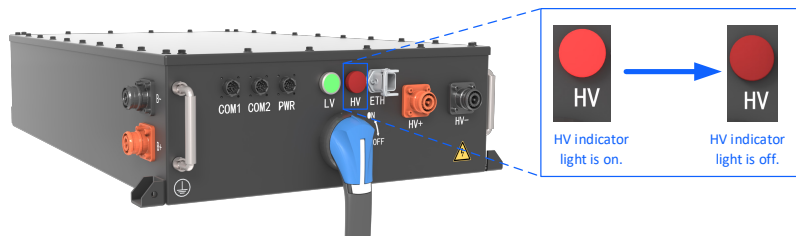


Fig 6-9 Confirm that the HV Indicator Light is off

### 2) Shut down the main circuit of the rack

After shutting down the system, manually open the disconnecter in the HV box, as shown below.



Fig 6-10 Manually Open the Disconnecter

### 3) Shut down the aux. circuit of the rack

After shutting down the main circuit of the rack, shutting down the auxiliary circuit of each rack (HV box) in turn. Press the LV button and check the indicator status to confirm that the LV button is off, as shown below.

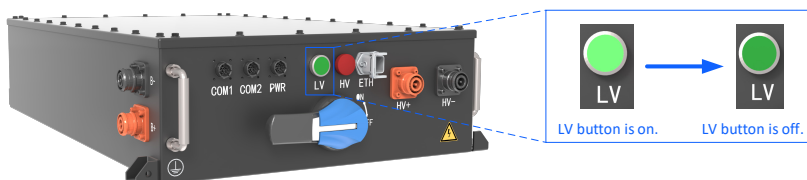


Fig 6-11 Press the LV Button and Confirm the LV Button is off

### 4) Shut down the UPS of the control panel

After shutting down the aux. circuit of the rack, press the power button on the front panel of the UPS for at least 2 seconds to shut down the UPS.

### 5) Shut down the aux. circuit of the control panel

After shutting down the UPS of the control panel, shutting down the aux. circuit of the control panel.

- 24V auxiliary power supply: Open the QF202 circuit breaker.
- HV box power supply: Open QF201 circuit breaker.
- Socket power supply: Open the QF104 circuit breaker.
- Input power supply of UPS: Open QF103 circuit breaker.
- Fire Protection System (optional) and environment control system power supply: Open the QF102 circuit breaker.
- Liquid cooling unit power supply: Open the QF101 circuit breaker.
- Total distribution power supply: Open the QF1 circuit breaker switch. System shutdown is completed.

### Emergency shutdown

In case of any abnormal situations happened during its operation, you can shut down the ESS Container by pressing the external "Emergency Stop" button. The following things happen after the press the button:

- The circuit breaker QF1 in control panel trips, and the auxiliary circuit disconnected.
- CBMU receives a signal to trip the contactor in the HV box, then the main circuit disconnected.
- After troubleshooting, reset the status of the emergency stop button first.

## 6.3. Emergency Operation

This Product is designed with multiple safety strategies and can prevent risks caused by faults. However, in case of uncertainty, it cannot be guaranteed that the module is perfectly safe.

### 1) In case of leakage:

In case of electrolyte leakage from the module, please avoid coming into contact with the leaked liquid or gas. The electrolyte is corrosive. Coming into contact with electrolyte may cause skin irritations and chemical burns. In case of contact with the leaked substances, please take the following measures:

Inhalation: Evacuate from the polluted area and get medical attention immediately.

Eye contact: Rinse your eyes with running water for 15 minutes and get medical attention immediately.

Skin contact: Clean the exposed area thoroughly with soap and water and get medical attention immediately.

Ingestion: Induce vomiting as soon as possible and get medical attention immediately.

### 2) In case of fire

The module may catch fire when the temperature is higher than 150°C (302°F).

If there is a fire at the place where the battery is installed, please take the following actions:

Put out the fire before the battery catches fire. If the battery is on fire, do not attempt to put the fire out. Immediately evacuate on-site personnel to a safe area and mark out a safety isolation area.

As long as personal safety is ensured, take the following actions when possible:

- If the wiring harness is smoking and starts burning, put out the fire with carbon dioxide or dry powder fire extinguishers.
- If the batteries are on fire, put out the fire with a high pressure water gun from a distance.
- If you accidentally inhale smoke, please seek medical attention as soon as possible. Notify the manufacturer of the case to obtain further suggestions on the handling.

### 3) In case of soaking

If the product is soaked in water, do not attempt to approach it. Please contact Hithium or the distributor for technical assistance.

### 4) In case of product damage

If the module is damaged, please contact the manufacturer or the distributor as soon as possible to seek help as the damaged battery is dangerous, and must be handled with great care. The damaged battery is not suitable for use as it may cause personal danger or property loss.

Damaged battery may leak electrolyte or flammable gas. Please contact the manufacturer or the distributor immediately.



## 7. Warranty

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### 7.1. Warranty Clauses

During its warranty period, for any faults caused by the battery system quality defects that occurred on any Hithium recognized products, Hithium will provide warranty services.

For product beyond its warranty period, Hithium provides paid services.

The following faults are not covered by the warranty and are beyond the scope of warranty services.

- 1) The warranty period is expired.
- 2) Failure to provide the product ID.
- 3) Flood, collision or other damage that goes beyond the product's tolerance.
- 4) Faults caused by failure to correctly use, maintain and repair the product in accordance with the Manual.
- 5) Faults due to abnormal circumstances, such as temperature extremes and improper installation.
- 6) Faults were not caused by the product itself, but the user's equipment and software.
- 7) Damage caused by client's handling of a battery system fault without the permission from Hithium or the distributor.
- 8) Quality problems caused by failure to use parts required by Hithium.
- 9) Damage caused by clients whilst moving or reassembling the product, or faults caused by unauthorized maintenance personnel.
- 10) Damage caused by natural disasters such as fire, earthquakes and floods.

### 7.2. Disclaimer

The content of these documents is supposed to be periodically checked and updated where necessary.

No guarantee is made for the completeness and absolute correctness of these documents. Please contact Hithium by visiting our website or distributors for the latest version.

During the project design phase, the design work shall be based on the drawings provided by Hithium engineers specifically for that project.

Hithium will not be liable for any personal injury, property loss, product damage and subsequent damage caused by the following reasons:

- 1) Non-compliance with this Manual
- 2) Improper use of the product.
- 3) Maintenance and opening of, and other operations on the product without authorization and/or by unqualified personnel.
- 4) Use of unapproved spare parts
- 5) Do not make any alterations or technical changes to the product without being authorized.

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## Appendix E – Decommissioning Plan



## Decommissioning Plan Narrative

### Description of Batter Storage Systems

#### System Overview and Components

Battery storage systems store electrical energy for later use, helping to stabilize the grid and support renewable energy integration. Components of the system include the following:

**Battery Containers:**

Hithium LFP314-2P52S – 5.015 MWh Liquid-cooled battery storage system.

**Cable Trenching:** Trenching requirements for the electrical cables and telecommunication lines would consist of a trench up to approximately three feet deep and one to four feet wide. The trenches would be filled with base material above and below the conductors and communications lines to ensure adequate thermal conductivity and electrical insulating characteristics. The topsoil from trench excavation would be set aside before the trench is backfilled and would ultimately comprise the uppermost layer of the trench. Any excess material from the foundation and trench excavations is incorporated onsite and will not be exported.

**Medium Voltage Step-Up Transformers:** The medium voltage step-up transformers will be offloaded from delivery trucks and placed on concrete foundations. This equipment will be bolted to concrete foundations. The underground electrical and communication cables will be routed and connected to this equipment.

**Combiner Boxes:** Combiner boxes allow for the paralleling of multiple conductors/feeder inputs and allow for fewer outputs.

**Inverters:** Inverters are power conversion devices which transform direct current (DC) to alternating current (AC).

**Transformers, Recloser, Disconnect Switch:** Transformers are an apparatus for reducing or increasing the voltage of an alternating current. There are 2 medium voltage step-up transformers. The Recloser and Disconnect Switch are protection devices that allow the Project or the utility company to isolate the projects from the wider distribution system.

**Underground Cables and Conduits:** Underground power (AC and DC) cables, communication and grounding cables will be either directly buried or placed in



conduit. The cables will be rated in accordance with their application. The cables will be located in a conduit as per code when transitioning from below grade to above grade.

**Access and Internal Roads:** The project will have access roads leading to the transformer equipment pads. Internal to the fence, a grass open area will be maintained for infrequent maintenance access to the batteries and inverters.

**Buildings and Enclosures:** The Project will not contain any permanent occupied building structures once construction is complete and the plant is operating. Except for periodic maintenance, the site is unstaffed.

**Security Fencing:** To ensure security of the facility, the property will be fenced with seven-foot-high perimeter fence. Access to the site will be controlled via locked access gates. To comply with noise regulations, a 10-foot sound wall will be in place on the north and west side of the site in lieu of the chain link fence.

**Project Life:** The facility has an estimated useful life of at least 20 years with an opportunity for extension up to 20 additional years depending on lease terms, equipment replacements, or refurbishments.

**SCADA and Communications Equipment Enclosure:** Supervisory Control and Data Acquisition (SCADA) refers to the entire communication and control components. The SCADA equipment for the projects will be mounted inside of an enclosure in the vicinity of the transformers. The enclosure is affixed to a foundation or mounted on piles, depending on soil conditions. The SCADA system includes an internet router, server(s), a firewall, battery backup, and other hardware to monitor the battery storage system.

## Decommissioning Process

Decommissioning consists of the removal of above- and below-ground facility components, management of excess wastes and materials, and the restoration of ground surface irregularities and herbaceous vegetation. Decommissioning activities are expected to take between 6 to 8 months. Removal of all equipment will be done in accordance with applicable regulations at the time of decommissioning. Disposal of all solid and hazardous waste will be done in accordance with local, state, and federal waste disposal regulations.

### Decommissioning Bond

Silver Street Storage 1, LLC shall continuously maintain a bond or other surety acceptable to the Town, in a form approved by the Mayor, for the period of life that the facility operates for.





### **Equipment Removal**

After the facility has been disconnected and isolated from the utility power grid and all electrical components have been disconnected within the facility, equipment will be dismantled and removed. Decommissioning will be undertaken by licensed subcontractors using similar techniques and equipment to those used in the construction of the Project.

The following describes the methods for dismantling and removal of various Project Components:

#### **Interconnection Poles, Equipment, and cables**

- All aboveground and underground cables will be removed and transported off-site to an approved recycling facility or landfill, as well as any power poles installed for interconnection.

#### **Access roads**

- All aggregate and other underlying materials from the access driveway / road will be excavated.
- As necessary, all compacted areas will be disc-ed or tilled to restore soil densities consistent with the surrounding area.
- The access road area will be restored in a manner consistent with its condition prior to facility construction.

#### **Other components**

- Fences, walls, and gates will be removed

### **Site Restoration**

The site will be returned to its previous use or stabilized with grasses common to the area if the future owner does not plan to return the site to its previous use.

### **Managing Excess Materials Waste**

A variety of excess materials and wastes will be generated during decommissioning. To the extent practicable, Silver Street Energy Storage will coordinate with manufacturers, contractors, waste firms, and other entities to maximize the reuse and/or recycling of materials. Those materials deemed reusable/recyclable will be transported offsite and managed at approved receiving facilities following all applicable federal, state, and county waste management regulations of the time. Calculations are provided based on current-day conditions and do not include potential salvage costs for recycling, making the calculations conservative in nature. All residual waste will be removed by a licensed contractor and transported to an



approved landfill or recycling center. No waste materials will remain on the site. Decommissioned materials will include:

### **Batteries Recycling**

Battery Containers will be dismantled, collected, and disposed of for recycling either by the battery manufacturer or in accordance with their guidelines. The batteries will be recycled by the battery manufacturer in accordance with local, state, and federal recycling regulations.

### **Inverters and Transformers**

All metal components of the DC to AC inverters will be recycled at an approved recycling facility to the extent practical. Transformers will be transported off-site for reuse. If no reuse option is available, transformers will be recycled or disposed of at an approved facility.

### **Gravel and Aggregates**

Any used gravel or aggregates will be tested for contamination prior to removal. All uncontaminated materials will be transported offsite for salvage processing and then reused for construction fill. In the unlikely event that the used gravel or aggregates are found to be contaminated, these will be disposed at an approved facility.

### **Concrete**

All concrete, including all foundations, will be broken down and transported to an approved landfill or recycling facility.

### **Cables and Wiring**

All copper and/or aluminum wiring and associated electronic equipment (e.g., isolation switches, fuses, metering) will be recycled to the extent practical. Any materials not deemed recyclable will be disposed of at an approved landfill.

### **Fencing**

All fencing materials will be recycled at a metal recycling facility to the extent practical.

### **Debris and Residual Waste**

Any remaining debris or residual waste will be collected, and all recyclable materials will be sorted. All sorted materials will be removed and sent to either an approved recycling or disposal facility.

### **Removing Equipment in the Event of a Fire or Other Event**



In the event that battery energy storage equipment is damaged or destroyed by a fire, equipment shall be removed in consultation with the relevant local, state, and federal regulatory agencies, as well as the fire department. The battery manufacturer shall give instructions for removing equipment and together with the project owner outline any mitigation and clean-up procedures.



## Decommissioning Estimate

Date: 04/09/25  
Calculated By: SV

404 Silver Street  
Agawam, MA 01001

This Decommissioning Estimate has been prepared by New Leaf Energy in an attempt to predict the cost associated with the removal of the proposed battery energy storage facility. The primary cost of decommissioning is the labor to dismantle and load equipment, as well as the cost of trucking materials off-site. All material will be removed from the site, including the concrete equipment pads, which will be broken up at the site and hauled to the nearest transfer station. Battery modules will be manually removed from each enclosure and packaged for delivery to the battery recycling facility.

The following values were used in this Decommissioning Estimate:

| System Specifications            |        | Equipment & Material Removal Rates          |     |
|----------------------------------|--------|---------------------------------------------|-----|
| System Capacity (MWh)            | 22.9   | Battery Module Removal (min/unit)           | 480 |
| Total Battery Enclosures         | 8      | Electrical Equipment Removal Rate (hr/unit) | 2   |
| Battery Enclosure Weight         | 45,000 | Electric Wiring Removal Rate (min/LF)       | 3   |
| Number of Inverters              | 2      | Wall Removal Rate (min/LF)                  | 10  |
| Number of Transformers           | 2      | Days req. to break up concrete pads         | 3   |
| Electrical Wiring Length (ft)    | 1,757  | Days req. with Rough Grader                 | 1   |
| Length of Perimeter Fence (ft)   | 189    | Days req. with Fine Grader                  | 1   |
| Length of Perimeter Wall (ft)    | 189    | Total Truckloads to Transfer Station        | 38  |
| Number of Power Poles            | 10     | Round-Trip Time to Transfer Station (hr)    | 0.5 |
| Total Disturbed Area (SF)        | 8,521  | Total Truckloads to Battery Recycling       | 13  |
| Total Wall Paneling Weight (lbs) | 10,395 | Round-Trip Time to Battery Rec. (hr)        | 0.5 |
| Wall I-Beam Weight (lbs)         | 295    |                                             |     |
| Number of I-Beams                | 53     |                                             |     |

| Labor and Equipment Costs         |             |
|-----------------------------------|-------------|
| Labor Rate (\$/hr)                | \$ 63.53    |
| Operator Rate (\$/hr)             | \$ 95.47    |
| Bobcat Cost (\$/hr)               | \$ 125.00   |
| Front End Loader Cost (\$/Day)    | \$ 1,000.00 |
| Excavator Cost (\$/Day)           | \$ 1,000.00 |
| Trucking Cost (\$/hr)             | \$ 130.00   |
| Backhoe Cost (\$/hr)              | \$ 245.00   |
| Power Pole Removal Cost (\$/pole) | \$ 1,500.00 |
| Grader Cost (\$/day)              | \$ 1,800.00 |
| Seeding Cost (\$/SF)              | \$ 0.10     |
| Fuel Cost (\$/mile)               | \$ 0.50     |
| Battery Disposal Fee (\$/MWh)     | \$ 2,000.00 |
| Crane Cost (\$/Day)               | \$ 5,000.00 |



## Decommissioning Estimate

Date: 04/09/25  
Calculated By: SV

404 Silver Street  
Agawam, MA 01001

### Labor, Material, and Equipment Costs

#### **1. Battery Module Removal and Packaging Cost**

Battery modules will be manually removed from each enclosure and packaged for delivery to the battery recycling facility.

$$(Number\ of\ Battery\ Enclosures \cdot Module\ Removal\ Rate) / 60\ Min\ per\ Hour \cdot 2 \times Labor\ Rate = \\ Battery\ Module\ Removal\ and\ Packaging\ Cost$$

**Total = \$ 8,131.84**

#### **2. Load Electrical Equipment**

Electrical equipment includes transformers and inverters and empty battery enclosures. We assume that companies removing electrical equipment will provide trucking services and will reclaim valuable materials themselves.

$$(Number\ of\ Inverters + Number\ of\ Transformers + Number\ of\ Battery\ Enclosures) \cdot Electrical \\ Equipment\ Removal\ Rate \cdot (Operator\ Rate + Bobcat\ Cost + Crane\ Cost) = \\ Electrical\ Equipment\ Removal\ Cost$$

**Total = \$ 20,291.28**

#### **3. Break Up Concrete Pads**

Concrete pads are broken up using an excavator and jackhammer.

$$Number\ of\ Demolition\ Days \cdot (Excavator\ Cost + Labor\ Cost) =$$

**Total = \$ 5,291.28**

#### **4. Remove Electrical Wiring**

Electrical wiring will be removed from all underground conduits.

$$Cable\ Length \cdot Cable\ Removal\ Rate \cdot (Operator\ Cost + Backhoe\ Cost) \\ = Total\ Cable\ Removal\ Cost$$

**Total = \$ 29,910.29**

#### **5. Remove Walls**

Wall columns, boards, and foundations will be loaded onto a truck and removed from site. Trucking costs included in this line item are for the removal process. Trucking to a recycling facility are included in item #8.

$$(Total\ Length\ of\ Wall \cdot Wall\ Removal\ Rate) \cdot (Operator\ Rate + Bobcat\ Cost + Trucking\ Cost) =$$

**Total = \$ 11,039.81**



## 6. Remove Fencing

Fencing posts, mesh, and foundations will be loaded onto a truck and removed from site. Trucking costs included in this line item are for the removal process.

$(Total\ Length\ of\ Fence \cdot Fence\ Removal\ Rate) \cdot (Operator\ Rate + Bobcat\ Cost + Trucking\ Cost) =$

**Total = \$ 11,039.81**

## 7. Seed Disturbed Areas

Seeding cost includes labor and materials for reseeding all disturbed areas including the reclaimed gravel road area, former electrical areas, and areas disturbed by racking foundation removal.

$Seeding\ Cost \cdot Disturbed\ Area =$   
 $Total\ Seeding\ Cost$

**Total = \$ 852.10**

## 8. Truck to CCDD

All material will be trucked to the nearest CCDD station that accepts construction material (i.e. fence, concrete pads and gravel).

The nearest transfer station is K&W Materials & Recycling

$(Total\ Trucks\ to\ CCDD \cdot Roundtrip\ Time \cdot Trucking\ Cost) =$   
 $Total\ Trucking\ Cost\ to\ CCDD$

**Total = \$ 2,470.00**

## 9. Truck to Recycling Facility Plus Disposal Fee

All batteries will be transported to the nearest recycling facility.

$(Total\ Trucks\ to\ Recycling\ Facility \cdot Roundtrip\ Time \cdot Trucking\ Cost) + (Battery\ MWh \cdot Battery$   
 $Disposal\ Fee) =$

$Total\ Battery\ Trucking\ and\ Battery\ Disposal\ Fee$

**Total = \$ 46,645.00**

## 10. Remove Power Poles

Power poles will be removed and shipped off site.

$Number\ of\ Power\ Poles \cdot Pole\ Removal\ cost =$

**Total = \$ 15,000.00**

**Summary of Decommissioning Costs**

| Line Item | Task                                             | Cost         |
|-----------|--------------------------------------------------|--------------|
| 1         | Remove and Package Battery Modules               | \$ 8,131.84  |
| 2         | Electrical Equipment Loading and Removal         | \$ 20,291.28 |
| 3         | Break Up Concrete Pads                           | \$ 5,291.28  |
| 4         | Electrical Wiring Removal                        | \$ 29,910.29 |
| 5         | Wall Removal                                     | \$ 11,039.81 |
| 6         | Fence Removal                                    | \$ 11,039.81 |
| 7         | Seed Disturbed Areas                             | \$ 852.10    |
| 8         | Trucking to CCDD                                 | \$ 2,470.00  |
| 9         | Trucking to Recycling Facility Plus Disposal Fee | \$ 46,645.00 |
| 10        | Power Pole Removal                               | \$ 15,000.00 |

Subtotal = \$ 150,671.40

**Present Value Total = \$ 150,671.40**

Total after 20 years @ 2% Inflation

*Present Value • (1+ Inflation Rate)<sup>Number of Years</sup> =*

**Grand Total = \$223,889.78**

## Appendix F – Liability Insurance Documents



## Appendix G – Equipment Specifications





# ESS **Container** 5.015 MWh

Liquid-cooled battery storage system



Preliminary

**Liquid-cooled battery storage system based on HiTHIUM prismatic LFP ESS Cells 314 Ah with highest cyclic lifetime.**

Improved safety characteristics and specially optimised for the highest requirements on safety, reliability and performance. Suitable e.g. for industrial, utility, and grid serving applications.

- Product certifications:  
IEC 62619, IEC 62477, IEC 63056, IEC 61000, UL 1973, UL 9540A, UN 38.3
- Company certifications:  
ISO 9001, ISO 14001, ISO 45001
- Environmental Compliance:  
ROHS, REACH

## High safety

- High thermal stability thanks to liquid cooling
- Multi-stage, active fire protection system, compliance to NFPA 855
- Use of highly safe prismatic HiTHIUM LFP cells
- Dedicated cell monitoring and protection system

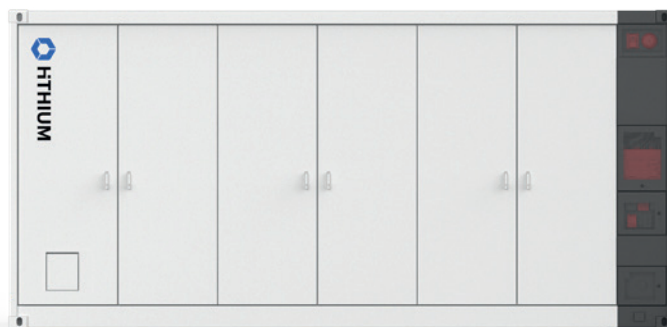
## Low LCOS (Levelised Cost of Storage)

- Excellent thermal management improves energy throughput by ensuring optimal operating temperature
- Highly integrated: including thermal management system, fire protection system, BMS, etc.
- Very high energy density using dual channel compact module technology (DCCM)
- Supports back to back and side by side installations

# ESS Container

## 5.015 MWh

Liquid-cooled battery storage system based on prismatic LFP cells with very high cyclic lifetime



### GENERAL

|                        |                                    |
|------------------------|------------------------------------|
| Battery Type           | HiTHIUM LFP314-2P52S               |
| No. of Battery Modules | 48 (6 x 8)<br>with DCCM Technology |
| Configuration          | 12P416S                            |
| Cooling Method         | Liquid Cooling                     |
| BMS Communication      | CAN, RS485, Ethernet               |
| Gravimetric            | > 111 Wh/kg                        |
| Volumetric             | > 117 Wh/l                         |
| Application Altitude   | ≤ 4,000 m                          |

### ELECTRICAL

|                               |                             |
|-------------------------------|-----------------------------|
| Nominal Voltage Container     | 1,331.2 V                   |
| Operating Voltage Container   | 1,123.2 ... 1,497.6 V       |
| Nominal Energy Container      | 5,015.96 kWh <sup>1,2</sup> |
| Nominal SOC at delivery       | 27 % <sup>2</sup>           |
| Nominal Charge/Discharge Rate | 0.5 P / 0.5 P               |
| Round Trip Efficiency         | > 94 %                      |

<sup>1</sup> 0.5 P / 0.5 P

<sup>2</sup> 25°C +/- 2.0

<sup>3</sup> ambient temperature

### MECHANICAL

|                           |                          |
|---------------------------|--------------------------|
| Dimensions (L x W x H)    | 6,058 x 2,438 x 2,896 mm |
| Weight Container (20 ft.) | < 45,000 kg              |
| Protection Level          | IP 55                    |

### TEMPERATURE RANGE

|                       |                               |
|-----------------------|-------------------------------|
| Operating             | -30 °C ... 55 °C <sup>3</sup> |
| Storing (recommended) | -20 °C ... 35 °C <sup>3</sup> |

### PRODUCT CERTIFICATIONS

|                          |                                                                                           |
|--------------------------|-------------------------------------------------------------------------------------------|
| Certificates and Reports | IEC 62619, IEC 62477,<br>IEC 63056, IEC 61000,<br>UL 1973, UL 9540A,<br>NFPA 855, UN 38.3 |
|--------------------------|-------------------------------------------------------------------------------------------|

### ENVIRONMENTAL

|            |             |
|------------|-------------|
| Compliance | ROHS, REACH |
|            | Cobalt free |

### COMPANY CERTIFICATIONS

ISO 9001, ISO 14001, ISO 45001

#### HiTHIUM Energy Storage Technology USA Inc.

Address: 4046 Clipper Ct, Fremont, CA 94538, United States

Email: [hithium@hithium.com](mailto:hithium@hithium.com)

#### Xiamen HiTHIUM Energy Storage Technology Co., Ltd.

Address: HiTHIUM Industrial Park, Tongxiang High-Tech Zone,  
Xiamen, Fujian, China | Email: [hithium@hithium.com](mailto:hithium@hithium.com)



LinkedIn



Website



# Sunny Central Storage UP-US

3450 / 3600 / 3800 / 3950

Battery inverters for large scale storage systems

/ 3+GW of hybrid and storage systems worldwide

## Efficient

- High power density
- Max. efficiency of 98.8%
- Lower transportation costs (up to 4 inverters in a standard shipping container)

## Robust

- Proven OptiCool™ technology for intelligent, effective cooling
- Can be installed worldwide outdoors in any ambient condition

## Flexible

- Conforms to all relevant grid requirements worldwide
- Four quadrant operation for full reactive power support
- Stand-alone device or a medium-voltage block solution

## Versatile

- Integrated battery communication
- Customized monitoring and control of inverters
- Grid management functions for dynamic grid support
- Integrated voltage supply for internal consumption and external loads

With an output of up to 3960 kVA and system voltages up to 1500 V DC, the SMA Sunny Central Storage allows for more efficient and flexible system design for battery power plants.

A separate voltage supply and additional space are available for the installation of customer equipment. The intelligent cooling system OptiCool ensures smooth operation even in extreme ambient temperature.



# SUNNY CENTRAL STORAGE

## 3450 UP-US / 3600 UP-US

| Technical Data                                                                                                                                           | SCS 3540 UP-US                                                                                                                                                     | SCS 3600 UP-US                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <b>Battery side (DC)</b>                                                                                                                                 |                                                                                                                                                                    |                                |
| Operating DC voltage range $V_{DC}$                                                                                                                      | 880 V to 1500 V                                                                                                                                                    | 921 V to 1500 V                |
| Max. DC current $I_{DC, max}$                                                                                                                            | 4750 A                                                                                                                                                             |                                |
| Fuse characteristic for battery connection-pre-arcing integral limit single DC busbar/ split busbar <sup>12) 14)</sup>                                   | 10.75 MA²s / 8.0 MA²s                                                                                                                                              |                                |
| Single DC busbar 36 connections per pole / split DC busbar 12/12/12 connections per pole / fused single DC busbar 22 connections per pole <sup>15)</sup> | ● / ○ / ○                                                                                                                                                          |                                |
| DC connection                                                                                                                                            | with terminal lug                                                                                                                                                  |                                |
| <b>Grid side (AC)</b>                                                                                                                                    |                                                                                                                                                                    |                                |
| Nominal AC apparent power at 1200 Vdc and cos φ=1.0 and 25°C                                                                                             | 3450 kW                                                                                                                                                            | 3620 kW                        |
| AC apparent power at 1200 Vdc (at 25°C / at 40°C /at 50°C) <sup>3) 13)</sup>                                                                             | 3450 kVA / 3140 kVA / 2930 kVA                                                                                                                                     | 3620 kVA / 3290 kVA / 3075 kVA |
| Max. AC current $I_{AC, max}$ (at 25°C / at 40°C /at 50°C)                                                                                               | 3320 A / 3020 A / 2820 A                                                                                                                                           |                                |
| Max. total harmonic distortion                                                                                                                           | < 3% at nominal power                                                                                                                                              |                                |
| Nominal AC voltage / nominal AC voltage range <sup>1) 8)</sup>                                                                                           | 600 V / 480 V to 720 V                                                                                                                                             | 630 V / 504 V to 756 V         |
| AC power frequency / range                                                                                                                               | 50 Hz / 47 Hz to 53 Hz<br>60 Hz / 57 Hz to 63 Hz                                                                                                                   |                                |
| Min. short-circuit ratio at the AC terminals <sup>9)</sup>                                                                                               | > 2                                                                                                                                                                |                                |
| Cos φ at rated active power/cos φ at rated apparent power/displacement cos φ adjustable <sup>8) 10)</sup>                                                | 1 / 0.8 overexcited to 0.8 underexcited / 0.0 overexcited to 0.0 underexcited                                                                                      |                                |
| AC connection                                                                                                                                            | with busbar system (three busbars, one per line conductor)                                                                                                         |                                |
| <b>Efficiency</b>                                                                                                                                        |                                                                                                                                                                    |                                |
| Max. efficiency <sup>2)</sup>                                                                                                                            | 98.8%                                                                                                                                                              |                                |
| <b>Protective Devices</b>                                                                                                                                |                                                                                                                                                                    |                                |
| Input-side disconnection point                                                                                                                           | DC load-break switch                                                                                                                                               |                                |
| Output-side disconnection point                                                                                                                          | AC circuit breaker                                                                                                                                                 |                                |
| DC overvoltage protection                                                                                                                                | Surge arrester, type I                                                                                                                                             |                                |
| AC overvoltage protection (optional)                                                                                                                     | Surge arrester, class I                                                                                                                                            |                                |
| Lightning protection (according to IEC 62305-1)                                                                                                          | Lightning Protection Level III                                                                                                                                     |                                |
| Insulation monitoring                                                                                                                                    | ●                                                                                                                                                                  |                                |
| Degree of protection: electronics / air duct / connection area (as per UL 50E)                                                                           | UL Type 3R / Type 1 / Type 1                                                                                                                                       |                                |
| <b>General Data</b>                                                                                                                                      |                                                                                                                                                                    |                                |
| Dimensions (W / H / D)                                                                                                                                   | 2815 mm / 2318 mm / 1588 mm (110.8 in / 91.3 in / 62.5 in)                                                                                                         |                                |
| Weight                                                                                                                                                   | < 3700 kg / <8200 lbs                                                                                                                                              |                                |
| Self-consumption (max. <sup>4)</sup> / partial load <sup>5)</sup> / average <sup>6)</sup>                                                                | < 8100 W / < 1800 W / < 2000 W                                                                                                                                     |                                |
| Self-consumption (standby)                                                                                                                               | < 370 W                                                                                                                                                            |                                |
| Auxiliary power supply: integrated 8.4 kVA transformer / external                                                                                        | ● / ○                                                                                                                                                              |                                |
| Noise emission <sup>7)</sup>                                                                                                                             | 65.0 dB(A)                                                                                                                                                         |                                |
| Operating temperature range (optional) <sup>8) 15)</sup>                                                                                                 | (-37°C) -25°C to 60°C / (-34.6°F) -13°F to 140°F                                                                                                                   |                                |
| Temperature range (standby)                                                                                                                              | -40°C to 60°C / -40°F to 140°F                                                                                                                                     |                                |
| Temperature range (storage)                                                                                                                              | -40°C to 70°C / -40°F to 158°F                                                                                                                                     |                                |
| Max. permissible value for relative humidity (condensing / non-condensing)                                                                               | 95% to 100% (2 month/year) / 0% to 95%                                                                                                                             |                                |
| Maximum operating altitude above MSL <sup>8)</sup> 1000 m / 2000 m <sup>11)</sup>                                                                        | ● / ○                                                                                                                                                              |                                |
| Fresh air consumption                                                                                                                                    | 6500 m³/h                                                                                                                                                          |                                |
| <b>Features</b>                                                                                                                                          |                                                                                                                                                                    |                                |
| Grid forming / black start ready without grid forming                                                                                                    | ○ / ○                                                                                                                                                              |                                |
| DC connection                                                                                                                                            | Terminal lug on each input (without fuse)                                                                                                                          |                                |
| AC connection                                                                                                                                            | With busbar system (three busbars, one per line conductor)                                                                                                         |                                |
| Communication                                                                                                                                            | Ethernet, Modbus Master, Modbus Slave                                                                                                                              |                                |
| Communication with SMA string monitor (transmission medium)                                                                                              | Modbus TCP / Ethernet (FO MM, Cat-5)                                                                                                                               |                                |
| Enclosure / roof color                                                                                                                                   | RAL 9016 / RAL 7004                                                                                                                                                |                                |
| Supply transformer for external loads                                                                                                                    | ○ (2.5 kVA)                                                                                                                                                        |                                |
| Certifications and approvals                                                                                                                             | UL 62109-1, UL 1741 (Chapter 31 CRD 6), NERC, UL 1741-SA + SB, IEEE 1547-2018, IEEE 1547 α-2020, IEEE 1547.1-2020, MIL-STD-810G, UL 1998, CAN/CSA C22.2 107.1 2016 |                                |
| EMC standards                                                                                                                                            | IEC / EN 61000-6-4, IEC / EN 61000-6-2, EN 55022, CISPR 22:2008 modified class A, FCC Part 15 Class A                                                              |                                |
| Quality standards and directives complied with                                                                                                           | VDI/VDE 2862 page 2, DIN EN ISO 9001                                                                                                                               |                                |
| ● Standard features   ○ Optional   — not available                                                                                                       |                                                                                                                                                                    |                                |
| Type designation                                                                                                                                         | SCS 3450 UP-US                                                                                                                                                     | SCS 3600 UP-US                 |

- 1) At nominal AC voltage, nominal AC power decreases in the same proportion
- 2) Efficiency measured without internal power supply
- 3) AC apparent power at higher DC voltages on request
- 4) Self-consumption at rated operation
- 5) Self-consumption at < 75% P<sub>n</sub> at 25 °C
- 6) Self-consumption averaged out from 5% to 100% P<sub>n</sub> at 25 °C
- 7) Sound pressure level at a distance of 10 m
- 8) Values apply only to inverters. Permissible values for SMA MV solutions from SMA can be found in the corresponding data sheets.
- 9) A short-circuit ratio of < 2 requires a special approval from SMA

- 10) Max. power values (S/P/Q) can be requested based on project specific design
- 11) Earlier temperature-dependent de-rating and reduction of DC open-circuit voltage
- 12) Battery short circuit disconnection has to be done on the battery side with ultra rapid battery group fuses, e.g. fuse type aR/aBat & DC time constant Tau (L/R) ≤ 1 ms. To fulfill UL requirements, SQB-DC154 aR series fusing from SIBA GmbH must be used, with a minimum of 1 fuse or a maximum of 2 fuses per split DC rail.
- 13) Depending on the ratio of reactive power (cos  $\varphi$ ), additional power derating may occur
- 14) Please check the manual for further information
- 15) Fused DC input equipped with optional 750 A, 900 A, or 1250 A fuses



# SUNNY CENTRAL STORAGE

## 3800 UP-US / 3950 UP-US

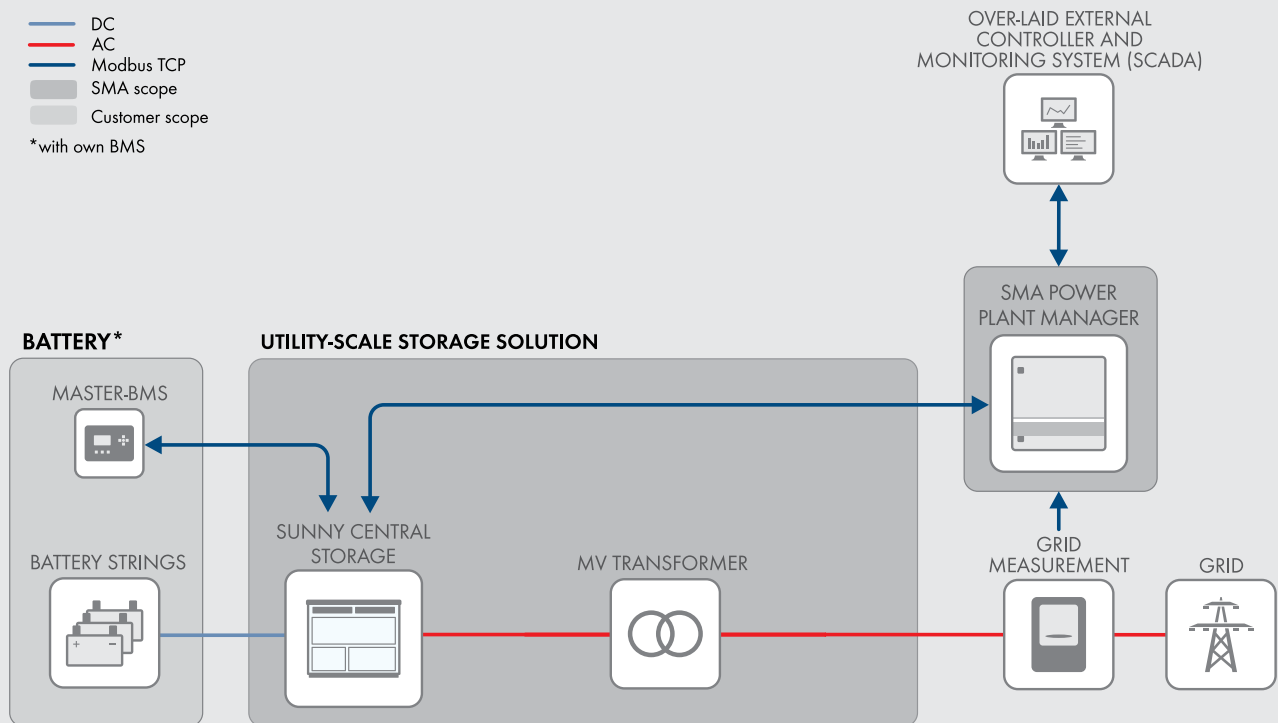
| Technical Data                                                                                                                                           | SCS 3800 UP-US                                                                                                                                                     | SCS 3950 UP-US                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <b>Battery side (DC)</b>                                                                                                                                 |                                                                                                                                                                    |                                |
| Operating DC voltage range $V_{DC}$                                                                                                                      | 962 V to 1500 V                                                                                                                                                    | 1003 V to 1500 V               |
| Max. DC current $I_{DC, max}$                                                                                                                            | 4750 A                                                                                                                                                             |                                |
| Fuse characteristic for battery connection-pre-arcing integral limit single DC busbar/ split busbar <sup>[2] [4]</sup>                                   | 10.75 MA²s / 8.0 MA²s                                                                                                                                              |                                |
| Single DC busbar 36 connections per pole / split DC busbar 12/12/12 connections per pole / fused single DC busbar 22 connections per pole <sup>[5]</sup> | ● / ○ / ○                                                                                                                                                          |                                |
| DC connection                                                                                                                                            | with terminal lug                                                                                                                                                  |                                |
| <b>Grid side (AC)</b>                                                                                                                                    |                                                                                                                                                                    |                                |
| Nominal AC apparent power at 1200 Vdc and cos φ=1.0 and 25 °C                                                                                            | 3800 kW                                                                                                                                                            | 3960 kW                        |
| AC apparent power at 1200 Vdc (at 25 °C / at 40 °C /at 50 °C) <sup>[3] [13]</sup>                                                                        | 3800 kVA / 3455 kVA / 3230 kVA                                                                                                                                     | 3960 kVA / 3610 kVA / 3365 kVA |
| Max. AC current $I_{AC, max}$ (at 25 °C / at 40 °C /at 50 °C)                                                                                            | 3320 A / 3020 A / 2820 A                                                                                                                                           |                                |
| Max. total harmonic distortion                                                                                                                           | < 3% at nominal power                                                                                                                                              |                                |
| Nominal AC voltage / nominal AC voltage range <sup>[1] [8]</sup>                                                                                         | 660 V / 528 V to 759 V                                                                                                                                             | 690 V / 552 V to 759 V         |
| AC power frequency / range                                                                                                                               | 50 Hz / 47 Hz to 53 Hz<br>60 Hz / 57 Hz to 63 Hz                                                                                                                   |                                |
| Min. short-circuit ratio at the AC terminals <sup>[9]</sup>                                                                                              | > 2                                                                                                                                                                |                                |
| Cos φ at rated active power/cos φ at rated apparent power/displacement cos φ adjustable <sup>[8] [10]</sup>                                              | 1 / 0.8 overexcited to 0.8 underexcited / 0.0 overexcited to 0.0 underexcited                                                                                      |                                |
| AC connection                                                                                                                                            | with busbar system (three busbars, one per line conductor)                                                                                                         |                                |
| <b>Efficiency</b>                                                                                                                                        |                                                                                                                                                                    |                                |
| Max. efficiency <sup>[2]</sup>                                                                                                                           | 98.8%                                                                                                                                                              |                                |
| <b>Protective Devices</b>                                                                                                                                |                                                                                                                                                                    |                                |
| Input-side disconnection point                                                                                                                           | DC load-break switch                                                                                                                                               |                                |
| Output-side disconnection point                                                                                                                          | AC circuit breaker                                                                                                                                                 |                                |
| DC overvoltage protection                                                                                                                                | Surge arrester, type I                                                                                                                                             |                                |
| AC overvoltage protection (optional)                                                                                                                     | Surge arrester, class I                                                                                                                                            |                                |
| Lightning protection (according to IEC 62305-1)                                                                                                          | Lightning Protection Level III                                                                                                                                     |                                |
| Insulation monitoring                                                                                                                                    | ●                                                                                                                                                                  |                                |
| Degree of protection: electronics / air duct / connection area (as per UL 50E)                                                                           | UL Type 3R / Type 1 / Type 1                                                                                                                                       |                                |
| <b>General Data</b>                                                                                                                                      |                                                                                                                                                                    |                                |
| Dimensions (W / H / D)                                                                                                                                   | 2815 mm / 2318 mm / 1588 mm (110.8 in / 91.3 in / 62.5 in)                                                                                                         |                                |
| Weight                                                                                                                                                   | < 3700 kg / <8200 lbs                                                                                                                                              |                                |
| Self-consumption (max. <sup>[4]</sup> / partial load <sup>[5]</sup> / average <sup>[6]</sup> )                                                           | < 8100 W / < 1800 W / < 2000 W                                                                                                                                     |                                |
| Self-consumption (standby)                                                                                                                               | < 370 W                                                                                                                                                            |                                |
| Auxiliary power supply: integrated 8.4 kVA transformer / external                                                                                        | ● / ○                                                                                                                                                              |                                |
| Noise emission <sup>[7]</sup>                                                                                                                            | 65.0 dB(A)                                                                                                                                                         |                                |
| Operating temperature range (optional) <sup>[8] [15]</sup>                                                                                               | (-37 °C) -25 °C to 60 °C / (-34.6 °F) -13 °F to 140 °F                                                                                                             |                                |
| Temperature range (standby)                                                                                                                              | -40 °C to 60 °C / -40 °F to 140 °F                                                                                                                                 |                                |
| Temperature range (storage)                                                                                                                              | -40 °C to 70 °C / -40 °F to 158 °F                                                                                                                                 |                                |
| Max. permissible value for relative humidity (condensing / non-condensing)                                                                               | 95% to 100% (2 month/year) / 0% to 95%                                                                                                                             |                                |
| Maximum operating altitude above MSL <sup>[8]</sup> 1000 m / 2000 m <sup>[11]</sup>                                                                      | ● / ○                                                                                                                                                              |                                |
| Fresh air consumption                                                                                                                                    | 6500 m³/h                                                                                                                                                          |                                |
| <b>Features</b>                                                                                                                                          |                                                                                                                                                                    |                                |
| Grid forming / black start ready without grid forming                                                                                                    | ○ / ○                                                                                                                                                              |                                |
| DC connection                                                                                                                                            | Terminal lug on each input (without fuse)                                                                                                                          |                                |
| AC connection                                                                                                                                            | With busbar system (three busbars, one per line conductor)                                                                                                         |                                |
| Communication                                                                                                                                            | Ethernet, Modbus Master, Modbus Slave                                                                                                                              |                                |
| Communication with SMA string monitor (transmission medium)                                                                                              | Modbus TCP / Ethernet (FO MM, Cat-5)                                                                                                                               |                                |
| Enclosure / roof color                                                                                                                                   | RAL 9016 / RAL 7004                                                                                                                                                |                                |
| Supply transformer for external loads                                                                                                                    | ○ (2.5 kVA)                                                                                                                                                        |                                |
| Certifications and approvals                                                                                                                             | UL 62109-1, UL 1741 (Chapter 31 CRD 6), NERC, UL 1741-SA + SB, IEEE 1547-2018, IEEE 1547 α-2020, IEEE 1547.1-2020, MIL-STD-810G, UL 1998, CAN/CSA C22.2 107.1 2016 |                                |
| EMC standards                                                                                                                                            | IEC / EN 61000-6-4, IEC / EN 61000-6-2, EN 55022, CISPR 22:2008 modified class A, FCC Part 15 Class A                                                              |                                |
| Quality standards and directives complied with                                                                                                           | VDI/VDE 2862 page 2, DIN EN ISO 9001                                                                                                                               |                                |
| ● Standard features    ○ Optional    — not available                                                                                                     |                                                                                                                                                                    |                                |
| Type designation                                                                                                                                         | SCS 3800 UP-US                                                                                                                                                     | SCS 3950 UP-US                 |

- 1) At nominal AC voltage, nominal AC power decreases in the same proportion
- 2) Efficiency measured without internal power supply
- 3) AC apparent power at higher DC voltages on request
- 4) Self-consumption at rated operation
- 5) Self-consumption at < 75% P<sub>n</sub> at 25 °C
- 6) Self-consumption averaged out from 5% to 100% P<sub>n</sub> at 25 °C
- 7) Sound pressure level at a distance of 10 m
- 8) Values apply only to inverters. Permissible values for SMA MV solutions from SMA can be found in the corresponding data sheets.
- 9) A short-circuit ratio of < 2 requires a special approval from SMA

- 10) Max. power values (S/P/Q) can be requested based on project specific design
- 11) Earlier temperature-dependent de-rating and reduction of DC open-circuit voltage
- 12) Battery short circuit disconnection has to be done on the battery side with ultra rapid battery group fuses, e.g. fuse type aR/aBat & DC time constant Tau (L/R) ≤ 1 ms. To fulfill UL requirements, SQB-DC154 aR series fusing from SIBA GmbH must be used, with a minimum of 1 fuse or a maximum of 2 fuses per split DC rail.
- 13) Depending on the ratio of reactive power (cos  $\phi$ ), additional power derating may occur
- 14) Please check the manual for further information
- 15) Fused DC input equipped with optional 750 A, 900 A, or 1250 A fuses

## SYSTEM DIAGRAM

- DC
  - AC
  - Modbus TCP
  - SMA scope
  - Customer scope
- \*with own BMS



### Grid-connected functions

- Setpoints for active and reactive power
- Static grid support  $Q(U)$ ,  $P(f)$
- Dynamic grid support (FRT)
- Active islanding detection (AID)
- High compatibility with different battery types

### Compatible with energy management system functionalities

- External static grid supporting functions
- Ramp-rate control of PV power
- Peak shaving
- Energy shifting
- Genset optimization control
- Reducing necessary spinning reserve of gensets
- Battery start-up and stop sequence
- Operates the battery within optimal operation window
- Grid forming
- Black start

## Appendix H – BESS Testing Data

Date: 2024-05-31

Xiamen Hithium Energy Storage  
Technology Co., Ltd.  
No.1 Benyuan Road, Tongxiang High-Tech Zone,  
Xiamen,  
Fujian  
P.R. China

**Ref: CU US + Canada Certificate**

Type of Equipment : Battery container  
Certificate No. : CU 72405387 0001  
Report No. : CN24Z0NH 001  
Engineer/Contact : Andy Chen  
Standards : ANSI/CAN/UL 9540:2023

Dear Madame or Sir,

The above referenced technical equipment has been tested and was found to be in compliance with the listed test requirement(s). Enclosed, please find the TUV Rheinland approval document No. CU 72405387 0001.

It authorizes you to label the listed product(s) with the TUV Rheinland Mark identified in the approval document. For compliance, the Test Mark must be on the approved unit.

Your product is subject to regular factory follow-up inspections as well as annual certificate and factory registration fees.

In using the TUV Rheinland Mark you are obligated to comply with the TUV Rheinland of North America Service Agreement.

If we can be of any further assistance to you, please do not hesitate to contact us.

With kind regards,

Certification Body



Weichun Li

Enclosure

# Certificate

Certificate no.

CU 72405387 0001

**License Holder:**

Xiamen Hithium Energy Storage  
Technology Co., Ltd.  
No.1 Benyuan Road, Tongxiang High-Tech  
Zone,  
Xiamen,  
Fujian  
P.R. China

**Manufacturing Plant:**

Nantong CIMC YuanEner Integrate  
Technology Co.,Ltd  
No.8, Qilianshan Road, Development  
Zone,  
Nantong City,  
Jiangsu  
P.R. China

**Report Number:** CN24Z0NH 001

**Client Reference:** 168481772

**Certification acc. to:** ANSI/CAN/UL 9540:2023

**Product Information**

**Certified Product:** Battery container

**Model Designation:** 1)LX501501,2)LX417901

**Technical Data:**

|                                   |                            |
|-----------------------------------|----------------------------|
| Voltage range                     | : 1040V-1500Vdc            |
| Nominal voltage                   | : 1331.2Vdc                |
| Rated charge and discharge power: | 1)2508kW, 2)2090kW         |
| Rated capacity                    | : 1)3768Ah 2)3140Ah        |
| Rated Energy                      | : 1)5016kWh 2) 4180kWh     |
| Auxiliary power supply            | : AC480V, 100A, 3P4L, 60Hz |
| IP Rating                         | : IP55                     |
| Operating Temperature             | : -30-55°C                 |
| Altitude                          | : 4000m                    |

**Remarks:** Other Data: See Appendix (Constr. Data Form)

**Appendix:** 1



**Date of issue:** 2024-05-31  
(yr/mo/day)

TUV Rheinland of North America, Inc.  
400 Beaver Brook Rd, Boxborough, MA 01719  
Tel +1 (978) 266 9500, Fax +1 (978) 266-9992

www.tuv.com

 **TÜVRheinland®**



**TEST REPORT**  
**ANSI/CAN/UL 9540:2023**  
**STANDARD FOR SAFETY**  
**Energy Storage Systems and Equipment**

**Report reference No.** ..... : CN24Z0NH 001

**Date of issue** ..... : see cover page

**Total number of pages**..... : see cover page

**Testing Laboratory**..... : TÜV Rheinland (Shanghai) Co., Ltd.

**Address**..... : No. 177, Lane 777, West Guangzhong Road, Jing'an District, Shanghai 200072, P. R. China

**Manufacture's name**..... : Xiamen Hithium Energy Storage Technology Co., Ltd.

**Address**..... : No.1 Benyuan Road, Tongxiang High-Tech Zone, Xiamen, Fujian, P.R. China

**Test specification:**

**Standard**..... : ANSI/CAN/UL 9540:2023

**Test procedure**..... : cTUVus mark approval

**Non-standard test method**.....: N/A

**Test Report Form No.**..... : UL 9540\_2023

**Test Report Form(s) Originator** ... : TÜV Rheinland (Shanghai) Co., Ltd.

**Master TRF**..... : Dated 2023-08

**General disclaimer:**

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the Issuing Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the Laboratory responsible for this Test Report.

|                      |                                                                                                                               |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Manufacturer:</b> | Xiamen Hithium Energy Storage Technology Co., Ltd.<br>No.1 Benyuan Road, Tongxiang High-Tech Zone, Xiamen, Fujian, P.R. China |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Factory:</b> | Nantong CIMC YuanEner Integrate Co., Ltd.<br>No.8, Qilianshan Road, Development Zone, Nantong City, Jiangsu, P.R. China |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|

**Purpose of This Report:**

see cover page

**Report History:**

N/A

|                                                                                                   |                                            |                                                                                                                     |
|---------------------------------------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):</b> |                                            |                                                                                                                     |
| <input checked="" type="checkbox"/>                                                               | <b>Testing Laboratory:</b>                 | TÜV Rheinland (Shanghai) Co., Ltd.                                                                                  |
| <b>Testing location/ address..... :</b>                                                           |                                            | No. 177, Lane 777, West Guangzhong Road, Jing'an District, Shanghai 200072, P. R. China                             |
| <b>Tested by (name, function, signature) .... :</b>                                               |                                            | See cover                                                                                                           |
| <b>Approved by (name, function, signature) :</b>                                                  |                                            | See cover                                                                                                           |
|                                                                                                   |                                            |                                                                                                                     |
| <input checked="" type="checkbox"/>                                                               | <b>Testing procedure: CTF Stage 1/TMP:</b> | Henan Xuji Power Electronics Co., Ltd.                                                                              |
| <b>Testing location/ address..... :</b>                                                           |                                            | No. 4138, Sunshine Avenue, Economic and Technological Development Zone, Xuchang City, 461000, Henan Province, China |
| <b>Tested by (name, function, signature) .... :</b>                                               |                                            | See cover                                                                                                           |
| <b>Approved by (name, function, signature) :</b>                                                  |                                            | See cover                                                                                                           |
|                                                                                                   |                                            |                                                                                                                     |
| <input type="checkbox"/>                                                                          | <b>Testing procedure: CTF Stage 2/WMT:</b> |                                                                                                                     |
| <b>Testing location/ address..... :</b>                                                           |                                            |                                                                                                                     |
| <b>Tested by (name + signature)..... :</b>                                                        |                                            |                                                                                                                     |
| <b>Witnessed by (name, function, signature):</b>                                                  |                                            |                                                                                                                     |
| <b>Approved by (name, function, signature) :</b>                                                  |                                            |                                                                                                                     |
|                                                                                                   |                                            |                                                                                                                     |
| <input type="checkbox"/>                                                                          | <b>Testing procedure: CTF Stage 3/SMT:</b> |                                                                                                                     |
| <input type="checkbox"/>                                                                          | <b>Testing procedure: CTF Stage 4:</b>     |                                                                                                                     |
| <b>Testing location/ address..... :</b>                                                           |                                            |                                                                                                                     |
| <b>Tested by (name, function, signature) .... :</b>                                               |                                            |                                                                                                                     |
| <b>Witnessed by (name, function, signature):</b>                                                  |                                            |                                                                                                                     |
| <b>Approved by (name, function, signature):</b>                                                   |                                            |                                                                                                                     |
| <b>Supervised by (name, function, signature):</b>                                                 |                                            |                                                                                                                     |
|                                                                                                   |                                            |                                                                                                                     |
| <b>List of Attachments (including a total number of pages in each attachment):</b>                |                                            |                                                                                                                     |
| Attachment 1: Photo document (9 pages)                                                            |                                            |                                                                                                                     |
| Attachment 2: CDF (12 pages)                                                                      |                                            |                                                                                                                     |

**Tests performed (name of test and test clause):**

Following tests performed during evaluation:

| <u>Clause(s)</u> | <u>Test(s)</u>                                      |
|------------------|-----------------------------------------------------|
| cl. 30           | Normal Operations Test                              |
| cl. 32           | Dielectric Voltage Withstand Test                   |
| cl. 33           | Impulse Test                                        |
| cl. 34           | Equipment Grounding and Bonding Test                |
| cl. 35           | Insulation Resistance Test                          |
| cl. 36           | Electromagnetic Immunity Tests                      |
| cl. 39.1         | Strength Tests                                      |
| cl. 41.2         | Outdoors installations subject to moisture exposure |
| cl 41.3          | Outdoor installation in marine environments         |

The DUT was complied with the requirements of UL 9540:2023.

**Testing location:**

Henan Xuji Power Electronics Co., Ltd.  
No. 4138, Sunshine Avenue, Economic and Technological Development Zone, Xuchang City, 461000, Henan Province, China

|                                                     |                |
|-----------------------------------------------------|----------------|
| <b>Test item particulars:</b>                       |                |
| Description.....:                                   | See cover page |
| Trademark .....                                     | N/A            |
| Model and/or type reference.....:                   | See cover page |
| <b>Electrical Ratings:</b>                          |                |
| Input Voltage/Current                               | See Page 9     |
| Output Voltage/Current                              | See Page 9     |
| Maximum Operating ambient                           | See Page 9     |
| <b>Additional Rating Information:</b>               |                |
| Input voltage range.....:                           | See Page 9     |
| Energy (kwh)                                        | See Page 9     |
| Power (Mw)                                          | See Page 9     |
| Output Short Circuit Current .....                  | See Page 9     |
| Maximum Current per DC Feed                         | See Page 9     |
| Maximum Number of Battery Racks                     | See Page 9     |
| Installation mode.....:                             | See Page 9     |
| <b>Additional Product Information:</b>              |                |
| Software/Firmware tested within the unit.....:      | See Page 9     |
| Pollution degree .....                              | See Page 9     |
| Overvoltage category .....                          | See Page 9     |
| Rated ambient temperature.....:                     | See Page 9     |
| Enclosure index / type.....:                        | See Page 9     |
| Equipment mobility .....                            | See Page 9     |
| Protection class of equipment .....                 | See Page 9     |
| Mass of equipment (Kg) .....                        | See Page 9     |
| Overall size (W x D x H) .....                      | See Page 9     |
| <b>Possible test case verdicts:</b>                 |                |
| - test case does not apply to the test object ..... | N/A            |
| - test object does meet the requirement.....:       | P(ass)         |
| - test object does not meet the requirement.....:   | F(ail)         |
| <b>Testing:</b>                                     |                |
| Date of receipt of test item.....:                  | See cover page |
| Date(s) of performance of tests .....               | See cover page |



### Product Description:

The equipment with model name LX501501 and LX417901 is a Stationary battery energy storage system with lithium batteries.

It contains 6 or 5 Battery cluster, a BMS box, liquid cooling Unit and Fire protection system. BMS box is in charge of control of charging and discharging. Battery Racks are used for electric energy storage.

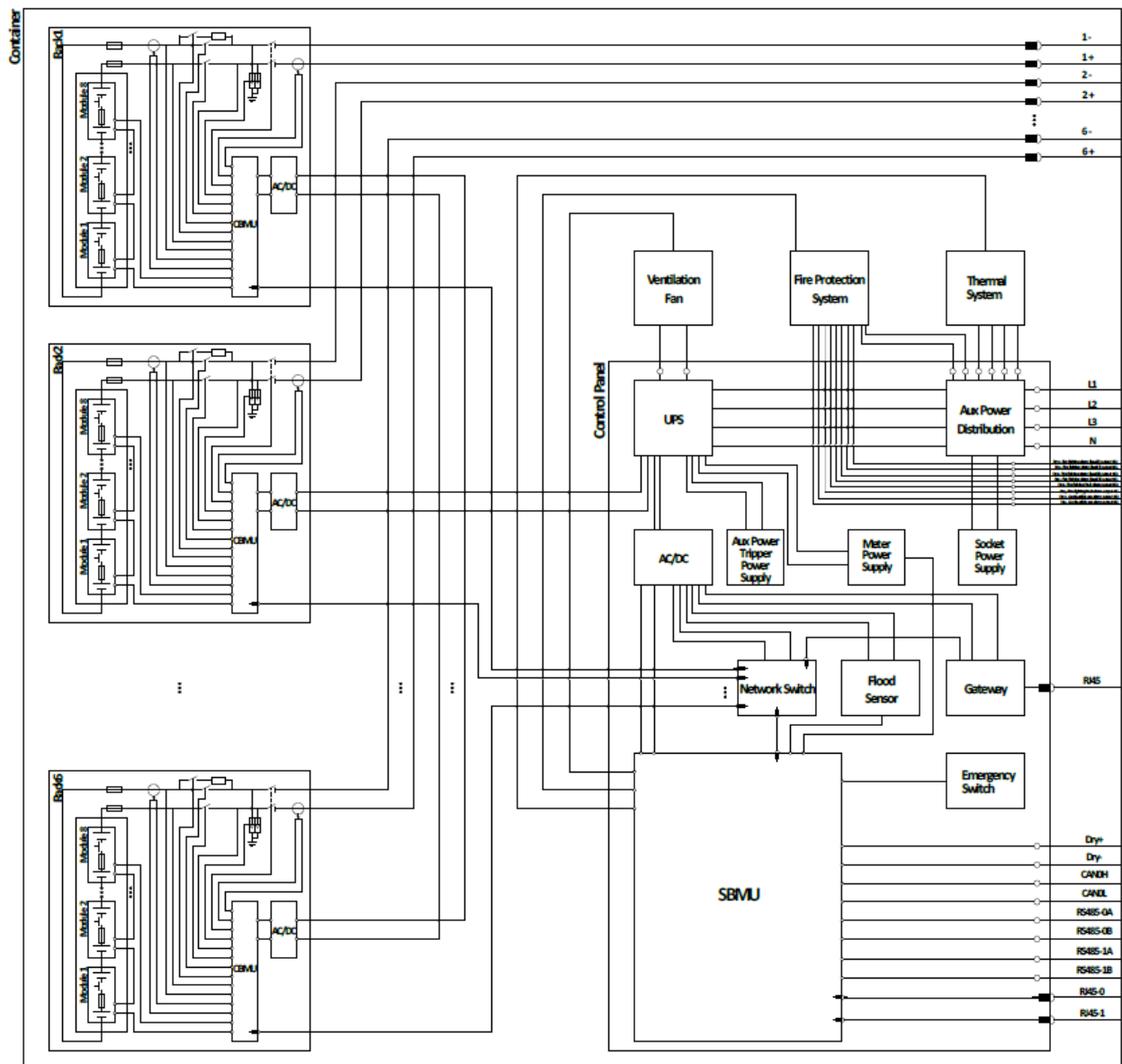
The EUT is outdoor type. The insulation between the DC circuit and the metal enclosure is basic insulation. And the insulation between the DC circuit and communication ports is reinforced insulation or double insulation. OVC II considered for rack, it shall be isolated from an OVC III supply source through an isolated transformer or protected in a manner that prevents transient over voltage conditions in end use.

The control circuit is supplied by AC mains with the OVC II.

The EUT is one type of DC ESS.

The functional safety of BMS is evaluated according to UL 60730-1 Annex H by TÜV Rheinland.

The frame diagram is as follows:



The main features of the Battery System are shown as below:

|                                              |                          |                  |
|----------------------------------------------|--------------------------|------------------|
| Product name                                 | Battery container        |                  |
| Model                                        | LX501501                 | LX417901         |
| Voltage range                                | 1040V-1500Vdc            | 1040V-1500Vdc    |
| Nominal voltage                              | 1331.2Vdc                | 1331.2Vdc        |
| Rated charge and discharge power             | 2508kW                   | 2090kW           |
| Rated capacity                               | 3768Ah                   | 3140Ah           |
| Rated Energy                                 | 5016kWh                  | 4180kWh          |
| Max DC Short Circuit Current                 | 16000A*6 (7.7ms)         | 16000A*5 (7.7ms) |
| Number of Battery cluster                    | 6                        | 5                |
| AC Input short-circuit current rating (SCCR) | 4000A                    |                  |
| Maximum overcurrent protective device rating | 100A                     |                  |
| Auxiliary power supply                       | AC480V, 100A, 3P4L, 60Hz |                  |
| IP Rating                                    | IP55                     |                  |
| Cooling type                                 | Liquid cooling           |                  |
| Operating Temperature                        | -30-55°C                 |                  |
| Storage Temperature                          | -30°C to 60°C            |                  |
| Nominal mass                                 | Max. 38.5T               | Max. 33.5T       |
| External dimensions                          | 6058mm*2438mm*2896mm     |                  |
| Altitude                                     | 4000m                    |                  |

Remark: All models have two constructions A and B, they are identical to each other with mirror relation

The main features of the Battery cluster are shown as below:

|                                                |                                 |
|------------------------------------------------|---------------------------------|
| Product name.....:                             | Battery cluster                 |
| Model.....:                                    | LC083502                        |
| Capacity [Ah].....:                            | 628                             |
| Nominal voltage [V d.c.] .....                 | 1331.2                          |
| Maximum continuous charge current [A] .....    | 402                             |
| Maximum continuous discharge current [A] ..... | 402                             |
| Standard fully charge voltage [V d.c.] .....   | 1500                            |
| Maximum charge voltage [V d.c.].....:          | 1500                            |
| End of discharge voltage [V d.c.] .....        | 1040 (T > 0°C)<br>832 (T ≤ 0°C) |
| Charging temperature range [°C].....:          | 0 to 55                         |
| Discharging temperature range [°C] .....       | -30 to 55                       |

|                                                              |                                                                                 |
|--------------------------------------------------------------|---------------------------------------------------------------------------------|
| Recommend charging method declared by the manufacturer ..... | Charged with constant power 418kW till cell voltage reaches 3.63V, at 25±2°C.   |
| Recommend discharging method declared by the manufacturer    | Discharged with constant power 418kW till cell voltage reaches 2.5V, at 25±2°C. |
| Maximum short circuit current(battery port)                  | 16000A (7.7ms)                                                                  |
| Overvoltage Category level .....                             | OVC II                                                                          |
| Nominal mass.....                                            | ≤7000kg                                                                         |
| External dimensions.....                                     | 2874mm x 1226mm x 2520mm                                                        |

The main features of the Battery Pack are shown as below:

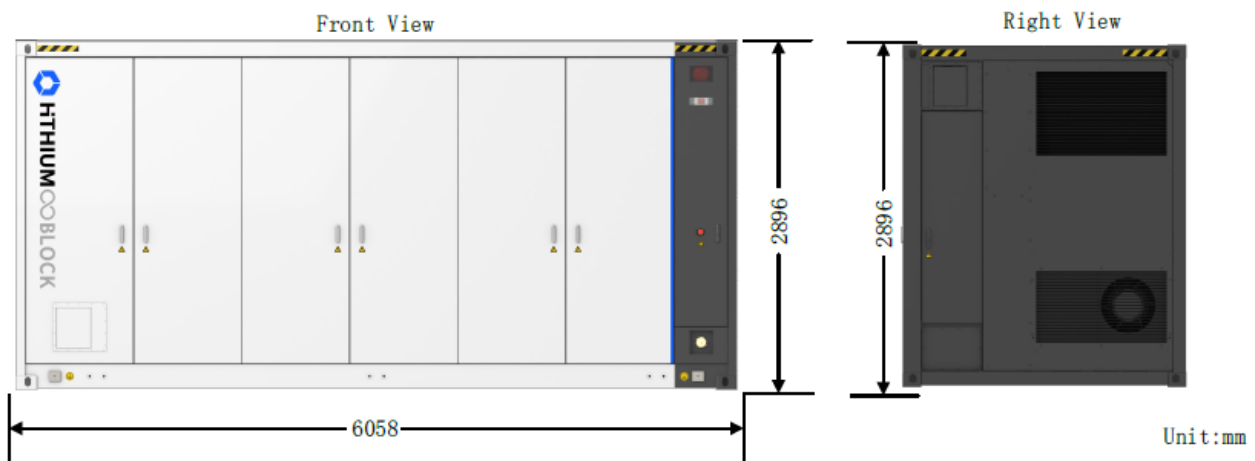
|                                                           |                                                                                  |
|-----------------------------------------------------------|----------------------------------------------------------------------------------|
| Product name                                              | Lithium iron phosphate battery module                                            |
| Model                                                     | LM010401                                                                         |
| Voltage range                                             | 130-189.8Vdc                                                                     |
| Nominal voltage                                           | 166.4Vdc                                                                         |
| Rated charge and discharge Current                        | 314A                                                                             |
| Maximum charge and discharge Current                      | 402A                                                                             |
| Rated capacity                                            | 628Ah                                                                            |
| Temperature range for charging                            | 0-55°C                                                                           |
| Temperature range for discharging                         | -30-55°C                                                                         |
| Storage Temperature                                       | -20°C to 45°C (within one month)                                                 |
| Recommend discharging method declared by the manufacturer | Charged with constant current 314A till cell voltage reaches 3.63V, at 25±2°C.   |
| Recommend discharging method declared by the manufacturer | Discharged with constant current 314A till cell voltage reaches 2.5V, at 25±2°C. |

The main features of Internal Cell:

|                                      |                             |
|--------------------------------------|-----------------------------|
| Product name                         | Iron Phosphate-Lithium Cell |
| Model                                | LFP71173207/314Ah           |
| Rated capacity                       | 314Ah                       |
| Nominal voltage                      | 3.2V                        |
| Maximum continuous charge current    | 314A                        |
| Maximum continuous discharge current | 314A                        |
| Upper Limit charging voltage         | 3.65V                       |
| End of discharge voltage             | 2.5V                        |
| Upper charging temperature limit     | 60°C                        |
| Lower charging temperature limit     | 0°C                         |
| Upper discharging temperature limit  | 60°C                        |
| Lower discharging temperature limit  | -30°C                       |

|                                                           |                                                                                                                                     |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Recommend charging method declared by the manufacturer    | At constant current 157A till cell voltage reaches 3.65V, then switch to constant voltage 3.65V till charge current drops to 15.7A. |
| Recommend discharging method declared by the manufacturer | Discharging the cell with 157A constant current to discharge cut-off voltage 2.5V.                                                  |
| Nominal mass                                              | 5.6 ± 0.20kg                                                                                                                        |
| External dimensions                                       | Height: 207.11mm ± 0.5mm;<br>Thickness: 71.70mm ± 0.5mm;<br>Width: 174.7mm ± 0.5mm;                                                 |

### Construction unit(mm):



**Nameplate, Warning, and Label, etc.:**

Battery container (DC ESS)  
 Xiamen Hithium Energy Storage Technology Co., Ltd.  
 LX417901  
 Nominal Capacity: 3140Ah Nominal Voltage: 1331.2Vdc  
 Nominal Energy: 4180kWh  
 IFpP73/176/208/[(2P52S)8S5P]M/-30+50/90  
 Date of Manufacture: XXXX-XX-XX  
 Max Charge Voltage: 1500Vdc  
 Voltage range: 1040-1500Vdc  
 Operating Temperature: -30 to 55°C  
 Nominal Charge/Discharge Power: 2090kW  
 Auxiliary power supply: AC480V, 100A, 3P4L, 60HZ  
 Max DC Short Circuit Current: 16000A\*5 (7.7ms)  
 AC Input short-circuit current rating (SCCR): 4000A  
 Maximum overcurrent protective device rating current :100A  
 Recommend charging method declared by the Manufacturer:  
 Charge the battery at constant power 2090kW until cell voltage  
 reaches 3.63V  
 IP: IP55  
 Caution  
 Don't disassemble, bump, crush or throw into fire.  
 In case of severe swelling, don't continue to use.  
 Don't expose to high temperature.  
 Attention  
 Ne pas démonter, heurter, écraser ou jeter au feu.  
 En cas de gonflement important, stopper l'utilisation.  
 Ne pas exposer à des températures élevées.  
 Contact information: XXXX





#### Battery container (DC ESS)

Xiamen Hithium Energy Storage Technology Co., Ltd.  
LX501501

Nominal Capacity: 3768Ah Nominal Voltage: 1331.2Vdc

Nominal Energy: 5016kWh

IFpP73/176/208/[(2P52S)8S6P]M/-30+50/90

Date of Manufacture: xxxx-xx-xx

Max Charge Voltage: 1500Vdc

Voltage range: 1040-1500Vdc

Operating Temperature: -30 to 55°C

Nominal Charge/Discharge Power: 2508kW

Auxiliary power supply: AC480V, 100A, 3P4L, 60Hz

Max DC Short Circuit Current: 16000A \* 6 (7.7ms)

AC Input short-circuit current rating (SCCR): 4000A

Maximum overcurrent protective device rating current : 100A

Recommend charging method declared by the Manufacturer:

Charge the battery at constant power 2508kW until cell voltage reaches 3.63V

IP: IP55



#### Caution

Don't disassemble, bump, crush or throw into fire.

In case of severe swelling, don't continue to use.

Don't expose to high temperature.

#### Attention

Ne pas démonter, heurter, écraser ou jeter au feu.

En cas de gonflement important, stopper l'utilisation.

Ne pas exposer à des températures élevées.

Contact information: XXXX

Not intended for installation in seismic environments



ARC FLASH HAZARD LABEL??

| <b>UL 9540</b> |                    |                 |         |
|----------------|--------------------|-----------------|---------|
| Clause         | Requirement + Test | Result - Remark | Verdict |

| <b>INTRODUCTION</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                  |     |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----|
| <b>1</b>            | <b>Scope</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                  | P   |
| 1.1                 | The system is designed to receive and store energy, and can be an AC ESS or a DC ESS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DC ESS                           | P   |
| 1.2                 | Standalone or utility interactive                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Depended on PCS connected.       | P   |
| 1.3                 | Requirements for installation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                  | P   |
| 1.4                 | Location of ESS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Outdoor                          | P   |
| 1.5                 | Systems using lead-acid or Ni-Cad falling under UL 1778/CSA C22.2 No.107.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                  | N/A |
| 1.6                 | Maximum Energy Capacities:<br>a) Residential use electrochemical ESS shall not exceed 20 kWh (72 MJ), and may be greater if ESS meets the UL 9540A Unit Level test requirements;<br>b) Non-residential use electrochemical ESS shall not exceed 50 kWh (180 MJ), and may be greater if ESS meets the UL 9540A Installation Level test requirements and is marked in accordance with 45.20.<br>c) No maximum energy capacity limit for non-residential use electrochemical ESS tested in accordance with UL 9540A and meeting the performance criteria for cell level testing;<br>d) Non-residential electrochemical ESS for use in remote outdoor locations has no maximum energy capacity limit, and shall be marked in accordance with 45.21. | Unit level test report provided. | P   |
| <b>2</b>            | <b>Components</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                  | P   |
| 2.1                 | Components comply with standard covering that component                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | See CDF for details.             | P   |
| <b>3</b>            | <b>Units of Measurement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                  | P   |
| 3.1                 | Values without parentheses are the requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                  | P   |
| <b>4</b>            | <b>Undated References</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                  | P   |
| 4.1                 | Undated references imply the latest edition of the standard.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                  | P   |
| <b>5</b>            | <b>Normative References</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                  | P   |
| 5.1                 | Refer to Standard document for list of references.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                  | P   |
| <b>6</b>            | <b>Glossary</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                  | P   |
| 6.1                 | Refer to Standard for a list of definitions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                  | P   |
| <b>CONSTRUCTION</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                  |     |
| <b>7</b>            | <b>Non-Metallic Materials</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Metal enclosure.                 | N/A |

| UL 9540 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 |         |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause  | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Result - Remark | Verdict |
| 7.1     | a) The polymeric materials employed for enclosures shall comply with UL 746C,<br>b) The enclosure shall be evaluated to meet the Unit Level performance criteria of UL 9540A.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 | N/A     |
| 7.2     | The following factors in (a) – (e) are taken into consideration<br>a) Resistance to impact;<br>b) Crush resistance;<br>c) Abnormal operations;<br>d) Severe conditions; and<br>e) Mold-Stress Relief Distortion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 | N/A     |
| 7.3     | Additional properties:<br>a) 5VA flame rating<br>b) Insulation material Property Considerations table UL 746C<br>c) Strain-Relief Test after Mold Stress-Relief Distortion of UL 746C<br>d) UV exposure test of UL 746C<br>e) Water exposure and immersion test of UL 746C<br>f) Conduit connections of UL 746C<br><i>Exception: 7.4</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 | N/A     |
| 7.4     | The requirements in 7.3 do not apply to non-metallic parts forming part of the enclosure in any of the following conditions in accordance with UL 94 or CSA C22.2 No. 0.17:<br>a) The part made of V-0, V-1, V-2, or HB-rated materials cover an opening no dimension greater than 25.4 mm (1 in.);<br>b) The part made of V-0, V-1, V-2, or HB-rated materials cover an opening that do not give access to the user to hazardous live parts, when it is removed;<br>c) The part made of V-0, V-1, V-2, or HB-rated materials cover an opening no dimension greater than 101.6 mm (4 in). There is no fire hazard closer than 101.6 mm (4 in) from the surface of the enclosure; or<br>d) A barrier or device made of V-0 classed material between parts made of V-0, V-1, V-2, or HB rated material and the source of a fire risk. |                 | N/A     |
| 7.5     | Materials employed as electrical insulation shall be resistant to deterioration that would result in an electrical shock, fire or other safety hazard. And shall comply with UL 746C.<br>Insulated wiring is subjected to the requirements outlined in Section 11.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 | N/A     |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |         |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------|
| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                         | Result - Remark       | Verdict |
| 7.6            | Gaskets and Seals relied upon for safety, shall be determined suitable for the environmental conditions and chemical substances they are anticipated to be exposed to in their end use.                                                                                                                                                                                                                                    |                       | N/A     |
| 7.7            | Compliance with 7.6 for gaskets and seals relied upon to prevent ingress of moisture into the enclosure, can either comply with the Gaskets Tests Clause of UL 50E/CSA C22.2 No. 94.2 or comply with UL 157 or ASTM D412 for the anticipated exposures.                                                                                                                                                                    |                       | N/A     |
| <b>8</b>       | <b>Metallic Enclosures and Parts Resistance to Corrosion</b>                                                                                                                                                                                                                                                                                                                                                               |                       | P       |
| 8.1            | Metallic enclosure parts for BESS shall be of non-combustible materials; otherwise, it shall be evaluated to verify compliance with its performance criteria through UL 9540A Unit Level testing.                                                                                                                                                                                                                          |                       | P       |
| 8.2            | Metallic enclosures shall be corrosion resistant                                                                                                                                                                                                                                                                                                                                                                           |                       | P       |
| 8.3            | Dissimilar metals not subject to corrosion due to electrochemical action                                                                                                                                                                                                                                                                                                                                                   |                       | P       |
| <b>9</b>       | <b>Enclosures and Guarding of Hazardous Parts</b>                                                                                                                                                                                                                                                                                                                                                                          |                       | P       |
| 9.1            | The enclosure(s) shall have the strength and rigidity required to resist the possible physical during its intended use                                                                                                                                                                                                                                                                                                     |                       | P       |
| 9.2            | UL 2416 compliant rack assemblies that serve as the internal support structure for the ESS are used within the rated load range                                                                                                                                                                                                                                                                                            |                       | P       |
| 9.3            | Openings in the enclosure shall be designed to prevent inadvertent access to hazardous parts. For a minimum IP rating of IP2X with consideration of the end use installation.<br><i>Exception: An Energy storage system intended for location in restricted access locations need not meet this accessibility criterion if provided with warning markings for service and other personnel having access to the system.</i> | IP 55 enclosure used. | P       |
| 9.4            | In service access areas, bare parts of hazardous voltage circuits, shall be located or guarded so that accidental shorting is unlikely                                                                                                                                                                                                                                                                                     |                       | P       |
| 9.5            | Enclosures of systems located where they will be subject to exposure to water and other elements shall be rated for the level of intended exposure                                                                                                                                                                                                                                                                         | IP 55 enclosure used. | P       |
| <b>10</b>      | <b>General Electrical Safety of Systems and Additional Requirements for Walk-in Units</b>                                                                                                                                                                                                                                                                                                                                  | Not a walk-in System  | N/A     |

| UL 9540 |                                                                                                                                    |                 |         |
|---------|------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause  | Requirement + Test                                                                                                                 | Result - Remark | Verdict |
| 10.1    | Instructions include measures and procedures for worker safety per NFPA70E, CSA Z463 and section 2 of the C22.1                    |                 | N/A     |
| 10.2    | Walk in enclosures have suitable mechanical load ratings for equipment and persons inside                                          |                 | N/A     |
| 10.3    | Shipping container type enclosures if modified comply with ASTM D3169                                                              |                 | N/A     |
| 10.4    | The enclosures for outdoor walk-in units exceeding 53x8.5x9.5ft shall be evaluated as an indoor environment                        |                 | N/A     |
| 10.5    | Explosion venting system of walk-in unit                                                                                           |                 | N/A     |
| 10.6    | Procedures for safe entry and exit                                                                                                 |                 | N/A     |
| 10.7    | Entrances to the enclosure shall be designed to prevent persons from becoming trapped within the enclosure                         |                 | N/A     |
| 10.8    | Work space dimensions and requirements within walk in enclosures shall be in accordance with the National Electrical (Safety) Code |                 | N/A     |
| 10.9    | Areas of access shall be designed to prevent tripping, slipping or falling when persons enter, exit                                |                 | N/A     |
| 10.10   | Protection against contact with hazardous voltage parts in the energy storage system                                               |                 | P       |
| 10.11   | Type of protection per an arc flash assessment report                                                                              |                 | N/A     |
| 10.12   | Unprotected arc flash boundary above 5 J/cm <sup>2</sup>                                                                           |                 | N/A     |
| 10.13   | Ventilation for a fully walk in enclosure                                                                                          |                 | N/A     |



| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |          |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                              | Result - Remark | Verdict  |
| 10.14          | Electrical circuits that are an integral part of the energy storage system including those that are part of a walk-in enclosure including lighting, controls, power, HVAC (heating, ventilation and air-conditioning), emergency lighting, alarm circuits, and the like shall comply with the appropriate requirements for the type of equipment and the specific application within the energy storage system. |                 | N/A      |
| 10.15          | Electrical equipment subject to condensation                                                                                                                                                                                                                                                                                                                                                                    |                 | N/A      |
| 10.16          | Lighting shall be supplied in enclosed working spaces in accordance with Article 410 of the NFPA 70 or Section 30 of C22.1                                                                                                                                                                                                                                                                                      |                 | N/A      |
| 10.17          | More than one source of supply                                                                                                                                                                                                                                                                                                                                                                                  |                 | N/A      |
| 10.18          | Protection against lightning surges in accordance with NFPA 70, C22.1 or IEEE C2 as applicable                                                                                                                                                                                                                                                                                                                  |                 | N/A      |
| <b>11</b>      | <b>Wiring and Electrical Supply Connections</b>                                                                                                                                                                                                                                                                                                                                                                 |                 | <b>P</b> |
| 11.1           | Wiring shall be insulated and acceptable for the purpose                                                                                                                                                                                                                                                                                                                                                        |                 | P        |
| 11.2           | Wiring methods and electrical supply connections shall be in accordance with the NEC, NFPA 70 or the National Electrical Safety Code, IEEE C2.                                                                                                                                                                                                                                                                  |                 | P        |
| 11.3           | Field-wiring compartments in which branch circuit connections are to be made shall:<br>a) Wiring terminals or wiring leads;<br>b) A means for connection of cable or conduit in accordance with the codes in 11.2.                                                                                                                                                                                              |                 | P        |
| 11.4           | A wiring terminal or lead that is supplied as a component of the energy storage system shall be rated and sized for connection to a field wiring conductor having an ampacity of no less than 125% of the ac or dc current that the circuit carries during rated conditions and in accordance with the codes in 11.2.                                                                                           |                 | P        |
| 11.5           | A field-wiring lead shall not be more than two wire sizes smaller than the copper conductor to which it is to be connected, and shall not be smaller than 2.08 mm <sup>2</sup> (14 AWG). A field-wiring lead shall not be less than 152.4-mm (6-in) long.                                                                                                                                                       |                 | P        |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                  |                   |         |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                               | Result - Remark   | Verdict |
| 11.6           | Field wiring compartments shall:<br>a) Permit the connection of the supply wires after the energy storage system is installed;<br>b) Permit the connection to be introduced and connected easily and safely; and<br>c) Be located so that the connections may be readily inspected after the energy storage system is installed. |                   | P       |
| 11.7           | Internal wiring shall be routed, supported, clamped or secured in a manner that reduces the likelihood of excessive strain.                                                                                                                                                                                                      |                   | P       |
| 11.8           | Insulated wires pass through a metal wall shall be provided with a smoothly rounded bushing or shall have smooth surfaces, free of burrs, fins, sharp edges, and the like.                                                                                                                                                       |                   | P       |
| 11.9           | Grouping of parallel conductors                                                                                                                                                                                                                                                                                                  |                   | P       |
| <b>12</b>      | <b>General Electrical Equipment</b>                                                                                                                                                                                                                                                                                              |                   | P       |
| 12.1           | A replaceable fuses marking with the fuse ratings & type shall be located adjacent to each fuse or fuse holder. Information on proper fuse shall also be included in the routine service manual instructions.                                                                                                                    |                   | P       |
| 12.2           | A hazardous voltage ESS shall have a manual disconnect to prevent inadvertent access to hazardous voltage parts during servicing.                                                                                                                                                                                                |                   | P       |
| 12.3           | Fuses, circuit breakers and disconnect devices shall be rated for the application.                                                                                                                                                                                                                                               |                   | P       |
| 12.4           | Power transformers installed as part of the ESS shall be of the dry type or type filled with a noncombustible dielectric medium in accordance with NEC NFPA 70.                                                                                                                                                                  |                   | P       |
|                | Exception: Oil filled transformers may be utilized if located outdoors and in accordance with the local codes or utility requirements.                                                                                                                                                                                           | No such equipment | N/A     |
| 12.5           | Oil filled transformers                                                                                                                                                                                                                                                                                                          | No such equipment | N/A     |
| 12.6           | Convenience receptacles provided for maintenance and servicing of the ESS shall be rated for outdoor use if located where exposed to the environment.                                                                                                                                                                            | No such equipment | N/A     |
| 12.7           | SCCR rating of interconnected components                                                                                                                                                                                                                                                                                         | No such equipment | N/A     |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                      |                       |         |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                   | Result - Remark       | Verdict |
| <b>13</b>      | <b>Electrical Spacings and Separation of Circuits</b>                                                                                                                                                                                                                                                                                                                                                |                       | P       |
| 13.1           | Electrical circuits shall be provided with reliable physical spacing to prevent inadvertent short circuits                                                                                                                                                                                                                                                                                           |                       | P       |
| 13.2           | Electrical spacings in circuits shall have the following minimum over surface and through air spacings as outlined in Table 13.1 or as outlined in UL 62368-1/CSA C22.2 No. 62368-1, Clearances, Clause 5.4.2, and Creepage Distances, Clause 5.4.3.                                                                                                                                                 | UL 62368-1 Considered | P       |
|                | <i>Exception No. 1: As an alternative, the spacing requirements in UL 840 may be used.</i>                                                                                                                                                                                                                                                                                                           |                       | N/A     |
|                | <i>Exception No. 2: Electrical spacings within components and parts of ESS previously determined to comply with an appropriate safety standard for the equipment need not be evaluated.</i>                                                                                                                                                                                                          |                       | N/A     |
| 13.3           | There are no minimum spacings applicable to parts where insulating compound completely fills the casing of a compound                                                                                                                                                                                                                                                                                |                       | N/A     |
| 13.4           | Conductors of circuits operating at different voltages shall be reliably separated from each other through the use of mechanical securements unless they are each provided with insulation acceptable for the highest voltage involved.                                                                                                                                                              |                       | P       |
| <b>14</b>      | <b>Insulation Levels and Protective Grounding</b>                                                                                                                                                                                                                                                                                                                                                    |                       | P       |
| 14.1           | Hazardous voltage circuits shall be insulated from accessible conductive parts and SELV circuits as outlined in 14.2 through the following:<br>a) Basic insulation and provided with a protective grounding system for protection in the event of a fault of the basic insulation that complies with 14.3;<br>b) A system of double or reinforced insulation; or<br>c) A combination of (a) and (b). |                       | P       |
| 14.2           | SELV circuits that are insulated from accessible conductive parts through functional insulation only are considered accessible. Another term used for similar circuits is protective extra low voltage (PELV)                                                                                                                                                                                        |                       | P       |
| 14.3           | Accessible non-current carrying metal parts that could become live in the event of an insulation fault shall be bonded to the equipment ground terminal.                                                                                                                                                                                                                                             |                       | P       |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |         |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Result - Remark | Verdict |
| 14.4           | The protective grounding methods of an energy storage system shall be in accordance with Article 250 of the NEC, NFPA 70 or Section 9 of the NESC, IEEE C2 as applicable to where the system is located. If used, grounding (bonding) braids used in the ESS or from the ESS to the grounding electrode shall comply with UL 467 /CSA C22.2 No. 41, and sized according to the Grounding - Size of Terminal or Bonding Conductor requirements of UL 508A or CSA C22.1.<br>In Canada, the method of bonding and grounding an energy storage system shall be in accordance with Section 10 and 36 of CSA C22.1. |                 | P       |
| 14.5           | Parts of the protective grounding system shall be reliably secured and provided with good metal-to-metal contact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 | P       |
| 14.6           | With reference to 14.5, when connecting conductive parts to be bonded, paint or coatings in areas of contact shall be removed or paint piercing lock washers shall be used with securement bolts or screws to provide good metal to metal contact.                                                                                                                                                                                                                                                                                                                                                            |                 | P       |
| 14.7           | Methods of securement for 14.5, methods of securement considered reliable and ensuring good metal-to metal contact can consist of the following methods:                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 | P       |
| 14.8           | For ESS greater than 100 V between conductors or to ground, the battery circuits can be ungrounded if the system is provided with a ground fault detector and indicator to monitor ground faults.                                                                                                                                                                                                                                                                                                                                                                                                             |                 | P       |
| <b>15</b>      | <b>Safety Analysis and Control Systems</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 | P       |
| 15.1           | ESS shall be provided with a safety analysis such as a failure modes and effects analysis (FMEA) that identifies critical safety components and circuits of the system. Guidance for analysis can be found in the following standards:<br>a) The Standard for Analysis Techniques for System Reliability – Procedures for Failure Mode and Effects Analysis (FMEA), IEC 60812;<br>b) The Standard for Fault Tree Analysis (FTA), IEC 61502; and<br>c) The Procedures for Performing a Failure Mode, Effects, and Criticality Analysis, MIL STD 882E.                                                          | FMEA provided   | P       |
| 15.2           | Interconnection of components already evaluated to 15.1 additionally evaluated to 15.1 as a group.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 | P       |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                     |         |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Result - Remark                     | Verdict |
| 15.3           | Mechanical, thermal and other hazards besides electrical to be considered.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                     | P       |
| 15.4           | Analysis of thermal ESS shall ensure that there is sufficient monitoring and control of pressure, thermal and fluid flow to ensure that the various parts of the system are maintained within their specifications for pressure temperature and fluid levels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                     | P       |
| 15.5           | Electrical and electronic controls of the ESS that are determined to be critical for safety shall comply with an appropriate safety standard for the control and used within their ratings. Electronics and software controls determined to be critical for safety are to be tested to verify electromagnetic immunity in accordance with Section 36 if this testing is not part of the functional safety standard requirements, and shall be evaluated for functional safety to one of the following sets of standards and safety ratings as applicable to the system:<br>a) UL 991 and UL 1998;<br>b) CSA C22.2 No. 0.8 (Function Class B requirements);<br>c) The Annex for Requirements for Electronic Controls, Annex H of UL 60730-1 or CSA E60730-1 (Function Class B requirements);<br>d) IEC 61508 (all parts) (minimum of Safety Integrity Level (SIL) "2" requirements for active protective devices with software controls);<br>e) ISO 13849-1 and ISO 13849-2 (minimum of Performance Level (PL) "c" requirements for active protective devices with software controls); or<br>f) ISO 26262 (all parts) (minimum Automotive Safety Integrity Level (ASIL) "C" requirements for active protective devices with software controls). | UL 60730-1 Annex H                  | P       |
| 15.6           | Required SIL, PL or ASIL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                     | N/A     |
| 15.7           | Types of interactions between equipment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                     | P       |
| 15.8           | Software that can be updated remotely to meet the requirements outlined in Section 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Software can't be updated remotely. | N/A     |
| <b>16</b>      | <b>Remote Software Update Enabled ESS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                     | N/A     |
| <b>16.1</b>    | <b>Critical and/or critical supervisory software (UL 1998)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | No such function                    | N/A     |



| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |         |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Result - Remark | Verdict |
| 16.1.1         | The requirements in 16.1.2-16.1.7 apply when the manufacturer declares the ESS has critical and supervisory and related critical supervisory sections of software per UL 1998, and has the functionality to remotely update this software.                                                                                                                                                                                                                                                                                                                                                   |                 | N/A     |
| 16.1.2         | The critical/supervisory sections of UL 1998 software, intended to be updated, shall comply with UL 1998.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 | N/A     |
| 16.1.3         | User authorization is required prior to any remote update of critical/supervisory sections of UL 1998 software.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 | N/A     |
| 16.1.4         | The remote update of software shall occur when the ESS is in a risk addressed state.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 | N/A     |
| 16.1.5         | The remote software update shall comply with UL 5500, with the following modifications:<br>a) The device specific requirements for a remote update of software, per the requirements for Application of Received Software Download Package in UL 5500, shall occur when the ESS is in a risk-addressed state; and<br>b) The bulleted items in the compliance criterion of the requirements for Documentation & Tracking in UL5500 are replaced with the following:<br>1) Communication protocol<br>2) Software update process<br>3) Identity and access management<br>4) Validation measures |                 | N/A     |
| 16.1.6         | The correct operation of the ESS safety functions shall be maintained after the critical/supervisory sections of software in accordance with UL 1998 software is updated.                                                                                                                                                                                                                                                                                                                                                                                                                    |                 | N/A     |
| 16.1.7         | Functional test of a remote software update using the procedure outlined in Operational Verification of Remote Software Update Capability in 36.9 after implementing a remote software update.                                                                                                                                                                                                                                                                                                                                                                                               |                 | N/A     |
| <b>16.2</b>    | <b>Class B software (UL 60730-1 or CSA E60730-1)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 | N/A     |
| 16.2.1         | The ESS has Class B software in accordance with UL 60730-1 or CSA E60730-1, and has the functionality to remotely update this software.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 | N/A     |
| 16.2.2         | The requirements for Controls Using Software in UL 60730-1 or CSA E60730-1 are met.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 | N/A     |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                            |                  |         |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------|
| Clause         | Requirement + Test                                                                                                                                                                                                                                         | Result - Remark  | Verdict |
| 16.2.3         | The remotely actuated control function, including the software update function, shall comply with the requirements for Remotely Actuated Control Functions in UL 60730-1 or CSA E60730-1.                                                                  |                  | N/A     |
| 16.2.4         | Where a remotely actuated control functions may be connected to a separate device containing control functions or providing other information, any data exchange between these devices shall not compromise the integrity of the Class B control function. |                  | N/A     |
| 16.2.5         | User authorization is required prior to any remote update of Class B software, UL 60730-1 or CSA E60730-1.                                                                                                                                                 |                  | N/A     |
| 16.2.6         | The remote update of software shall occur when the ESS is in a risk addressed state.                                                                                                                                                                       |                  | N/A     |
| 16.2.7         | The correct operation of the ESS's safety functions shall be maintained after the Class B software is updated per UL 60730-1 or CSA E60730-1.                                                                                                              |                  | N/A     |
| 16.2.8         | A functional test of a remote software update using the procedure outlined in Operational Verification of Remote Software Update Capability in 36.9 after implementing a remote software update.                                                           |                  | N/A     |
| <b>17</b>      | <b>Remote Controls</b>                                                                                                                                                                                                                                     | No such function | N/A     |
| 17.1           | ESS which have the ability to be controlled remotely are to be provided with a local means to disconnect the system from the remote control                                                                                                                |                  | N/A     |
| 17.2           | Remote disconnect controls marking                                                                                                                                                                                                                         |                  | N/A     |
| <b>18</b>      | <b>Communication Systems</b>                                                                                                                                                                                                                               |                  | P       |
| <b>18.1</b>    | <b>General</b>                                                                                                                                                                                                                                             |                  | P       |
| 18.1.1         | Communication protocols used by ESS for communication between its various parts and the grid shall be in accordance with those of the intended grid application.                                                                                           |                  | P       |
| <b>18.2</b>    | <b>External warning communication system (EWCS)</b>                                                                                                                                                                                                        |                  | P       |
| 18.2.1         | Electrochemical ESS using lithium-ion batteries have an energy capacity of 500 kWh or greater shall be provided with an external warning communication system                                                                                              |                  | P       |
| 18.2.2         | The information inputs to the EWCS                                                                                                                                                                                                                         |                  | P       |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                      |          |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Result - Remark      | Verdict  |
| 18.2.3         | The EWCS shall communicate with an operator station and communicate to a local warning system                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                      | P        |
| 18.2.4         | The EWCS and the sources providing information to the EWCS shall be evaluated as part of the safety analysis of the system                                                                                                                                                                                                                                                                                                                                                                                                                           |                      | P        |
| 18.2.5         | The EWCS can be supplied by the lithium batteries it is monitoring, and shall also have a dedicated backup power source independent of the batteries                                                                                                                                                                                                                                                                                                                                                                                                 |                      | P        |
| 18.2.6         | Instructions of the EWCS including its back up power source shall be provided. If installed indoors, the instructions shall reference the Notification Appliances Chapter of NFPA 72. Visual alarms shall be in accordance with UL 1638, and audio alarms shall be in accordance with UL 464/ULC 525 with the maximum sound level not exceed 110 dBA at the minimum hearing distance. For outdoor installations, visible alarms installed on the ESS, shall be located no less than 203.2 cm (80 in) nor more than 243.8 cm (96 in) above the ground |                      | P        |
| <b>19</b>      | <b>Heating and Cooling Systems</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                      | <b>P</b> |
| 19.1           | ESS that rely upon integral thermal management systems to prevent overheating or operation outside the specified safe operating range, shall be designed to safely shutdown upon failure of the thermal management system                                                                                                                                                                                                                                                                                                                            |                      | P        |
| <b>20</b>      | <b>Piping Systems, Pressure Vessels, Fuel and Other Fluid Supply Connections and Controls</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                      | <b>P</b> |
| 20.1           | Piping Systems, pressure vessels, fuel or other supply systems shall comply with 20.2-20.10                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                      | P        |
| 20.2           | Piping systems utilized to carry fluids in an ESS such as water, heated air, fuel gases, etc. shall comply with ASME B31 (all applicable parts), or CSA B51, or CSA B52, or CSA Z662, or CSA B149.1 as applicable.                                                                                                                                                                                                                                                                                                                                   | comply with ASME B31 | P        |
| 20.3           | Pressure vessels and related equipment including pressure relief devices that fall under the scope of the Boilers and Pressure Vessels Code, ASME BPVC or CSA B51 shall comply with the applicable requirements                                                                                                                                                                                                                                                                                                                                      |                      | N/A      |
| 20.4           | Flammable fuel supply connections on the ESS shall be suitable for the material contained and in accordance with the applicable part of ASME B31 based upon the fluid, temperatures and pressures they are subjected to.                                                                                                                                                                                                                                                                                                                             |                      | N/A      |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |         |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Result - Remark | Verdict |
| 20.5           | Means is to be provided to prevent backflow of process gases, etc. into the fuel supply lines                                                                                                                                                                                                                                                                                                                                                                               |                 | N/A     |
| 20.6           | The energy storage system shall be designed so that process water used in the system shall be prevented from contaminating potable water sources in accordance with local regulations through the use of check valves or other means as part of the system design.                                                                                                                                                                                                          |                 | N/A     |
| 20.7           | Piping, hose, and tubing containing liquids, shall be routed and secured to prevent leakage that could result in a fire, explosion or shock hazard.                                                                                                                                                                                                                                                                                                                         |                 | P       |
| 20.8           | Coolant leaks shall be detected, and a warning signal shall be sent to the ESS monitoring and control system, as well as an alarm if provided.                                                                                                                                                                                                                                                                                                                              |                 | P       |
| 20.9           | Manual shut off valves shall be provided near the energy storage system in a location where they can be accessed to allow for disconnection of the fuel or water supply from the energy storage system for maintenance, etc. Automatic (nonelectric type) and manual valves intended for the use in flammable fluid lines shall comply with the Standard for Valves for Flammable Fluids, UL 842. Solenoid valves shall comply with <del>UL 429</del> or CSA C22.2 No. 139. |                 | N/A     |
| 20.10          | Pressure regulators used on flammable or other hazardous gas lines shall comply with the Standard for Compressed Gas Regulators, UL 252. UL 252, CSAZ662, or CSAB149.1, as applicable                                                                                                                                                                                                                                                                                       |                 | N/A     |
| <b>21</b>      | <b>Containment of Moving Parts in Mechanical ESS</b>                                                                                                                                                                                                                                                                                                                                                                                                                        |                 | N/A     |
| 21.1           | Moving parts shall be provided with a means to contain the parts in the event they could become loosened during operating.                                                                                                                                                                                                                                                                                                                                                  |                 | N/A     |
| 21.2           | The alternator/generator elements associated with mechanical ESS shall comply with UL 1004-1 and other parts                                                                                                                                                                                                                                                                                                                                                                |                 | N/A     |
| <b>22</b>      | <b>Noise Levels</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 | N/A     |

| UL 9540   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |         |
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| Clause    | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Result - Remark                                                                                                                                  | Verdict |
| 22.1      | The noise level from an ESS during operation, including noise levels in walk-in ESS that can be entered during operation, shall be limited to an 8-hr time-weighted average of 85 dBA when tested in accordance with 29 CFR 1910.95 (C)(1)(2). Systems that have noise levels in excess of this limit shall be provided with warning labels and instructions that address hearing protection and other protective measures to be taken for those who may be exposed to the noise in accordance with 29 CFR 1910.95. |                                                                                                                                                  | N/A     |
| <b>23</b> | <b>Hazardous Fluid Control</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Not flow battery                                                                                                                                 | N/A     |
| 23.1      | Where the system contains fluid in excess of 208 L (55 gal) in a single vessel or an aggregate of more than 3785 L (1000 gal), secondary containment shall be provided.                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                  | N/A     |
| 23.2      | Systems containing conductive fluids                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                  | N/A     |
| 23.3      | Neutralization of spills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                  | N/A     |
| 23.4      | Venting of toxic vapours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                  | N/A     |
| <b>24</b> | <b>Combustible Vapor Concentrations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                  | P       |
| 24.1      | Enclosures or areas that contain flammable fluid systems or batteries that vent hydrogen to the atmosphere shall be ventilated to prevent hazardous concentrations of flammable materials.                                                                                                                                                                                                                                                                                                                          | No flammable gases occur under normal operation.                                                                                                 | N/A     |
| 24.2      | ESS Systems not addressed in 22.1 and dependent on mechanical ventilation as a protection measure against emission of flammable gas that can occur during fault conditions to prevent hazardous gas concentrations within the system, shall be equipped with a fault detection system that activates the mechanical ventilation in a manner which prevents the LFL from exceeding 25 % in any non-hazardous area/zone within the ESS.                                                                               | Depend on mechanical ventilation as a protection measure, ventilation volume and rate were evaluated to comply with NFPA 69 report CN24Q0JQ 001. | P       |
| 24.3      | For battery and similar systems, openings to prevent hazardous concentrations within an enclosure can be used.                                                                                                                                                                                                                                                                                                                                                                                                      | Li-ion battery used                                                                                                                              | N/A     |
| 24.4      | As an alternative to 24.3, ventilation openings shall have a minimum opening area of:<br>$A = 0.005NC_5 (cm^2)$                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  | N/A     |
| 24.5      | Electrochemical ESS with integral enclosures where there is the potential for a flammable gas concentration within the enclosure from an abnormal condition shall be provided with deflagration or explosion protection in accordance with NFPA 68 or NFPA 69.                                                                                                                                                                                                                                                      | NFPA 69                                                                                                                                          | P       |



| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                       |         |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                      | Result - Remark                                                                       | Verdict |
| 24.6           | ESS located within dilution boundaries (i.e. concentrations above 25% LFL) or classified locations shall be suitable for the classification in accordance with the National Electrical Code, NFPA 70, CSA C22.1, or IEEE C2.                                                                                                                                                            |                                                                                       | N/A     |
| 24.7           | Electrical compartments adjacent to classified zones or locations shall be maintained at positive pressure in accordance with the Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas, NFPA 497.                                                          |                                                                                       | N/A     |
| <b>25</b>      | <b>Flammable Solids</b>                                                                                                                                                                                                                                                                                                                                                                 |                                                                                       | N/A     |
| 25.1           | ESS containing hazardous solids (i.e. pyrophoric or water reactive metals) shall be designed and installed in accordance with NFPA 484                                                                                                                                                                                                                                                  |                                                                                       | N/A     |
| <b>26</b>      | <b>Fire Detection, Suppression and Propagation</b>                                                                                                                                                                                                                                                                                                                                      |                                                                                       | P       |
| <b>26.1</b>    | <b>General</b>                                                                                                                                                                                                                                                                                                                                                                          |                                                                                       | P       |
| 26.1.1         | Fire detection and fire suppression equipment provided as an integral part of an ESS shall comply with applicable product safety standards and shall be installed in accordance with the applicable safety product standards and the manufacturer's instructions.                                                                                                                       | Fire detection and fire suppression equipment provided as an integral part of an ESS. | P       |
| 26.1.2         | Energy storage systems with integral fire detection or fire suppression systems shall be provided with instructions for installing, commissioning, maintaining and testing these systems in accordance with applicable installation codes and standards. NFPA 1 and ICC IFC provide information on applicable requirements and codes for fire suppression systems. See also Appendix A. |                                                                                       | P       |
| 26.1.3         | If fire suppression optional the ESS meets applicable requirements with or without it.                                                                                                                                                                                                                                                                                                  |                                                                                       | N/A     |
| <b>26.2</b>    | <b>Large Scale Fire Testing</b>                                                                                                                                                                                                                                                                                                                                                         |                                                                                       | P       |
| 26.2.1         | Fire testing to UL 9540A                                                                                                                                                                                                                                                                                                                                                                | Unit level test report provided.                                                      | P       |
| 26.2.2         | ESS for habitable or living space meet UL 9540A cell level test requirements                                                                                                                                                                                                                                                                                                            | Not such ESS.                                                                         | N/A     |
| 26.2.3         | Electrochemical ESS intended for use in dwelling units where UL 9540A testing is indicated per the codes and standards, shall minimally meet the Unit Level Performance Criteria for residential installations identified in UL 9540A with a test that aligns with the manufacturer's installation instructions.                                                                        |                                                                                       | N/A     |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                           |                             |         |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                        | Result - Remark             | Verdict |
| 26.2.4         | Electrochemical ESS intended for non-residential use shall be subjected to specific large scale fire testing in accordance with UL 9540A for installations described in the manufacturer's instructions.                                                                                                                                                                                                  |                             | P       |
| <b>27</b>      | <b>Power Conversion Equipment</b>                                                                                                                                                                                                                                                                                                                                                                         | Only BESS container, no PCS | N/A     |
| <b>27.1</b>    | <b>General</b>                                                                                                                                                                                                                                                                                                                                                                                            |                             | N/A     |
| 27.1.1         | Inverters, chargers, and charging charge control equipment that are part of an energy storage system shall be designed and rated for use with the battery system employed in the energy storage system and evaluated to UL 1741, UL 62109-1 or CAN/CSA C22.2 No. 62109-1, UL 1012, UL 1564, or CAN/CSA C22.2 No. 107.1 as applicable to the power conversion equipment and its application in the system. |                             | N/A     |
| <b>27.2</b>    | <b>Utility Grid Interaction</b>                                                                                                                                                                                                                                                                                                                                                                           |                             | N/A     |
| 27.2.1         | Energy storage systems intended to export energy to the electric power systems (EPS)/electric utility shall be designated as utility-interactive, grid support utility-interactive, or special purpose utility interactive and shall utilize the appropriately evaluated power conditioning systems. See 6.41, 6.44, and 6.45.                                                                            |                             | N/A     |
| 27.2.2         | The inverter shall be designed to properly interconnect with the particular energy storage technology it is connected to as determined by the system safety analysis.                                                                                                                                                                                                                                     |                             | N/A     |
| 27.2.3         | Products that rely upon internal or external utility interconnection protection functions or devices shall be specifically identified for the particular product in the ESS instructions.                                                                                                                                                                                                                 |                             | N/A     |
| <b>27.3</b>    | <b>Utility grid interactive inverter</b>                                                                                                                                                                                                                                                                                                                                                                  |                             | N/A     |
| 27.3.1         | A utility-interactive inverter, grid support, utility interactive inverter shall comply with UL 1741, UL 62109-1 or CAN/CSA C22.2 No. 62109-1, or CSA C22.2 No. 107.1.                                                                                                                                                                                                                                    |                             | N/A     |
| 27.3.2         | The utility-interactive inverters or converters may also include additional grid support and or special purpose utility-interactive features and/or functions that may be enabled in accordance with local utility interconnection protection requirements                                                                                                                                                |                             | N/A     |
| <b>27.4</b>    | <b>Standalone and multi-mode power conditioning systems</b>                                                                                                                                                                                                                                                                                                                                               |                             | N/A     |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                           |                 |         |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                        | Result - Remark | Verdict |
| 27.4.1         | Power conditioning systems for standalone and multi-mode applications shall comply with UL 1741, UL 62109-1 or CAN/CSA C22.2 No. 62109-1, or CSA C22.2 No. 107.1.                                                                                                                                                                                                                         |                 | N/A     |
| <b>28</b>      | <b>Energy Storage System Technologies</b>                                                                                                                                                                                                                                                                                                                                                 |                 | P       |
| <b>28.1</b>    | <b>Electrochemical ESS</b>                                                                                                                                                                                                                                                                                                                                                                |                 | P       |
| 28.1.1         | Systems composed of batteries, electrochemical capacitors, hybrid battery capacitors systems or flow batteries shall comply with the requirements of the Standard for Batteries for Use in Light Electric Rail (LER) Applications and Stationary Applications, UL 1973.                                                                                                                   |                 | P       |
| <b>28.2</b>    | <b>Chemical ESS</b>                                                                                                                                                                                                                                                                                                                                                                       |                 | N/A     |
| 28.2.1         | Fuel Cell Systems shall comply with the Standard for Fuel Cell Technologies – Part 3-100: Stationary Fuel Cell Power Systems – Safety, ANSI/CSA FC 1. Fuel Cell Power Systems and shall be installed in energy storage systems in accordance with NFPA 853, Standard for the Installation of Stationary Fuel Cell Power Systems or other applicable regional or local installation codes. |                 | N/A     |
| 28.2.2         | Stationary engine generators shall comply with the Standard for Stationary Engine Generators Assemblies, UL 2200 or CSA C22.2 No. 100 and CSA C22.2 No. 286.                                                                                                                                                                                                                              |                 | N/A     |
| 28.2.3         | Water electrolysis type hydrogen generators used in an energy storage system to provide hydrogen for storage shall be evaluated and found to be in compliance to an appropriate safety standard for the equipment.                                                                                                                                                                        |                 | N/A     |
| 28.2.4         | Hydrogen fuel containing parts of a chemical energy storage system shall be constructed of materials suitable for gaseous hydrogen service at the pressures and temperatures of use. Pressure vessels used for storage of gaseous hydrogen and piping employed as part of a chemical energy storage system shall comply with Section 20.                                                  |                 | N/A     |
| <b>28.3</b>    | <b>Mechanical ESS</b>                                                                                                                                                                                                                                                                                                                                                                     |                 | N/A     |
| 28.3.1         | Hazards associated with moving parts of Mechanical Energy storage systems                                                                                                                                                                                                                                                                                                                 |                 | N/A     |

| <b>UL 9540</b>     |                                                                                                                                                                                                                                                                                                                                      |                 |         |
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| Clause             | Requirement + Test                                                                                                                                                                                                                                                                                                                   | Result - Remark | Verdict |
| 28.3.2             | Flywheel systems and other systems with moving parts with the capacity to store kinetic energy shall comply with the Containment of Moving Parts tests of Section 37 and the Strength Tests of Section 39. Parts containing hazardous fluids shall comply with the Leakage Tests of Section 38 and the Strength Tests of Section 39. |                 | N/A     |
| 28.3.3             | Flywheel energy storage devices with a maximum surface speed of 200 m/s or less fall within standard electric generator design practice and shall be evaluated in accordance with the Standard for Electric Generators, UL 1004-4 or the Standard for Motors and Generators, CSA 22.2, No. 100.                                      |                 | N/A     |
| <b>28.4</b>        | <b>Thermal ESS</b>                                                                                                                                                                                                                                                                                                                   |                 | N/A     |
| 28.4.1             | A thermal ESS consists of gases, fluids, and/or solids storing heat energy that can be turned into electrical energy when needed through the use of energy conversion equipment (e.g. engines, generators).                                                                                                                          |                 | N/A     |
| 28.4.2             | Thermal energy storage systems shall be evaluated to determine hazards associated with containment of high temperature and high pressure and potentially hazardous fluids are mitigated.                                                                                                                                             |                 | N/A     |
| 28.4.3             | Stationary engine generators that are part of a thermal ESS shall comply with UL 2200 or CSA C22.2 No. 100, and CSA C22.2 No. 286. Generators that are part of a thermal ESS shall comply with UL 1004-4 or CSA C22.2 No. 100.                                                                                                       |                 | N/A     |
| 28.4.4             | Hazardous fluid containing parts of a thermal ESS shall be constructed of materials suitable for use with that fluid at the pressures and temperatures of use.                                                                                                                                                                       |                 | N/A     |
| 28.4.5             | Containment systems for combustible materials (solids or fluids) shall be designed to prevent the potential for explosion hazards as a result of contact with moisture, contaminants, etc.                                                                                                                                           |                 | N/A     |
| 28.4.6             | A thermal ESS shall have sufficient pressure controls, fluid level controls and temperature Controls. Compliance is determined through the safety analysis of the system and the functional safety investigation of the controls per Section 15 and the abnormal operations tests for thermal ESS in accordance with Section 31.     |                 | N/A     |
| <b>PERFORMANCE</b> |                                                                                                                                                                                                                                                                                                                                      |                 |         |

| <b>UL 9540</b>          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                         |            |
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| Clause                  | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Result - Remark         | Verdict    |
| <b>29</b>               | <b>General</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                         | <b>P</b>   |
| 29.1                    | To be tested and determined compliant to an applicable technology safety standard. Where no applicable safety standard exists, they are to be tested in accordance with this standard.                                                                                                                                                                                                                                                                                                                                                                                                          |                         | <b>P</b>   |
| 29.2                    | All tests, unless noted otherwise, are conducted in a room ambient $25 \pm 5^{\circ}\text{C}$ ( $77 \pm 9^{\circ}\text{F}$ ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                         | <b>P</b>   |
| 29.3                    | Temperature shall be measured using thermocouples consisting of wires not larger than $0.21 \text{ mm}^2$ (24 AWG) and not smaller than $0.05 \text{ mm}^2$ (30 AWG)                                                                                                                                                                                                                                                                                                                                                                                                                            |                         | <b>P</b>   |
| 29.4                    | The tests contained in this outline of investigation may result in explosions, fire and emissions of flammable and/or toxic fumes as well as electric shock.                                                                                                                                                                                                                                                                                                                                                                                                                                    |                         | <b>P</b>   |
| <b>ELECTRICAL TESTS</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                         |            |
| <b>30</b>               | <b>Normal Operations Test</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>See table cl. 30</b> | <b>P</b>   |
| 30.1                    | A normal operations test can be waived for those ESS systems where a similar evaluation such as a temperature test has already been conducted under the specific technology standard.                                                                                                                                                                                                                                                                                                                                                                                                           |                         | <b>P</b>   |
| 30.2                    | An ESS is operated through a maximum of 2 cycles of charge and discharge of the system under maximum loading conditions.<br>Exception: Normal operations testing on a subassembly may be conducted instead of the complete ESS if through analysis it can be determined to be representative of the ESS.                                                                                                                                                                                                                                                                                        |                         | <b>P</b>   |
| 30.3                    | During the test, consideration shall be given to maximum and minimum room ambient conditions. During operation, temperatures on critical components that are temperature sensitive shall be monitored and operating parameters of components of the system monitored to determine that they are operating within their ratings. If the ESS is intended for mounting on a wall, it shall be mounted as intended in accordance with installation instructions on a flat wall in an alcove that is painted a dull black, and temperatures shall be monitored on the wall surfaces during the test. |                         | <b>N/A</b> |
| 30.4                    | During the normal operations test, the manufacturer's specified limits shall not be exceeded during the charging and discharging cycles. Temperatures measured on components shall not exceed their specifications                                                                                                                                                                                                                                                                                                                                                                              |                         | <b>P</b>   |
| <b>31</b>               | <b>Abnormal Operation Tests for Thermal Energy Storage Systems</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                         | <b>N/A</b> |



| <b>UL 9540</b> |                                                                                                                                                                                                                                                                             |                 |         |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                          | Result - Remark | Verdict |
| <b>31.1</b>    | <b>General</b>                                                                                                                                                                                                                                                              |                 | N/A     |
| 31.1.1         | Thermal ESS shall remain in a safe state should the thermal controls, fluid controls or pressure controls of the system fail.                                                                                                                                               |                 | N/A     |
| <b>31.2</b>    | <b>Failure of thermal controls</b>                                                                                                                                                                                                                                          |                 | N/A     |
| 31.2.1         | The thermal ESS shall be operated for one charge and one discharge cycle with a single fault in the thermal control system. The test shall be conducted at ambient conditions and the ESS shall be operated at maximum normal operating limits of the system.               |                 | N/A     |
| 31.2.2         | There shall be no evidence of fire, explosion, rupture of parts containing hazardous fluids, or leakage of hazardous fluids until discharge or charging is complete, or until the control device shuts down the system to prevent a hazard.                                 |                 | N/A     |
| <b>31.3</b>    | <b>Exposure to out of specification thermal conditions</b>                                                                                                                                                                                                                  |                 | N/A     |
| 31.3.1         | The thermal ESS shall be subjected to a temperature conditions outside of the operating specifications of the system to determine if the controls will prevent an over temperature condition or other condition that could lead to a hazard                                 |                 | N/A     |
| 31.3.2         | As a result of the tests, there shall be no evidence of fire, explosion, rupture of parts containing hazardous fluids or leakage of hazardous fluids. Thermal controls shall prevent the system from operating outside of safe limits.                                      |                 | N/A     |
| <b>31.4</b>    | <b>Failure of pressure controls</b>                                                                                                                                                                                                                                         |                 | N/A     |
| 31.4.1         | The thermal ESS shall be operated for one charge and one discharge cycle with a single fault in the pressure control system. The test shall be conducted at ambient conditions and the ESS shall be operated at maximum normal operating limits of the system.              |                 | N/A     |
| 31.4.2         | There shall be no evidence of fire, explosion, rupture of parts containing hazardous fluids, or leakage of hazardous fluids until discharge or charging is complete, or until the controls shut down the system to prevent a hazard.                                        |                 | N/A     |
| <b>31.5</b>    | <b>Failure of fluid controls</b>                                                                                                                                                                                                                                            |                 | N/A     |
| 31.5.1         | The thermal ESS shall be operated for one charge and one discharge cycle with a single fault in each separate fluid level control system. The test shall be conducted at ambient conditions and the ESS shall be operated at maximum normal operating limits of the system. |                 | N/A     |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                        |                     |         |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------|
| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                     | Result - Remark     | Verdict |
| 31.5.2         | There shall be no evidence of fire, explosion, rupture of parts containing hazardous fluids, or leakage of hazardous fluids until discharge or charging is complete, or until the controls shut down the system to prevent a hazard.                                                                                                                                   |                     | N/A     |
| <b>32</b>      | <b>Dielectric Voltage Withstand Test</b>                                                                                                                                                                                                                                                                                                                               | See table cl. 32&33 | P       |
| 32.1           | Purpose of Test                                                                                                                                                                                                                                                                                                                                                        |                     | P       |
| 32.2           | Test Potential                                                                                                                                                                                                                                                                                                                                                         |                     | P       |
| 32.3           | Locations of test                                                                                                                                                                                                                                                                                                                                                      |                     | P       |
| 32.4           | Locations of Test (enclosure)                                                                                                                                                                                                                                                                                                                                          |                     | P       |
| 32.5           | Duration of Test                                                                                                                                                                                                                                                                                                                                                       |                     | P       |
| 32.6           | Test Equipment                                                                                                                                                                                                                                                                                                                                                         |                     | P       |
| 32.7           | Result of Test                                                                                                                                                                                                                                                                                                                                                         |                     | P       |
| <b>33</b>      | <b>Impulse Test</b>                                                                                                                                                                                                                                                                                                                                                    | See table cl. 33    | P       |
| 33.1           | The impulse voltage test is intended to evaluate the energy storage system's ability to withstand lightning or similar surges. Systems provided with protection that has already been evaluated for voltage surges (e.g. inverters meeting the Standard for Interconnecting Distributed Resources with Electric Power Systems, IEEE 1547 criteria) need not be tested. |                     | P       |
| 33.2           | Impulse test voltage and waveform                                                                                                                                                                                                                                                                                                                                      |                     | P       |
| 33.3           | Application of the pulses                                                                                                                                                                                                                                                                                                                                              |                     | P       |
| 33.4           | No insulation puncture, flashover, or spark-over                                                                                                                                                                                                                                                                                                                       |                     | P       |
| <b>34</b>      | <b>Equipment Grounding and Bonding Test</b>                                                                                                                                                                                                                                                                                                                            | See table cl. 34    | P       |
| 34.1           | Method of measurement and result                                                                                                                                                                                                                                                                                                                                       |                     | P       |
| 34.2           | Resistance does not exceed 0.1ohm.                                                                                                                                                                                                                                                                                                                                     |                     | P       |
| <b>35</b>      | <b>Insulation Resistance Test</b>                                                                                                                                                                                                                                                                                                                                      | See table cl. 35    | P       |
| 35.1           | To be Greater than 1MΩ                                                                                                                                                                                                                                                                                                                                                 |                     | P       |
| 35.2           | Method of Measurement                                                                                                                                                                                                                                                                                                                                                  |                     | P       |
| 35.3           | Resistors and/or resistor networks may be removed for the test                                                                                                                                                                                                                                                                                                         |                     | P       |
| <b>36</b>      | <b>Electromagnetic Immunity Tests</b>                                                                                                                                                                                                                                                                                                                                  |                     | P       |
| <b>36.1</b>    | <b>General</b>                                                                                                                                                                                                                                                                                                                                                         |                     | P       |
| 36.1.1         | Electronics and software controls determined to be critical for safety shall demonstrate sufficient immunity to electromagnetic interference by complying with the tests specified in these sections.                                                                                                                                                                  |                     | P       |

| UL 9540     |                                                                                                                                                                                                                                                                                                                                                                                               |                 |         |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause      | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                            | Result - Remark | Verdict |
| 36.1.2      | Each test begins with an operation unit                                                                                                                                                                                                                                                                                                                                                       |                 | P       |
| 36.1.3      | Modes of operation                                                                                                                                                                                                                                                                                                                                                                            |                 | P       |
| 36.1.4      | Inspection after test                                                                                                                                                                                                                                                                                                                                                                         |                 | P       |
| 36.1.5      | All samples used comply with section 36.8 after the test.                                                                                                                                                                                                                                                                                                                                     |                 | P       |
| <b>36.2</b> | <b>Electrostatic Discharge</b>                                                                                                                                                                                                                                                                                                                                                                |                 | P       |
| 36.2.1      | Immunity to discharge per IEC 61000-4-2                                                                                                                                                                                                                                                                                                                                                       |                 | P       |
| 36.2.2      | 6kV contact discharge<br>8kV air discharge                                                                                                                                                                                                                                                                                                                                                    |                 | P       |
| 36.2.3      | Complies with 36.1.4 after test                                                                                                                                                                                                                                                                                                                                                               |                 | P       |
| <b>36.3</b> | <b>Radio-frequency electromagnetic field</b>                                                                                                                                                                                                                                                                                                                                                  |                 | P       |
| 36.3.1      | Immunity to IEC 61000-4-3                                                                                                                                                                                                                                                                                                                                                                     |                 | P       |
| 36.3.2      | a) 10 V/m from 80 MHz to 1 GHz, 1 kHz (80% AM); and<br>b) 3 V/m from 1.4 GHz to 6.0 GHz, 1 kHz (80% AM).                                                                                                                                                                                                                                                                                      |                 | P       |
| 36.3.3      | During the test compies with 36.1.3                                                                                                                                                                                                                                                                                                                                                           |                 | P       |
| 36.3.4      | After test complies with 36.1.4                                                                                                                                                                                                                                                                                                                                                               |                 | P       |
| <b>36.4</b> | <b>Fast transient/burst Immunity</b>                                                                                                                                                                                                                                                                                                                                                          |                 | P       |
| 36.4.1      | Comply with IEC 61000-4-4                                                                                                                                                                                                                                                                                                                                                                     |                 | P       |
| 36.4.2      | a) On signal/control ports intended to be connected to cables longer than 3 m (118.1 in), $\pm 1$ kV (5/50 ns, 5 kHz); capacitive clamp shall be used;<br>b) On input and output DC ports, $\pm 1$ kV (5/50 ns, 5 kHz); and<br>c) On input and output AC ports, $\pm 2$ kV (5/50 ns, 5 kHz).                                                                                                  |                 | P       |
| 36.4.3      | Test levels applied to all ports                                                                                                                                                                                                                                                                                                                                                              |                 | P       |
| 36.4.4      | After test complies with 36.1.4                                                                                                                                                                                                                                                                                                                                                               |                 | P       |
| <b>36.5</b> | <b>Surge Immunity</b>                                                                                                                                                                                                                                                                                                                                                                         |                 | P       |
| 36.5.1      | Comply with IEC 61000-4-5                                                                                                                                                                                                                                                                                                                                                                     |                 | P       |
| 36.5.2      | a) For I/O signal/control ports intended to be connected to long-distance cables longer than 30 m(118.1 in), which leave the building, and/or are for outdoor use, $\pm 1$ kV line-to-ground;<br>b) For input and output DC ports, $\pm 0.5$ kV line-to-line, and $\pm 1$ kV line-to-ground; and<br>c) For input and output AC ports, $\pm 1$ kV line-to-line, and $\pm 2$ kV line-to-ground. |                 | P       |
| 36.5.3      | Applied to all ports                                                                                                                                                                                                                                                                                                                                                                          |                 | P       |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                        |                 |         |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                     | Result - Remark | Verdict |
| 36.5.4         | After test complies with 36.1.4                                                                                                                                                                                                                                                                        |                 | P       |
| <b>36.6</b>    | <b>Radio Frequency Common Mode</b>                                                                                                                                                                                                                                                                     |                 | P       |
| 36.6.1         | Comply with IEC 61000-4-6                                                                                                                                                                                                                                                                              |                 | P       |
| 36.6.2         | a) For I/O signal/control ports intended to be connected to cables longer than 3 m (118.1 in), 10 V(150 kHz to 80 MHz, 1 kHz, 80% AM);<br>b) For input and output DC ports, 10 V (150 kHz to 80 MHz, 1 kHz, 80% AM); and<br>c) For input and output AC ports, 10 V (150 kHz to 80 MHz, 1 kHz, 80% AM). |                 | P       |
| 36.6.3         | Applied to all ports                                                                                                                                                                                                                                                                                   |                 | P       |
| 36.6.4         | During test complies with 36.1.3                                                                                                                                                                                                                                                                       |                 | P       |
| 36.6.5         | After test complies with 36.1.4                                                                                                                                                                                                                                                                        |                 | P       |
| <b>36.7</b>    | <b>Power Frequency Magnetic Field</b>                                                                                                                                                                                                                                                                  |                 | P       |
| 36.7.1         | Comply with IEC 61000-4-8                                                                                                                                                                                                                                                                              |                 | P       |
| 36.7.2         | Test level 10A/m                                                                                                                                                                                                                                                                                       |                 | P       |
| 36.7.3         | During test complies with 36.1.3                                                                                                                                                                                                                                                                       |                 | P       |
| 36.7.4         | After test complies with 36.1.4                                                                                                                                                                                                                                                                        |                 | P       |
| <b>36.8</b>    | <b>Operational Verification</b>                                                                                                                                                                                                                                                                        |                 | P       |
| 36.8.1         | After the tests in 36.2 – 36.7 have been completed, all samples used during these tests shall comply with the following.                                                                                                                                                                               |                 | P       |
| 36.8.2         | The manufacturer shall declare the anticipated performance of all safety functions performed by electronics and software controls.                                                                                                                                                                     |                 | P       |
| 36.8.3         | The manufacturer shall provide test procedures to verify that each of the safety functions performed by electronics and software controls is working correctly. This may include, for example, verification of correct safety function performance by simulation.                                      |                 | P       |
| 36.8.2         | During the test procedures specified in 32.8.3, each DUT shall exhibit one of the following behaviors:<br>a) No loss of safety functions; or<br>b) Transition to an appropriate state to ensure safe operation of the DUT.                                                                             |                 | P       |
| <b>36.9</b>    | <b>Operational verification of remote software update capability</b>                                                                                                                                                                                                                                   |                 | N/A     |

| <b>UL 9540</b>          |                                                                                                                                                                                                                                                                                                                                                                               |                 |         |
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| Clause                  | Requirement + Test                                                                                                                                                                                                                                                                                                                                                            | Result - Remark | Verdict |
| 36.9.1                  | The test of 36.8 shall be conducted on safety controls intended for remote software updates in accordance with Section 16 to ensure that they are operational after the update. See 16.1.7 and 16.2.8.                                                                                                                                                                        |                 | N/A     |
| <b>MECHANICAL TESTS</b> |                                                                                                                                                                                                                                                                                                                                                                               |                 |         |
| <b>37</b>               | <b>Containment of Moving Parts</b>                                                                                                                                                                                                                                                                                                                                            |                 | N/A     |
| <b>37.1</b>             | <b>Control system fault overspeed test</b>                                                                                                                                                                                                                                                                                                                                    |                 | N/A     |
| 37.1.1                  | The energy storage system with hazardous moving parts that may be subject to over speed conditions through a fault in the system controls shall be subjected to an over speed test.                                                                                                                                                                                           |                 | N/A     |
| 37.1.2                  | The system controls shall be subjected to single fault in the controls that would allow over speed of the hazardous moving parts. The DUT shall be operated at over speed conditions until a secondary protection control operates to stop operation of the DUT                                                                                                               |                 | N/A     |
| 37.1.3                  | As a result of the over speed condition, the hazardous moving part(s) shall not become loosened or disconnected in a manner that would result in a hazardous condition.                                                                                                                                                                                                       |                 | N/A     |
| 37.1.4                  | The system controls shall limit the overspeed to a level less than the speed defined in 37.4.                                                                                                                                                                                                                                                                                 |                 | N/A     |
| <b>37.2</b>             | <b>Faulted securement test</b>                                                                                                                                                                                                                                                                                                                                                |                 | N/A     |
| 37.2.1                  | The energy storage system with hazardous moving parts shall be subjected to the faulted securement test if faulting of the moving parts securement means may result in a hazard.                                                                                                                                                                                              |                 | N/A     |
| 37.2.2                  | The hazard moving parts of the system shall be subjected to a single fault of their securement while operated at the maximum speed anticipated during normal operation.                                                                                                                                                                                                       |                 | N/A     |
| 37.2.3                  | This test is not required in cases where test or field data is available to support the safety analysis indicating that there is not a hazard associated with the loss of primary securement.                                                                                                                                                                                 |                 | N/A     |
| 37.2.4                  | The system shall be operated until:<br>a) The part has operated for 30 min under the faulted condition and then as gradually slowed down after discontinuation of operation;<br>b) A protection control operates to stop operation of the DUT or hazardous moving part; or<br>c) The part has loosened and is completely or partially disconnected from its securement means. |                 | N/A     |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |         |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                        | Result - Remark | Verdict |
| 37.2.5         | As a result of the operation with a faulted securement condition, the hazardous moving part(s) shall not become loosened or disconnected to result in a hazardous condition.                                                                                                                                                                                                                                                              |                 | N/A     |
| <b>37.3</b>    | <b>Blocked Shaft Test</b>                                                                                                                                                                                                                                                                                                                                                                                                                 |                 | N/A     |
| 37.3.1         | An energy storage system with moving parts with the capacity to store kinetic energy shall be subjected to the blocked shaft qualification test if blocking the shaft or moving parts may result in a hazard.                                                                                                                                                                                                                             |                 | N/A     |
| 37.3.2         | With the moving part blocked to prevent movement, the system shall be operated at maximum ratings allowed for a zero speed condition.                                                                                                                                                                                                                                                                                                     |                 | N/A     |
| 37.3.3         | The system shall be operated:<br>a) With the part blocked for 30 min and then stopped;<br>b) Until a protection control operates to stop operation of the DUT with the blocked part; or<br>c) Until any moving parts break off or become completely or partially disconnected from its securement means.<br>Exception: Moving parts already evaluated for blocked shaft conditions as part of a component evaluation, need not be tested. |                 | N/A     |
| 37.3.4         | Pass criteria                                                                                                                                                                                                                                                                                                                                                                                                                             |                 | N/A     |
| <b>37.4</b>    | <b>Mechanical integrity Test</b>                                                                                                                                                                                                                                                                                                                                                                                                          |                 | N/A     |
| 37.4.1         | An ESS with any moving part having the capacity to store kinetic energy shall have the mechanical (i.e. rotating) energy storage elements designed to have a minimum margin factor of safety. The factor of safety requirements vary depending on the material of construction.                                                                                                                                                           |                 |         |



| UL 9540     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |         |
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| Clause      | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Result - Remark | Verdict |
| 37.4.2      | <p>The mechanical energy storage element shall be subjected to an overspeed type test demonstrating the required factor of safety.</p> <p>a) Where the minimum required factor of safety is 2.0, the overspeed shall be at least 139 %. The</p> <p>OUT shall sustain the overspeed for a time period of 1 min without ruptures in of any part of the assembly.</p> <p>b) Where the minimum required factor of safety is 1.3, the overspeed shall be 120 % minimum. The</p> <p>DUT shall sustain the overspeed for a time period of 1 min.</p> |                 | N/A     |
| 37.4.3      | Hollow cylindrical mechanical storage systems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 | N/A     |
| 37.4.4      | Condition of DUT before the test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 | N/A     |
| 37.4.5      | Alternative to 37.4.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 | N/A     |
| 37.4.6      | With reference to 37.4.1-37.4.5, in the event of a deviation of any mechanical characteristic or material property that results in an increase of more than 10% between calculated stress in production mechanical energy storage elements and demonstrated stress in the previously qualified mechanical energy storage elements, the mechanical failure qualification test shall be repeated.                                                                                                                                               |                 | N/A     |
| <b>37.5</b> | <b>Bearing Failure Test</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 | N/A     |
| 37.5.1      | An ESS with moving parts with the capacity to store kinetic energy that relies upon bearings in their moving mechanism shall be subjected to the bearing failure test if failing bearings may have the potential to result in a hazard.                                                                                                                                                                                                                                                                                                       |                 | N/A     |
| 37.5.2      | With the system operating at maximum operating conditions, a failure in the primary bearings shall be induced that results in the loss of the primary bearing function and forces the DUT to spin down on its backup bearing or other suitable support system.                                                                                                                                                                                                                                                                                |                 | N/A     |
| 37.5.3      | <p>The system shall be operated:</p> <p>a) Until the DUT's energy is dissipated and it has come to a stop;</p> <p>b) Until a protection control operates to stop operation of the DUT; or</p> <p>c) Until any moving parts break off or become completely or partially disconnected from its securement means.</p>                                                                                                                                                                                                                            |                 | N/A     |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                |                 |         |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                             | Result - Remark | Verdict |
| 37.5.4         | This test is intended to verify that the backup bearing or support system for the energy storage element is effective. This test may also suffice as the faulted securement test described in 37.2 if the safety analysis indicates a bearing failure as the worst case condition.                                                                                                             |                 | N/A     |
| 37.5.5         | As a result of operating the system with a failed bearing condition, the moving parts shall not become loosened or disconnected to result in a hazardous condition. If the part becomes completely loosed or disconnected, the containment means for the part shall safely contain the part(s). There shall be no overheating of parts that will result in a hazard such as fire or explosion. |                 | N/A     |
| <b>38</b>      | <b>Leakage Tests</b>                                                                                                                                                                                                                                                                                                                                                                           |                 | P       |
| 38.1           | Energy storage systems that contain hazardous fluids shall be subjected to the Leakage Test in accordance with 38.2 and 38.3.                                                                                                                                                                                                                                                                  |                 | P       |
| 38.2           | Leakage from energy storage systems containing hazardous fluids shall not result in the risk of fire, electric shock, or injury to persons.                                                                                                                                                                                                                                                    |                 | P       |
| 38.3           | Compliance is determined by subjecting the fluid-containing parts and their connections to a fluid pressure of 1.5 times the maximum pressure (if testing with liquid) or 1.1 times the maximum pressure (if air pneumatic testing) of intended use during operation of the system. There shall be no leaks from fluid-containing parts or their connections as a result.                      |                 | P       |
| <b>39</b>      | <b>Strength Tests</b>                                                                                                                                                                                                                                                                                                                                                                          |                 | P       |
| <b>39.1</b>    | <b>General</b>                                                                                                                                                                                                                                                                                                                                                                                 |                 | P       |
| 39.1.1         | Energy storage systems that contain hazardous fluids shall comply with the Strength Tests in accordance with 39.2 and 39.3.                                                                                                                                                                                                                                                                    |                 | P       |
| <b>39.2</b>    | <b>Hydrostatic Strength Test</b>                                                                                                                                                                                                                                                                                                                                                               |                 | P       |
| 39.2.1         | Parts of the energy storage system containing hazardous fluids (gases or liquids) shall be subjected to a hydrostatic strength test of 1.5 times the design pressure of the system for a period of 1 min after reaching the maximum pressure.                                                                                                                                                  |                 | P       |

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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                          | Result - Remark | Verdict |
| 39.2.2         | As a result of the hydrostatic strength test, there shall be no fracture, distortion, rupture or other damage to the fluid containing parts.                                                                                                                                                |                 | P       |
| <b>39.3</b>    | <b>Pneumatic Strength Test</b>                                                                                                                                                                                                                                                              |                 | N/A     |
| 39.3.1         | The pneumatic strength test is an alternative to the hydrostatic strength test of 39.2 and is conducted in accordance with 39.3.2                                                                                                                                                           |                 | N/A     |
| 39.3.2         | Parts of the energy storage system containing hazardous fluids (gases or liquids) shall be subjected to a pneumatic strength test of 1.3 times the design pressure of the system for a period of 1 min after reaching the maximum pressure                                                  |                 | N/A     |
| 39.3.3         | As a result of the pneumatic strength test, there shall be no fracture, distortion, rupture or other damage to the fluid containing parts                                                                                                                                                   |                 | N/A     |
| <b>40</b>      | <b>Enclosure and Mounting Tests</b>                                                                                                                                                                                                                                                         |                 | N/A     |
| <b>40.1</b>    | <b>Wall Mount Fixture/Test</b>                                                                                                                                                                                                                                                              |                 | N/A     |
| 40.1.1         | Sufficient Strength to support the system                                                                                                                                                                                                                                                   |                 | N/A     |
| 40.1.2         | The wall mounting apparatus and ESS shall be installed in accordance with the manufacturer's specifications. A force equal to three times the weight of the ESS is additionally applied to the center of the mounting apparatus in a downward direction. The force shall be held for 1 min. |                 | N/A     |
| 40.1.3         | As a result of the applied force, there shall be no damage to the mounting apparatus and its securement means when testing the wall mounting fixture.                                                                                                                                       |                 | N/A     |
| <b>40.2</b>    | <b>Enclosure impact</b>                                                                                                                                                                                                                                                                     |                 | N/A     |
| 40.2.1         | This test is conducted on electrochemical ESS that are for residential applications or for non-residential applications that are less than or equal to 50 kWh.                                                                                                                              |                 | N/A     |
| 40.2.2         | A fully charged DUT shall be subjected to a minimum of three impacts of 6.8 J (5 ft-lb) on any surface that can be exposed to a blow during intended use. A different sample may be used for each impact.                                                                                   |                 | N/A     |
| 40.2.3         | After the impacts, the DUT shall be subjected to a test in accordance with Section 32. The DUT shall be examined for signs of rupture or damage that could lead to a hazard.                                                                                                                |                 | N/A     |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |         |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                    | Result - Remark | Verdict |
| 40.2.4         | There shall be no damage to the enclosure that could result in a hazard such as exposure of hazardous parts or result in a dielectric breakdown after testing.                                                                                                                                                                                                                                                        |                 | N/A     |
| <b>40.3</b>    | <b>Enclosure steady force</b>                                                                                                                                                                                                                                                                                                                                                                                         |                 | N/A     |
| 40.3.1         | The purpose of this test is to determine if the enclosure has sufficient strength to safely withstand a static force that may be applied to it. This test is conducted on electrochemical ESS that are for residential applications or for non-residential applications that are less than or equal to 50 kWh.                                                                                                        |                 | N/A     |
| 40.3.2         | The enclosure of a fully charged DUT shall withstand a steady force of $250 \pm 10$ N (56.2 lbf $\pm 2.25$ lbf) for a period of 5 s, applied in turn to the top, bottom and sides of the enclosure fitted to the DUT, by means of a suitable test tool providing contact over a circular plane surface 30 mm (1.2 in) in diameter.                                                                                    |                 | N/A     |
| 40.3.3         | The DUT shall be subjected to a test between live parts and the enclosure in accordance with Section 32. The DUT shall be examined for signs of rupture or damage that could lead to a hazard.                                                                                                                                                                                                                        |                 | N/A     |
| 40.3.4         | As a result of the steady force test, there shall be no damage to the enclosure that could result in a hazard such as exposure of hazardous parts or result in a dielectric breakdown.                                                                                                                                                                                                                                |                 | N/A     |
| <b>40.4</b>    | <b>Mold stress</b>                                                                                                                                                                                                                                                                                                                                                                                                    |                 | N/A     |
| 40.4.1         | The purpose of this test is to determine if an enclosure made from molded polymeric material can withstand an accelerated aging test without compromising the safety of the enclosure.                                                                                                                                                                                                                                |                 | N/A     |
| 40.4.2         | One complete fully discharged sample shall be placed in a full-draft circulating-air oven maintained at a uniform temperature of at least $10^{\circ}\text{C}$ ( $18^{\circ}\text{F}$ ) higher than the maximum temperature of the enclosure measured during the Normal Operations Test in Section 30, but not less than $70^{\circ}\text{C}$ ( $158^{\circ}\text{F}$ ). The sample shall remain in the oven for 7 h. |                 | N/A     |
| 40.4.3         | After removal from the oven the DUT shall be subjected to a test in accordance with Section 32. The DUT shall be examined for signs of rupture and damage                                                                                                                                                                                                                                                             |                 | N/A     |

| <b>UL 9540</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |         |
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| Clause                     | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Result - Remark | Verdict |
| 40.4.4                     | As a result of the mold stress conditioning, the sample shall show no evidence of mechanical damage, such as cracking of the enclosure exposing hazardous parts or result in a dielectric breakdown.                                                                                                                                                                                                                                                                                                                                                                                                             |                 | N/A     |
| <b>ENVIRONMENTAL TESTS</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |         |
| <b>41</b>                  | <b>Special Environmental Installations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 | P       |
| <b>41.1</b>                | <b>General</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 | P       |
| 41.1.1                     | <p>Intended for installation in special environments shall be evaluated for their ability to operate safety in those environments.</p> <p>Exception No. 1: Testing need not be conducted on systems or parts of the system if already covered as part of the specific technology safety standard.</p> <p>Exception No 2: Environmental testing on a subassembly may be conducted instead of the complete ESS if through analysis it can be determined to be representative of the ESS. The rationale used to determine the suitability of the subassembly to represent the complete ESS shall be documented.</p> |                 | P       |
| <b>41.2</b>                | <b>Outdoor Installations subject to moisture exposure</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 | P       |
| 41.2.1                     | <p>Energy storage systems intended for installation outdoors where they will be subject to rated levels of moisture exposure shall be tested in accordance with their environmental ratings outlined in their nameplate labels and installation instructions of 45.17 and 46.13.</p>                                                                                                                                                                                                                                                                                                                             |                 | P       |
| 41.2.2                     | <p>Based upon the ratings of the system, moisture resistance testing shall be done in accordance with either the Standard for Degrees of Protection Provided by Enclosures (IP Code), IEC 60529,</p> <p>Enclosures for Electrical Equipment, Environmental Considerations, UL 50E, or the Standard for Enclosures for Electrical Equipment, Environmental Considerations, C22.2 No. 94.2.</p>                                                                                                                                                                                                                    | IP 55 enclosure | P       |
| 41.2.3                     | At the conclusion of the test, the sample is to be subjected to the electric insulation tests of Sections 32 and 35 and examined for signs of water in the system that could result in a hazardous condition.                                                                                                                                                                                                                                                                                                                                                                                                    |                 | P       |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                               |                 |         |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                            | Result - Remark | Verdict |
| 41.2.4         | As a result of the water exposure, there shall be no evidence of water on parts that could result in a hazard and no reduction of spacings or breakdown/deterioration in insulation levels.                                                                                                                                                   |                 | P       |
| <b>41.3</b>    | <b>Outdoor installation in marine environments</b>                                                                                                                                                                                                                                                                                            |                 | P       |
| 41.3.1         | Energy Storage Systems intended for installation outdoors in marine environments in accordance with the installation instructions in 46.13 where they will be subject to salt fog exposure, shall be tested as outlined below.                                                                                                                |                 | P       |
| 41.3.2         | Tested to IEC 60068-2-52 Severities 1 or 2                                                                                                                                                                                                                                                                                                    | Severities 2    | P       |
| 41.3.3         | At the conclusion of the testing, the systems shall be subjected to the electrical insulation tests of Sections 32 and 35 to determine that insulation has not been damaged in a manner that would result in an electric shock hazard.                                                                                                        |                 | P       |
| 41.3.4         | The system shall be examined for signs of damage as a result of salt exposure that would indicate a potential for a safety hazard (e.g. corrosion of parts that could result in weakening of a securement or an enclosure, damage to insulation). If operational, the system is to be operated to determine that it can do so without hazard. |                 | P       |
| 41.3.5         | As a result of the test, the energy storage system shall not show evidence of damage from salt fog exposure that could result in a hazard such as electrical, shock, overheating or damage that could result in a physical hazard.                                                                                                            |                 | P       |
| <b>41.4</b>    | <b>Installation in seismic environments</b>                                                                                                                                                                                                                                                                                                   | Not evaluated   | N/A     |



| <b>UL 9540</b>                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |         |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause                                    | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Result - Remark | Verdict |
| 41.4.1                                    | <p>Energy storage systems intended for installation where they will be subject to seismic activity shall be evaluated and if necessary tested in accordance with their seismic ratings and installations instructions per 45.3 and 46.13. Compliance is determined through review of documentation of the seismic evaluation for the appropriate seismic level (i.e. level marked on the equipment) or through testing for the specific seismic level in accordance with a testing standard for this purpose.</p> <p>Exception No. 1: There is equipment that cannot be practically evaluated by testing alone because of the size of the equipment. For those situations, it may be necessary to do a combination of analysis with testing of parts of the system. This approach is outlined in IEEE 344.</p> <p>Exception No. 2: Some standards allow for calculations and modelling as an approach for determining compliance for seismic ratings in lieu of testing.</p> |                 | N/A     |
| 41.4.2                                    | The energy storage system shall be examined for signs of explosion, fire, combustible concentrations (if applicable to technology), rupture of the enclosure, electrolyte leakage, electric shock and loss of protection controls that may lead to any of the other non-compliant results in 41.4.3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 | N/A     |
| 41.4.3                                    | Compliance conditions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 | N/A     |
| <b>MANUFACTURING AND PRODUCTION TESTS</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |         |
| <b>42</b>                                 | <b>Electrical Production Tests</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 | P       |
| <b>42.1</b>                               | <b>Dielectric Voltage Withstand Test</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 | P       |
| 42.1.1                                    | Value for production test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 | P       |
| <b>42.2</b>                               | <b>Grounding and Bonding system Check</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 | P       |
| 42.2.1                                    | Impedance to be of grounding and bonding system to be checked                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | P       |
| 42.2.2                                    | Resistance <0.1 $\Omega$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 | P       |
| <b>42.3</b>                               | <b>Check of Safety Controls</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 | P       |
| 42.3.1                                    | Energy storage systems shall be subjected to 100% production screening to determine that any active controls utilized for safety are functioning.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 | P       |
| <b>43</b>                                 | <b>Mechanical Production Tests</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 | N/A     |

| <b>UL 9540</b>  |                                                                                                                                                                                                                                                                                                    |                 |         |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause          | Requirement + Test                                                                                                                                                                                                                                                                                 | Result - Remark | Verdict |
| <b>43.1</b>     | <b>Integrity at Maximum Abnormal Operating Speed</b>                                                                                                                                                                                                                                               |                 | N/A     |
| 43.1.1          | Every production mechanical storage element shall be subjected to a maximum abnormal operating speed test.                                                                                                                                                                                         |                 | N/A     |
| 43.1.2          | As an alternative to 43.1.1                                                                                                                                                                                                                                                                        |                 | N/A     |
| <b>43.2</b>     | <b>Production Screening of Rotors</b>                                                                                                                                                                                                                                                              |                 | N/A     |
| 43.2.1          | Rotor assemblies for mechanical ESS shall be subject to 100% production screening through the use of ultrasonic testing or other means to check for cracks and other flaws in the rotor in order to determine that the rotor is manufactured in accordance with the manufacturer's specifications. |                 | N/A     |
| 43.2.2          | As an alternative to 43.2.1                                                                                                                                                                                                                                                                        |                 | N/A     |
| <b>43.3</b>     | <b>Leak check of hazardous fluid systems</b>                                                                                                                                                                                                                                                       |                 | N/A     |
| 43.3.1          | ESS that contain hazardous fluids including ESS with liquid coolant systems shall be subjected to a leak check in accordance with Section 38 of the assembled fluid containment system.                                                                                                            |                 | N/A     |
| <b>44</b>       | <b>Production Quality Control</b>                                                                                                                                                                                                                                                                  |                 | P       |
| 44.1            | Manufacturers of ESS shall have documented production process controls in place                                                                                                                                                                                                                    |                 | P       |
| <b>MARKINGS</b> |                                                                                                                                                                                                                                                                                                    |                 |         |
| <b>45</b>       | <b>General</b>                                                                                                                                                                                                                                                                                     |                 | P       |
| 45.1            | Markings shall be legible and permanent                                                                                                                                                                                                                                                            |                 | P       |
| 45.2            | Markings and signage shall be in lettering that is sized so that it is legible from the distance from which it must be read and shall have lettering in a color that contrasts with the background.                                                                                                |                 | P       |
| 45.3            | An ESS shall be provided with a nameplate marking (main label) that includes parameters, product definitions, and manufacturer information, etc.                                                                                                                                                   |                 | P       |
| 45.4            | If the system is intended to be operated in a duty cycle, the intended duty cycle shall be included on the nameplate.                                                                                                                                                                              |                 | N/A     |
| 45.5            | The suppression system to be installed, if applicable, shall be marked on the system.                                                                                                                                                                                                              |                 | N/A     |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |         |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Result - Remark    | Verdict |
| 45.6           | The operating ambient conditions in °C or °F, the weight of the system in kilograms or pounds, and the overall dimensions of the system can either be marked on the system or provided in the installation instructions.                                                                                                                                                                                                                                                                                                                                                                                                                   |                    | P       |
| 45.7           | For multi-part ESS, a nameplate marking (main label) noted in 45.3 shall be provided on at least one of the parts and shall identify that the system has been evaluated as a multi-part ESS.                                                                                                                                                                                                                                                                                                                                                                                                                                               | Not multi-part ESS | N/A     |
| 45.8           | Each separate part of the multi-part ESS shall have a nameplate marking as required by the equipment safety standard to which it was evaluated.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    | N/A     |
| 45.9           | Where not included in the end-product standard or label, the following information shall be included in the ESS installation instructions as applicable to the ESS:<br>a) Single-line electrical diagram<br>b) Input short circuit current rating (SCCR) in A/kA that each component can withstand from other parts of the ESS if the connection point is a power input or bi-direction power connection; and<br>c) Available fault current (as defined in Article 100 of NFPA 70) and time duration that the ESS part can provide to other parts of the ESS if the connection point is a power output or bi-directional power connection. |                    | N/A     |
| 45.10          | Contact information for the system in the event of an emergency or problems with the system                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    | P       |
| 45.11          | Date of manufacture is permitted to be in the form of a code that does not repeat within 20 years. All external terminals and connections shall be provided with identification.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    | P       |
| 45.12          | The point of connection to the charger earth grounding system shall be identified by the word "Ground" or the letters "G" or "GR" or the grounding symbol.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    | P       |

| <b>UL 9540</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 |         |
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| Clause              | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Result - Remark | Verdict |
| 45.13               | System that contains hazardous voltage circuits shall be marked "Warning: Hazardous Voltage Circuits" or be marked with the electric shock hazard symbol. Electrical equipment parts of the ESS such as control panels and the enclosures of disconnecting devices shall also be marked with arc flash markings according to NFPA 70E or CSA Z462 and arc flash personal protective equipment (PPE) requirements, to warn service personnel of potential for arc flash hazards, and necessary protection to be worn if applicable. |                 | P       |
| 45.14               | ESS other than electrochemical ESS that contain hazardous materials such as flammable solids or fluids or toxic or other hazardous materials shall be marked in accordance with NFPA 704.                                                                                                                                                                                                                                                                                                                                          |                 | N/A     |
| 45.15               | Shall be marked as follows: "WARNING – To Reduce the Risk of Injury, read all instructions" or marked with the symbols W001 (i.e. exclamation point in triangle) and M002 of ISO 7010.                                                                                                                                                                                                                                                                                                                                             |                 | P       |
| 45.16               | Walk in system marked                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 | N/A     |
| 45.17               | An energy storage system shall be marked with the environmental rating of its enclosure                                                                                                                                                                                                                                                                                                                                                                                                                                            | IP 55 enclosure | P       |
| 45.18               | The control devices and indicators required for operation or maintenance are to be marked with their function on or adjacent to the control.                                                                                                                                                                                                                                                                                                                                                                                       |                 | P       |
| 45.19               | Egress door marked with "Exit". Any doorway or passage that might be mistaken for an exit shall be marked "Not an Exit" or with an indication of its actual use.                                                                                                                                                                                                                                                                                                                                                                   | No such door    | N/A     |
| 45.20               | A non-residential use electrochemical ESS that complies with 1.6(b) shall be marked, "ESS with capacities exceeding 50 kWh shall include the additional fire suppression and/or fire protection identified in the installation instructions.                                                                                                                                                                                                                                                                                       |                 | N/A     |
| 45.21               | A non-residential use electrochemical ESS intended for use in remote outdoor locations per 1.6(d) shall be marked "For use only in remote outdoor locations as permitted in applicable installation codes and standards.                                                                                                                                                                                                                                                                                                           |                 | N/A     |
| 45.22               | Disconnect Controls marked                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 | P       |
| <b>INSTRUCTIONS</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 |         |
| <b>46</b>           | <b>General</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 | P       |
| 46.1                | The ESS shall be provided with complete instructions for installation, commissioning, operation and maintenance                                                                                                                                                                                                                                                                                                                                                                                                                    |                 | P       |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                  |                                          |         |
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| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                               | Result - Remark                          | Verdict |
| 46.2           | The installation instructions shall identify the maximum rated energy capacity for the system and minimum separation distances from other ESS and from exposures (e. g. combustibles, structures) in accordance with the limitations to the system based on applicable codes or in accordance with the large scale fire testing of 26.2.                         |                                          | P       |
| 46.3           | Instructions for wall mounted ESSs. Outdoor rated ESS marked "Suitable for Use in Residential Non-Habitable Spaces" are suitable for installation on exterior walls of residential dwelling units as indicated in the manufacturer's instructions.                                                                                                               |                                          | N/A     |
| 46.4           | Non residential systems identify 9540A test report                                                                                                                                                                                                                                                                                                               |                                          | N/A     |
| 46.5           | Non-residential use ESS requiring large scale fire testing per 26.2, the additional fire suppression and/or fire protection identified in the UL 9540A test report shall be included in the installation instructions.                                                                                                                                           | Unit level tested according to UL 9540A. | P       |
| 46.6           | Installation instructions for indoor residential electrochemical ESS shall indicate that the units are only intended to be installed in attached or detached garages, sheds, enclosed utility closets, basements, storage or utility spaces within dwelling units and are not intended for installation in habitable spaces and living spaces in dwelling units. |                                          | N/A     |
| 46.7           | Installation instructions for indoor electrochemical ESS marked "Suitable for Use in Residential Habitable Spaces" shall be permitted to indicate the units are suitable for use in residential dwelling units, including in the living or habitable spaces, provided that they meet the criteria as noted in 26.2.2.                                            |                                          | N/A     |
| 46.8           | Instructions in accordance with NFPA79 or CSA C22.1 No. 201 and in accordance with 46.2 to 46.10                                                                                                                                                                                                                                                                 |                                          | P       |
| 46.9           | Cautionary markings and ratings in the instructions                                                                                                                                                                                                                                                                                                              |                                          | P       |
| 46.10          | The installation information shall include instructions for making all necessary connections for electrical, communications, piping for fuels and other fluids, etc. as well as connections to other equipment that are part of the system.                                                                                                                      |                                          | P       |
| 46.11          | Instructions specify installation to be in accordance with local codes                                                                                                                                                                                                                                                                                           |                                          | P       |

| <b>UL 9540</b>                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |            |
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| Clause                                                            | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Result - Remark | Verdict    |
| 46.12                                                             | With reference to 46.9, the installation instructions for ESS, such as flow batteries, lead acid batteries, etc., containing free electrolyte (greater than 208 L (55 gal) in a single vessel or an aggregate of 3785 L (1000 gal)) shall be provided with instructions for location of eye wash stations. In addition, if necessary in accordance with building codes, installation instructions shall provide information on spill control to be installed with the system per 23.1 and 23.3. |                 | N/A        |
| 46.13                                                             | Instructions for installation in certain environments                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 | P          |
| 46.14                                                             | The installation instructions for a DC ESS shall include specifications for the equipment performing electric power conditioning or conversion function that is intended to be connected for supplying the DC ESS, including if it is part of the DC load that the DC ESS is supplying.                                                                                                                                                                                                         |                 | P          |
| 46.15                                                             | Smoke alarm instructions for indoor use                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 | N/A        |
| 46.16                                                             | Instructions for special handling                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | P          |
| 46.17                                                             | Instructions for proper use                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 | P          |
| 46.18                                                             | Maintenance instructions                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 | P          |
| 46.19                                                             | Instructions for field replacement of replaceable materials                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 | P          |
| 46.20                                                             | Schedule of routine maintenance mechanical systems                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 | P          |
| 46.21                                                             | The installation instructions shall contain all ESS operation mode/settings, operation function/settings and protection/settings, which the inverters can provide.                                                                                                                                                                                                                                                                                                                              |                 | P          |
| <b>ANNEX A(Normative)</b>                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |            |
| <b>A1</b>                                                         | <b>Standards for Components</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 | <b>N/A</b> |
| <b>ANNEX B(Informative)–General Battery Safety Considerations</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |            |
| <b>B1</b>                                                         | <b>General</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 | <b>P</b>   |
| B1.1                                                              | The battery specific safety requirements for this standard can be found in the Standard for Batteries for Use in Light Electric Rail (LER) Applications and Stationary Applications, UL 1973.                                                                                                                                                                                                                                                                                                   |                 | P          |
| <b>B2</b>                                                         | <b>Design Recommendations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 | <b>P</b>   |



| UL 9540 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                |         |
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| Clause  | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Result - Remark                | Verdict |
| B2.1    | Battery systems should have two-fault tolerance for all catastrophic failures including overcharge, overdischarge, short circuit and extreme temperatures.                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                | P       |
| B2.2    | The chargers used for charging the energy storage battery systems should be designed for the chemistry of the battery to be charged. The charging algorithm should be verified to ensure that the charging procedure is suitable for the battery chemistry and battery design.                                                                                                                                                                                                                                                                                                                    |                                | P       |
| B2.3    | Protection circuits should be verified by test in the relevant battery design configuration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                | P       |
| B2.4    | Cell level protection should not be relied upon for battery pack protection unless it can be verified through analysis and testing of the battery that the cell protection provides sufficient protection at the battery pack level.                                                                                                                                                                                                                                                                                                                                                              |                                | P       |
| B2.5    | For lithium ion batteries and any other chemistry as determined by the battery system safety analysis, voltage should be monitored for every series element, temperatures should be monitored throughout the battery pack, and battery level current monitoring should be carried out continuously with alarm and control circuits able to react. Thermal runaway protection should be provided. Such protection should be verified through testing that it provides sufficient protection of the battery pack. Any off-nominal values should be recorded by the battery management system (BMS). |                                | P       |
| B2.6    | For aqueous battery chemistries such as lead acid or nickel cadmium, battery or module level voltage, temperature and current monitoring should be carried out continuously with alarm and control circuits able to react. If possible, any off-nominal values should be recorded by the control system.                                                                                                                                                                                                                                                                                          | No aqueous battery chemistries | N/A     |
| B2.7    | Consideration should be given for conducting high fidelity thermal analysis when developing battery designs to determine the appropriate locations of the thermal sensors used in the battery.                                                                                                                                                                                                                                                                                                                                                                                                    |                                | P       |
| B2.8    | All temperature sensor readings should be continuously recorded and controls set in place to trigger a stoppage of charging or discharging of the battery when the temperature readings go above the manufacturer's rating of that particular cell or battery design.                                                                                                                                                                                                                                                                                                                             |                                | P       |

| UL 9540 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |         |
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| Clause  | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Result - Remark | Verdict |
| B2.9    | If the battery is used only periodically, the battery should be designed to prevent cells from going into an overdischarge mode due to the long term storage conditions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 | P       |
| B2.10   | For lithium battery designs and other technologies as determined through safety analysis, cells should be spaced or insulated from other cells appropriately or through other mechanisms to prevent cell to cell thermal runaway propagation in the event that any one cell experiences a thermal runaway event.                                                                                                                                                                                                                                                                                                                                                                          |                 | P       |
| B2.11   | If temperature control is required for the battery system, the failure of the temperature controls, such as failure of heaters, cooling systems, or their controls, should not impose a safety hazard.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 | P       |
| B2.12   | For systems requiring heaters for operation, heater designs should not result in temperatures that exceed specified safe operating temperatures of the batteries.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 | P       |
| B12.13  | For systems requiring active cooling systems, a failure of the cooling system due to breach or breakage in the cooling lines should not result in a leakage that will cause short circuiting of the cells inside the battery pack leading to a hazardous condition. Coolant leakage lines should be routed or secured to mitigate the potential for leakage on live parts and if necessary fluid monitor and controls of the coolant system may need to be provided.                                                                                                                                                                                                                      |                 | P       |
| B12.14  | For lithium batteries and other technologies as determined by the battery safety analysis, to prevent any unforeseen hazards due to a complex design and usage environment, the thermal runaway propagation test should be performed on a subset of the battery system design. This test should be carried out to understand the worst case failure that can occur in the battery design due to single cell undergoing thermal runaway and to understand how this catastrophic event propagates to the other cells in the battery system. This test can be carried out by using a heater or other method to induce thermal runaway in a single cell and then observing surrounding cells. |                 | P       |
| B12.15  | All parameters such as cell voltages, battery voltage, battery current (sub-module currents, if applicable) and temperatures should be verified to be within the specification for the cells and battery system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 | P       |

| <b>UL 9540</b> |                    |                 |         |
|----------------|--------------------|-----------------|---------|
| Clause         | Requirement + Test | Result - Remark | Verdict |

|                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |            |
|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------|
| <b>ANNEX C(Normative for Canada and Informative for the US)–Safety Marking Translations</b>                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                | <b>P</b>   |
| <b>ANNEX D(Normative)–Approach For Evaluating Valve Regulated Of Vented Lead Acid Or Nickel Cadmium Battery Energy Storage Systems</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                | <b>N/A</b> |
| <b>D1</b>                                                                                                                              | <b>General</b>                                                                                                                                                                                                                                                                                                                                                                                                                                         | Li-ion battery | N/A        |
| D1.1                                                                                                                                   | Scope of appendix                                                                                                                                                                                                                                                                                                                                                                                                                                      |                | N/A        |
| D1.2-D1.3                                                                                                                              | Safety concerns of lead acid or nickel cadmium                                                                                                                                                                                                                                                                                                                                                                                                         |                | N/A        |
| <b>D2</b>                                                                                                                              | <b>Construction</b>                                                                                                                                                                                                                                                                                                                                                                                                                                    |                | N/A        |
| D2.1                                                                                                                                   | The batteries and components of the battery systems shall be installed in accordance with NFPA 70 or CSA C22.1.                                                                                                                                                                                                                                                                                                                                        |                | N/A        |
| D2.2                                                                                                                                   | Valve regulated or vented lead acid or nickel cadmium cells and monobloc batteries shall comply with the requirements of the Annex for Alternative Approach for Evaluating Valve Regulated or Vented Lead Acid or Nickel Cadmium Batteries in UL 1973 for these types of batteries.                                                                                                                                                                    |                | N/A        |
| D2.3                                                                                                                                   | Cells and monobloc batteries shall be installed in an ESS in accordance with the battery Manufacturer's instructions for spacings between batteries and other required spacings, cell/battery installation orientation, wiring and connection requirements, environmental and other protections to be provided in the installation.                                                                                                                    |                | N/A        |
| D2.4                                                                                                                                   | Support structures for vented and valve regulated lead acid and nickel cadmium batteries shall be suitable for handling the maximum anticipated weight of the installed cells and batteries. The rack system shall comply with the criteria outlined in the Annex for Alternative Approach for Evaluating Valve Regulated or Vented Lead Acid or Nickel Cadmium Batteries of UL 1973.                                                                  |                | N/A        |
| D2.5                                                                                                                                   | ESS shall comply with the applicable criteria outlined in this Standard with regard to materials, enclosures, electrical safety, insulation levels and protective earthing, combustible concentrations, fire detection and suppression, and power conversion equipment as applicable to the ESS. Short circuit protection used in the system to protect the batteries and limit their short circuit current output shall be rated for dc applications. |                | N/A        |

| <b>UL 9540</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 |         |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Result - Remark | Verdict |
| D2.6           | The charging system for these batteries shall prevent charging outside of the battery specifications through the use of current and temperature monitoring and control on the batteries. The system may also use voltage monitoring and controls to prevent out of condition specifications. Charging systems for these batteries shall comply with the requirements for power conversion equipment in Section 27 and shall also comply with the battery manufacturer's specifications for chargers.                                                                                 |                 | N/A     |
| D2.7           | Ventilation provided for the ESS shall maintain hydrogen concentration within the ESS to less than 25 % LFL. If relying upon mechanical ventilation to maintain the safe concentrations within an ESS enclosure, it shall be monitored and alarmed at a constantly attended location, should the mechanical ventilation fail. Hot parts such as electronics and switching devices that can ignite combustible concentrations shall not be located in locations in the exhaust gas stream where the hydrogen can be ignited or near vents or valves of the batteries. See Section 24. |                 | N/A     |
| D2.8           | The battery system exceeding 240 Vdc shall be provided with disconnects in accordance with Article 706 of NFPA 70 or Section 64 of CSA C22.1, for servicing of the battery system.                                                                                                                                                                                                                                                                                                                                                                                                   |                 | N/A     |
| D2.9           | Installation of ESS systems of lead acid or nickel cadmium batteries, shall be installed with ventilation in accordance to applicable fire and building code requirements and the battery manufacturer's installation instructions.                                                                                                                                                                                                                                                                                                                                                  |                 | N/A     |
| D2.10          | ESS systems with vented lead acid or nickel cadmium batteries shall be provided with spill control in accordance with the building, fire and installation codes and manufacturer's instructions. See 23.1.                                                                                                                                                                                                                                                                                                                                                                           |                 | N/A     |
| D2.11          | ESS systems with lead acid or nickel cadmium cells or batteries shall be marked in accordance to Section 45 as applicable to the system.                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 | N/A     |
| D2.12          | Installation instructions for an ESS with lead acid or nickel cadmium batteries                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 | N/A     |
| D2.13          | Maintenance and operating instructions for ESS employing lead acid or nickel cadmium cells and batteries                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 | N/A     |
| <b>D3</b>      | <b>Performance</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 | N/A     |
| <b>D3.1</b>    | <b>General</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 | N/A     |
| D3.1.1         | UL 1973 tests to be applied                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 | N/A     |

| <b>UL 9540</b> |                    |                 |         |
|----------------|--------------------|-----------------|---------|
| Clause         | Requirement + Test | Result - Remark | Verdict |

| <b>ANNEX E(Informative)–Guidance On Capacity And Separation Distance Limits For Electrochemical ESS</b> |                |            |
|---------------------------------------------------------------------------------------------------------|----------------|------------|
| <b>E1</b>                                                                                               | <b>General</b> | <b>N/A</b> |
| <b>ANNEX F(Normative)–Metal Compatibility Table</b>                                                     |                | <b>P</b>   |
| <b>ANNEX G(Normative)–Cleanagent Direct Injection Battery Rack Coolant System Units</b>                 |                | <b>P</b>   |





| UL 9540                                |                    |                 |               |
|----------------------------------------|--------------------|-----------------|---------------|
| Clause                                 | Requirement + Test | Result - Remark | Verdict       |
| DC terminal Bus bar                    | 53.8               | 79.7            | 200           |
| CTB                                    | 38.3               | 64.2            | 85            |
| QF1                                    | 42.8               | 68.7            | 70            |
| SPD1                                   | 38.9               | 64.8            | 70            |
| FU2                                    | 39.7               | 65.6            | 85            |
| M1                                     | 42.4               | 68.3            | 85            |
| H1                                     | 36.2               | 62.1            | 85            |
| Power wire                             | 43.2               | 69.1            | 125           |
| Internal ambient (near QF1)            | 42.4               | 68.3            | For reference |
| Internal ambient (near QF102)          | 38.6               | 64.5            | For reference |
| Internal ambient (near QF202)          | 38.5               | 64.4            | For reference |
| Transformer 1winding                   | 60.5               | 86.4            | 110           |
| Transformer 1 core                     | 55.7               | 81.6            | 110           |
| Transformer 2 winding                  | 55.9               | 81.8            | 110           |
| Battery cabinet                        |                    |                 |               |
| Battery terminal                       | 34.0               | 59.9            | 125           |
| Battery wire                           | 55.3               | 81.2            | 125           |
| Battery enclosure                      | 36.7               | 63.6            | For reference |
| DC switch on HV box                    | 35.9               | 61.8            | 85            |
| DC wire to HV box                      | 56.8               | 82.7            | 200           |
| HV+ Terminals                          | 65.3               | 91.2            | 150           |
| MSD                                    | 47.2               | 73.1            | 85            |
| Internal ambient (Top near battery)    | 34.3               | 60.2            | For reference |
| Internal ambient (middle near battery) | 34.1               | 60.0            | For reference |
| Whole unit                             |                    |                 |               |
| AC Power cable                         | 51.1               | 77.0            | 125           |
| DC Power cable                         | 50.2               | 76.1            | 200           |
| Battery cabinet door                   | 34.7               | 60.6            | 70            |
| MC cabinet door                        | 54.1               | 80.0            | 100 *         |
| Cooling system door                    | 42.0               | 67.9            | 70            |
| Side enclosure (near top opening)      | 70.3               | 96.2            | 100 *         |
| Handle                                 | 34.1               | 60.0            | 70            |
| Externa ambient                        | 29.1               | 55.0            | --            |

| UL 9540                                                                                                                                  |                    |                 |         |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------|---------|
| Clause                                                                                                                                   | Requirement + Test | Result - Remark | Verdict |
| <b>Note(s):</b><br>* Unintentional contact is unlikely as equipment located in restricted access locations and hot warning symbol added. |                    |                 |         |

| Table Cl.<br>32&33                | TABLE: Dielectric Strength and Impulse |                            |                 | P           |
|-----------------------------------|----------------------------------------|----------------------------|-----------------|-------------|
| Test Location                     |                                        | Dielectric Applied Voltage | Impulse Voltage | Pass / Fail |
| Main DC +/- to Ground (BI)        |                                        | 2500                       | 6000            | Pass        |
| AC mains to Ground (BI)           |                                        | 2500                       | 6000            | Pass        |
| Main DC +/- to Communication (RI) |                                        | 5000                       | 8000            | Pass        |
| AC mains to Communication (RI)    |                                        | 5000                       | 8000            | Pass        |
| Supplementary information:        |                                        |                            |                 |             |

| Cl. 34                                    | TABLE: Equipment Grounding and Bonding |         |         | P         |
|-------------------------------------------|----------------------------------------|---------|---------|-----------|
| Tested between:                           |                                        | Voltage | Current | Milli-ohm |
| Fire cabinet door to PE terminal          |                                        | -       | -       | 14.3      |
| MC cabinet door to PE terminal            |                                        | -       | -       | 7.1       |
| Centre cabinet door to PE terminal        |                                        | -       | -       | 13.8      |
| battery compartment door 1 to PE terminal |                                        | -       | -       | 11.8      |
| battery compartment door 2 to PE terminal |                                        | -       | -       | 17.7      |
| battery compartment door 3 to PE terminal |                                        | -       | -       | 18.4      |
| battery compartment door 4 to PE terminal |                                        | -       | -       | 11.9      |
| battery compartment door 5 to PE terminal |                                        | -       | -       | 19.3      |
| battery compartment door 6 to PE terminal |                                        | -       | -       | 11.4      |
| Supplementary information:                |                                        |         |         |           |

| <b>UL 9540</b>                    |                                     |                         |               |
|-----------------------------------|-------------------------------------|-------------------------|---------------|
| Clause                            | Requirement + Test                  | Result - Remark         | Verdict       |
| <b>Cl. 35</b>                     | <b>TABLE: Insulation Resistance</b> |                         | <b>P</b>      |
| Tested between:                   |                                     | Measure Resistance (MΩ) | Comments      |
| Main DC +/- to Ground             |                                     | >100                    | Limit: > 1 MΩ |
| AC mains to Ground                |                                     | >100                    | Limit: > 1 MΩ |
| Main DC +/- to Communication      |                                     | >100                    | Limit: > 1 MΩ |
| AC mains to Communication         |                                     | >100                    | Limit: > 1 MΩ |
| <b>Supplementary information:</b> |                                     |                         |               |

--End of test report--

# Certificate



Certificate no.

CU 72302476 01

**License Holder:**

Xiamen Hithium Energy Storage Technology Co., Ltd. 201-1, Comprehensive Building 5, No. 11, Butang Middle Road, Industrial Base Of Xiamen Torch High Tech Zone (Tongxiang), Xiamen, Fujian P.R. China

**Manufacturing Plant:**

Xiamen Hithium Energy Storage Technology Co., Ltd. Northwest of the intersection of Guoshan south 2nd Road and Tongxiang Avenue, 12-12 Hongtang north area, Tongxiang high tech industrial base, Tong'an District, Xiamen City, Fujian P.R. China

**Test report no.:** USA-CHENANDCN23RGEH 001

**Client Reference:** 168441619

**Tested to:** ANSI/CAN/UL 1973:2022

**Certified Product:** Iron Phosphate-Lithium Cell

**License Fee - Units**

Model Designation: LFP71173207/314Ah

Rated capacity : 314Ah  
Nominal voltage : 3.2V  
Maximum charge/Discharge Current: 314A  
Charge temperature Range: 0 to 60°C  
Discharge temperature Range: -30°C to 60°C  
Other Data: See Appendix (Constr. Data Form)

Appendix: 1

**Licensed Test mark:**



**Date of Issue**  
(day/mo/yr)

01/11/2023

Date : 2023/11/01

Xiamen Hithium Energy Storage  
Technology Co., Ltd. 201-1,  
Base Of Xiamen Torch High Tech  
Zone (Tongxiang), Xiamen, Fujian  
P.R. China  
Attn:

**Re. : CU US + Canada Certificate**

Type of Equipment : Iron Phosphate-Lithium Cell  
Model Designation : See Certificate  
Certificate No. : CU 72302476 0001  
File No. : CN23RGEH 001  
Engineer/Contact : Andy Chen  
Standard(s) : ANSI/CAN/UL 1973:2022

Dear Madame or Sir,

The above referenced technical equipment has been tested and was found to be in compliance with the listed test requirement(s). Enclosed, please find the TUV Rheinland approval document No. CU 72302476 0001. It authorizes you to label the listed product(s) with the TUV Rheinland Mark identified in the approval document. For compliance, the Test Mark must be on the approved unit.

Your product is subject to regular factory follow-up inspections as well as annual certificate and factory registration fees.

In using the TUV Rheinland Mark you are obligated to comply with the TUV Rheinland of North America Service Agreement.

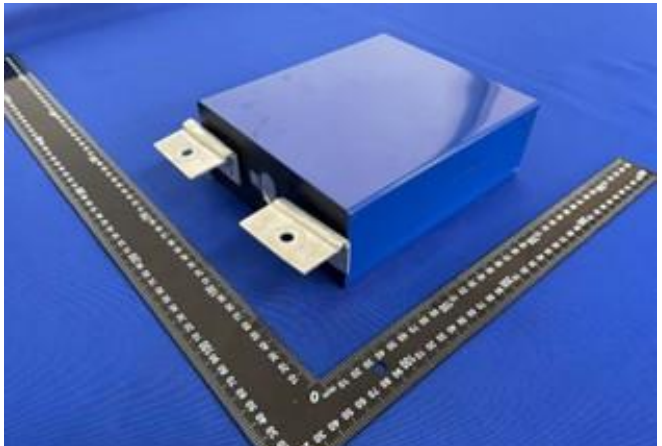
If we can be of any further assistance to you, please do not hesitate to contact us.

Sincerely yours,  
Certification Body

Jason Tang



Enclosure

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                     |                                                                                                 |                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------|
| <b>Prüfbericht-Nr.:</b><br><i>Test report no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                            | CN23F118 001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Auftrags-Nr.:</b><br><i>Order no.:</i>                                           | 168441619                                                                                       | Seite 1 von 36<br>Page 1 of 36 |
| <b>Kunden-Referenz-Nr.:</b><br><i>Client reference no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                   | 2347845                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Auftragsdatum:</b><br><i>Order date:</i>                                         | 2023-08-29                                                                                      |                                |
| <b>Auftraggeber:</b><br><i>Client:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                        | Xiamen Hithium Energy Storage Technology Co., Ltd.<br>201-1, Comprehensive Building 5, No.11, Butang Middle Road, Industrial Base Of Xiamen Torch High Tech Zone (Tongxiang), Xiamen, Fujian, P.R. China                                                                                                                                                                                                                                                                                                                                                     |                                                                                     |                                                                                                 |                                |
| <b>Prüfgegenstand:</b><br><i>Test item:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                   | Iron Phosphate-Lithium Cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                     |                                                                                                 |                                |
| <b>Bezeichnung / Typ-Nr.:</b><br><i>Identification / Type no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                            | LFP71173207/314Ah                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                     |                                                                                                 |                                |
| <b>Auftrags-Inhalt:</b><br><i>Order content:</i>                                                                                                                                                                                                                                                                                                                                                                                                                              | Test report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                     |                                                                                                 |                                |
| <b>Prüfgrundlage:</b><br><i>Test specification:</i>                                                                                                                                                                                                                                                                                                                                                                                                                           | UL 9540A:2019 (Forth Edition)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                     |                                                                                                 |                                |
| <b>Wareneingangsdatum:</b><br><i>Date of sample receipt:</i>                                                                                                                                                                                                                                                                                                                                                                                                                  | 2023-08-30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                                                                 |                                |
| <b>Prüfmuster-Nr.:</b><br><i>Test sample no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                             | Engineering sample                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                     |                                                                                                 |                                |
| <b>Prüfzeitraum:</b><br><i>Testing period:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                | 2023-09-04 - 2023-11-21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                     |                                                                                                 |                                |
| <b>Ort der Prüfung:</b><br><i>Place of testing:</i>                                                                                                                                                                                                                                                                                                                                                                                                                           | See to clause 1.1 of main report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                     |                                                                                                 |                                |
| <b>Prüflaboratorium:</b><br><i>Testing laboratory:</i>                                                                                                                                                                                                                                                                                                                                                                                                                        | TÜV Rheinland (Shenzhen) Co., Ltd.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                     |                                                                                                 |                                |
| <b>Prüfergebnis*:</b><br><i>Test result*:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                 | See main report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                     |                                                                                                 |                                |
| <b>erstellt von:</b><br><i>created by:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>genehmigt von:</b><br><i>authorized by:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                     |                                                                                                 |                                |
| <b>Datum:</b><br><i>Date:</i> 2023-12-06                                                                                                                                                                                                                                                                                                                                                                                                                                      | <br>Jason Zhu                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                     | <br>Xun Yu |                                |
| <b>Stellung / Position:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Project Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                     | Reviewer                                                                                        |                                |
| <b>Sonstiges /</b><br><i>Other:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>This report does not evidence compliance of the provided sample with the relevant standards but only with the referred tests. This test report documents the findings of examination conducted on the delivered product mentioned above only. This report does not entitle the applicant to carry any safety mark on this or similar products. Further for sales or other application purposes of the tested product, any reference to TÜV Rheinland or a test through TÜV Rheinland is only permissible with prior written consent of TÜV Rheinland.</p> |                                                                                     |                                                                                                 |                                |
| <b>Zustand des Prüfgegenstandes bei Anlieferung:</b><br><i>Condition of the test item at delivery:</i>                                                                                                                                                                                                                                                                                                                                                                        | Prüfmuster vollständig und unbeschädigt<br><i>Test item complete and undamaged</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                     |                                                                                                 |                                |
| * Legende: P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet<br>* Legend: P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                     |                                                                                                 |                                |
| <p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b><br/> <i>This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                     |                                                                                                 |                                |



Prüfbericht-Nr.: CF23F118 001  
Test report no.:

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**Anmerkungen**  
*Remarks*

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</p> <p>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| 3 | <p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.</p> <p>Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i></p> <p><i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 4 | <p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p>                                                                                                                                                                                                                                                                                       |

## Introduction

Model fire codes and energy storage system standards require energy storage systems to comply with UL 9540, which in turn requires battery cells and modules to comply with UL 1973. Compliance with these standards reduces the risk of batteries and battery energy storage systems (BESS) creating fire, shock or personal injury hazards. However, they don't evaluate the ability of the BESS installed as intended and with fire suppression mechanisms in place if necessary, from contributing to a fire or explosion in the end use installations.

To address these fire and explosion hazards associated with the installation of a BESS, the fire and other codes require energy storage systems to meet certain location, separation, fire suppression and other criteria. Those codes also provide a means to provide an equivalent level of safety based on large scale fire testing of anticipated BESS installations.

UL 9540A is intended to provide a test method that can be used as a basis for validating the safety of a BESS installation in lieu of meeting the specific criteria provided in those codes. The data generated can be used to determine the fire and explosion protection required for installation of a BESS.

The test method is initiated through the establishment of a thermal runaway condition that leads to combustion within the BESS. The test method outlined in UL 9540A consists of several steps – cell level testing, module level testing, unit level testing and installation level testing. The cell and module level testing steps are information gathering steps to inform the unit and installation level testing.

The following outlines the information that may gathered as part of the testing:

- a) Cell level – An individual cell fails in a manner that leads to thermal runaway and fire through a suitable method such as external heating. Data such as off-gassing contents, temperatures at venting and temperatures at thermal runaway are recorded.
- b) Module level – One or more cells within a BESS module fail in the manner determined during the cell level testing. Data such as fire propagation in the module, temperatures on the failed cells and surrounding cells, off-gassing contents and heat release data are gathered.
- c) Unit level – A complete BESS is installed surrounded by target (e.g. dummy) BESS and walls separated at a distance as intended in its installation. The module level test is repeated on a module located in the BESS in the most unfavorable location. Data such as temperature within the BESS, on surrounding walls and target BESS; incident heat flux on walls and target BESS; observation of fire propagation from BESS to target units and walls as well as observance of explosions or evidence of re-ignition within the BESS; and heat release and off-gassing contents are gathered.
- d) Installation level – This test is a repeat of the unit level test with the test conducted within a test room and with the intended fire suppression system installed as well as any overhead cables (that can lead to fire propagation) installed. This test is intended to validate the fire suppression system for the BESS installation. Data such as temperature within the BESS, on surrounding walls and target BESS; incident heat flux on walls and target BESS; fire propagation from the BESS to target units, walls or overhead cables and any observable explosion incidents or re-ignition within the BESS; and off-gassing contents (if needed) and heat release are gathered.

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# **1 General information**

## **1.1 Test specification**

**Standard: ANSI/CAN/UL 9540A:2019 (Fourth Edition)**

**Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems**

This report presents the result of cell level tests of UL 9540A: 2019.

All tests were conducted at TUV Rheinland (Shenzhen) Co., Ltd. and TUV Rheinland's partner labs that were under supervision of TÜV Rheinland's engineer.

Testing period: 2023-09-04 to 2023-11-17

Refer to Clause 4 for test and measurement instruments.

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## **1.2 General remarks**

This report is descriptive and provide the test data only.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the testing laboratory.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

## **1.3 List of attachments**

The following attachments resulting from the tests, provided with separate page number, are included in this report.

Appendix A: Cell vent gas lower flammability limit (LFL) test

Appendix B: Cell vent gas burning velocity ( $S_u$ ) test

Appendix C: Cell vent gas maximum pressure ( $P_{max}$ ) test

## **1.4 Revision information**

New report, not applicable

## 1.5 Definitions

**CELL** – The basic functional electrochemical unit containing an assembly of electrodes, electrolyte, separators, container, and terminals. It is a source of electrical energy by direct conversion of chemical energy.

**MODULE** – A subassembly that is a component of a BESS that consists of a group of cells or electrochemical capacitors connected together either in a series and/or parallel configuration (sometimes referred to as a block) with or without protective devices and monitoring circuitry.

**UNIT** – A frame, rack or enclosure that consists of a functional BESS which includes components and subassemblies such as cells, modules, battery management systems, ventilation devices and other ancillary equipment.

**BATTERY SYSTEM (BS)** – Is a component of a BESS and consists of one or more modules typically in a rack configuration, controls such as the BMS and components that make up the system such as cooling systems, disconnects and protection devices.

**BATTERY ENERGY STORAGE SYSTEM (BESS)** – Stationary equipment that receives electrical energy and then utilizes batteries to store that energy to supply electrical energy at some future time. The BESS, at a minimum consists of one or more modules, a power conditioning system (PCS), battery management system (BMS) and balance of plant components.

a) **INITIATING BATTERY ENERGY STORAGE SYSTEM UNIT (INITIATING BESS)** – A BESS unit which has been equipped with resistance heaters in order to create the internal fire condition necessary for the installation level test (Section 9).

b) **TARGET BATTERY ENERGY STORAGE SYSTEM UNIT (TARGET BESS)** – The enclosure and/or rack hardware that physically supports and/or contains the components that comprise a BESS. The target BESS unit does not contain energy storage components, but serves to enable instrumentation to measure the thermal exposure from the initiating BESS.

**Note:** Depending upon the configuration and design of the BESS (e.g. the BESS is composed of multiple separate parts within separate enclosures), the unit level test can be done at battery system level. In such case, the BESS is be read as BS throughout this report.

**NON-RESIDENTIAL USE** – Intended for use in commercial, industrial or utility owned locations.

**RESIDENTIAL USE** – In accordance with this standard, intended for use in one or two family homes and town homes and individual dwelling units of multi-family dwellings.

**THERMAL RUNAWAY**- The incident when an electrochemical cell increases its temperature through self-heating in an uncontrollable fashion. The thermal runaway progresses when the cell's generation of heat is at a higher rate than the heat it can dissipate. This may lead to fire, explosion and gas evolution.

**STATE OF CHARGE (SOC)** – The available capacity in a BESS, pack, module or cell expressed as a percentage of rated capacity.



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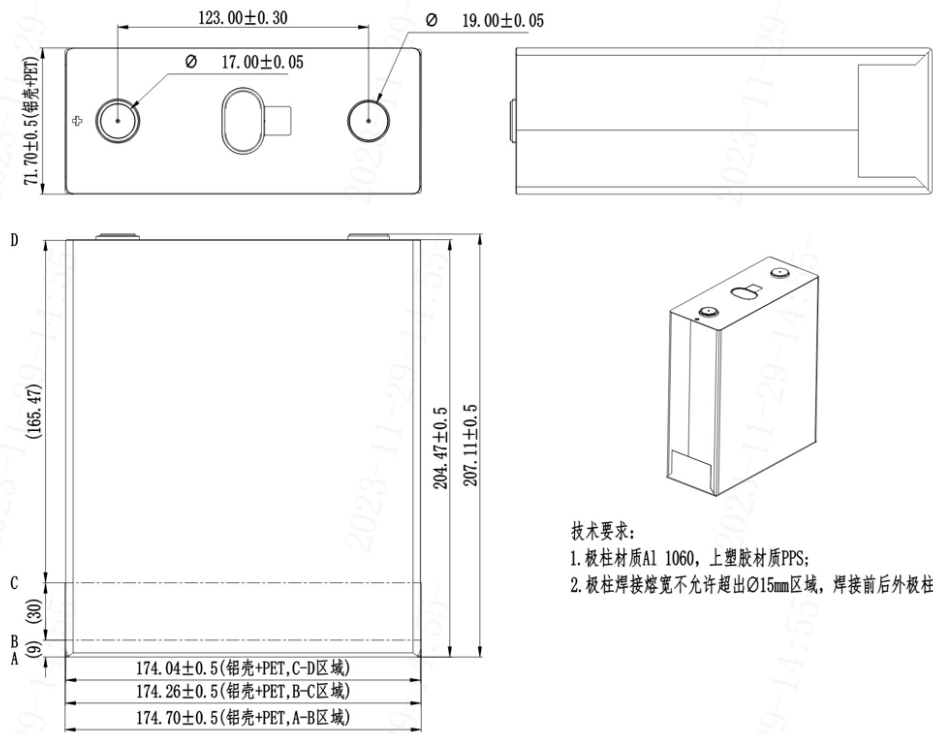
## 2 General Product Information

### 2.1 Product information and parameters

The product information and parameters are provided by the client as below.

|                                            |                                                                                                                                                                                                          |                                      |                                                                                              |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------|
| Manufacturer .....                         | Xiamen Hithium Energy Storage Technology Co., Ltd.<br>201-1, Comprehensive Building 5, No.11, Butang Middle Road, Industrial Base Of Xiamen Torch High Tech Zone (Tongxiang), Xiamen, Fujian, P.R. China |                                      |                                                                                              |
| Model number .....                         | LFP71173207/314Ah                                                                                                                                                                                        |                                      |                                                                                              |
| Chemistry .....                            | <input checked="" type="checkbox"/> LiFePO <sub>4</sub>                                                                                                                                                  | <input type="checkbox"/> NMC         | <input type="checkbox"/> NCA <input type="checkbox"/> LTO<br><input type="checkbox"/> Other: |
| Physical configuration.....                | <input checked="" type="checkbox"/> Prismatic                                                                                                                                                            | <input type="checkbox"/> Cylindrical | <input type="checkbox"/> Pouch                                                               |
|                                            | Weight(kg):                                                                                                                                                                                              | 5.6±0.2                              |                                                                                              |
| Electrical rating .....                    | Rated capacity(Ah):                                                                                                                                                                                      | 314 (25°C±2°C)                       |                                                                                              |
|                                            | Nominal voltage(V):                                                                                                                                                                                      | 3.2                                  |                                                                                              |
| Standard charge method .....               | Charge current(A):                                                                                                                                                                                       | 157 (25°C±2°C)                       |                                                                                              |
|                                            | Standard Charge Voltage(V):                                                                                                                                                                              | 3.65                                 |                                                                                              |
|                                            | Cut off current(A):                                                                                                                                                                                      | /                                    |                                                                                              |
| Standard discharge method.....             | Discharge current(A):                                                                                                                                                                                    | 157 (25°C±2°C)                       |                                                                                              |
|                                            | End of discharge voltage(V):                                                                                                                                                                             | 2.5V (T>0°C)<br>2.0V (T≤0°C)         |                                                                                              |
| Maximum continuous charge current :        | 314A                                                                                                                                                                                                     |                                      |                                                                                              |
| Maximum continuous discharge current ..... | 314A                                                                                                                                                                                                     |                                      |                                                                                              |
| Compliance with UL 1973.....               | <input checked="" type="checkbox"/> Yes, TUV Report No.: CN23RGEH 001<br><input type="checkbox"/> No                                                                                                     |                                      |                                                                                              |
| Note:                                      |                                                                                                                                                                                                          |                                      |                                                                                              |

2.2 Diagram with overall dimension

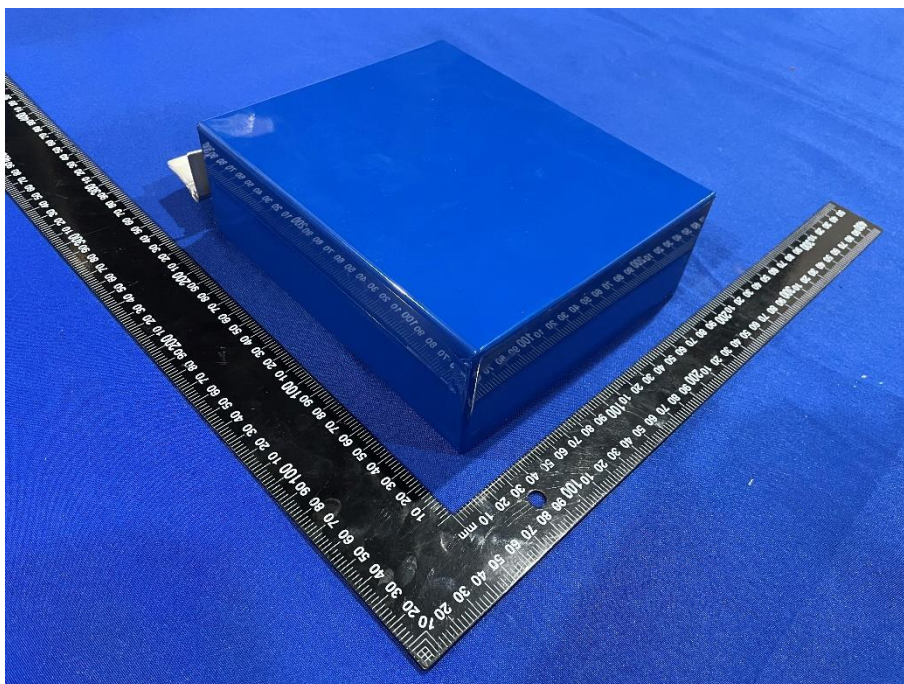
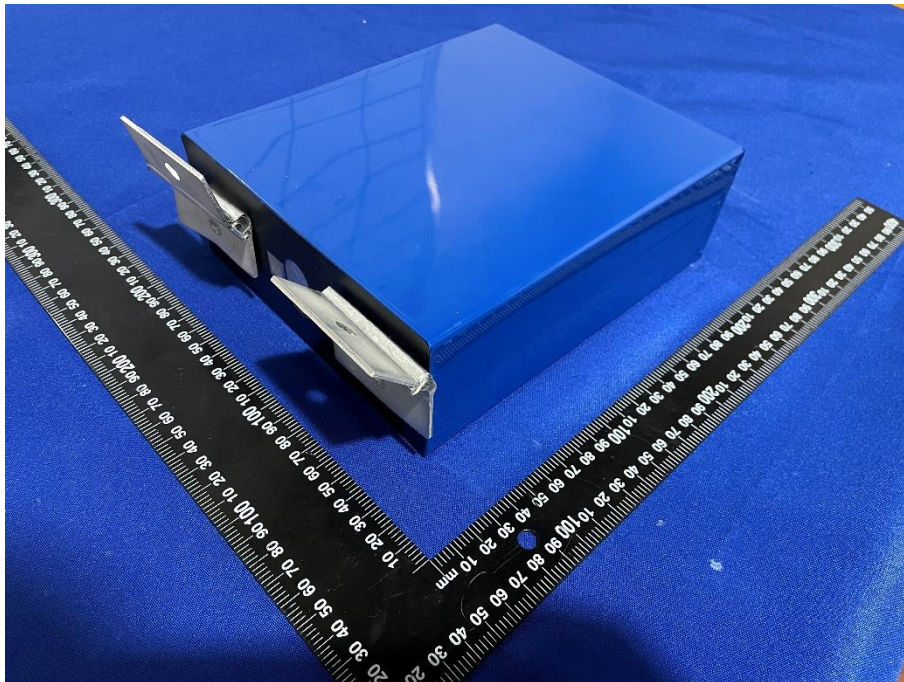


Unit: mm

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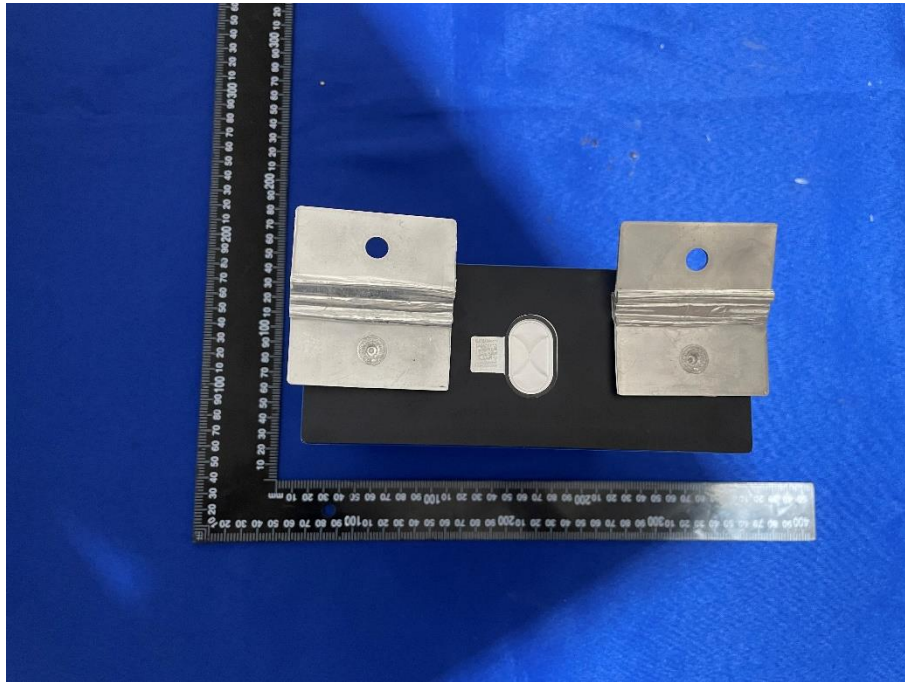
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## Photos



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### **3 Cell level test (section 7 of UL 9540A)**

#### **3.1 General**

This testing is conducted on individual cells and uses various stress conditions such as external heating to force the cells into thermal runaway.

Once the stress mechanism is induced, the test measures the temperature at which the cell vents and then the temperature at which thermal runaway occurs.

The test also measures the volume and pressure of the vent gases that are released from the cells, and the composition of the vent gases.

Cell vent gas with flammable components in its composition should have the following parameters characterized in order to enable deflagration venting design:

- a) Measurement of fundamental burning velocity by the vertical tube method described in the Method of Test for Burning Velocity Measurement of Flammable Gases Annex in ISO 817; and
- b) Maximum pressure developed in a contained deflagration of an optimum mixture per EN 15967.

Cell level testing performed on the cells used within a BESS module establishes a base line fire test performance that can be evaluated against the fire performance of other battery cells the BESS manufacturer may choose to use within the unit's modules.

If none of the cell samples can be forced into thermal runaway and none of the cell samples vent flammable gases as determined by the ASTM E918 test, during any of the cell level tests, it is not necessary to conduct additional module or unit level testing on BESS that utilize these cells.

#### **3.2 Sample preparation**

##### **3.2.1 Test method and description**

The cells were conditioned, prior to testing, through charge and discharge cycles for 2 cycles using a manufacturer specified methodology (refer to 2.1.1).

During the cycling, ambient condition is maintained within  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$  and R.H.  $50 \pm 25\%$ .



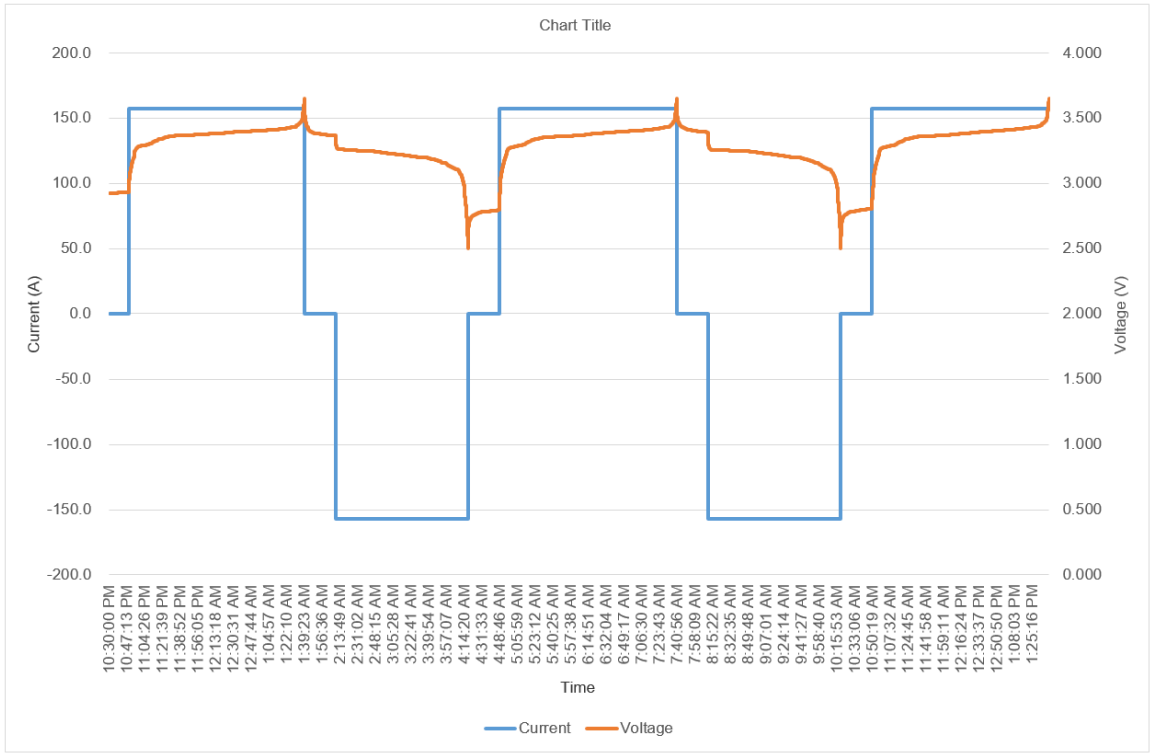
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3.2.2 Cell cycling curves  
#1



#2

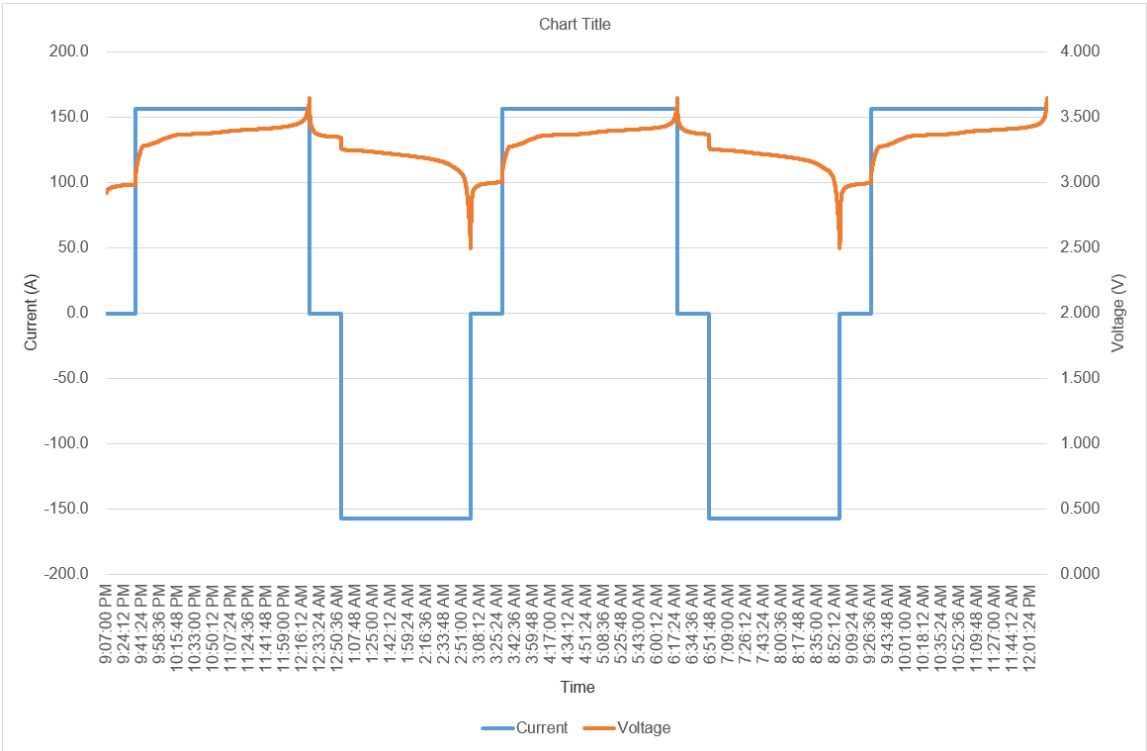




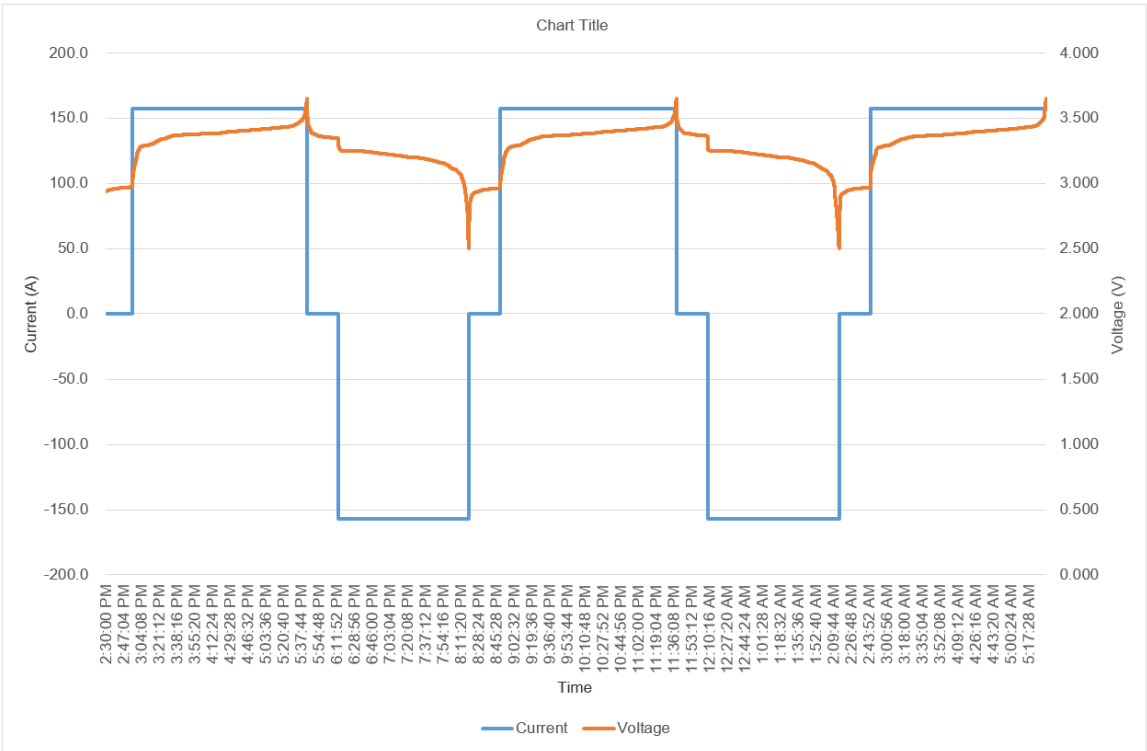
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#3



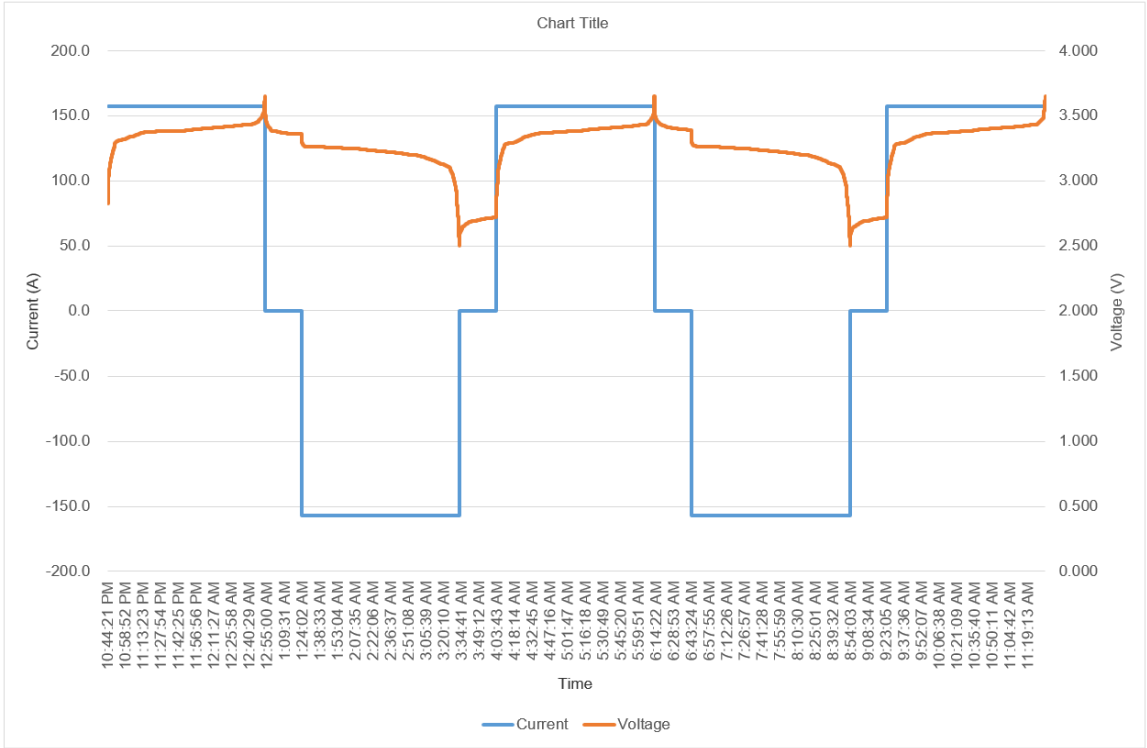
#4



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#5



### **3.3 Determination of cell thermal runaway methodology**

#### **3.3.1 Test method and description**

The cells to be tested were charged to 100% SOC and allowed to stabilize for a minimum of 1 h and a maximum of 8 h before the start of the test.

External film heater rated 220Vac/429W was put below the cell to induce the cell thermal runaway.

The cell sample and heater were clamped by two steel plate together using four bolts during test to simulate the constraint in the BESS module to prevent excessive swelling during the test.

The thermocouple (type K, 24AWG) was located below the heater that used to measure vent and thermal runaway onset temperature.

An AC power supply controller was used to control the voltage supply to the heater and maintain a 4°C/min to 7°C/min heating rate. Once thermal runaway was observed, the heaters were immediately de-energized.

The cell exhibits thermal runaway after establishing the heating rate. 3 additional samples were repeated to demonstrate repeatability.

The vent temperature and thermal runaway onset temperatures were averaged over the tested samples.

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### 3.3.2 Test result

|                                                                    |                  |                 |                 |                 |                 |
|--------------------------------------------------------------------|------------------|-----------------|-----------------|-----------------|-----------------|
| Ambient conditions at the initiation of the test.....:             | 26.1°C, 51%R.H.  | 27.9°C, 51%R.H. | 26.1°C, 52%R.H. | 27.9°C, 50%R.H. | 26.1°C, 51%R.H. |
| Sample number .....                                                | #1 <sup>1)</sup> | #2              | #3              | #4              | #5              |
| Open circuit voltage before test (V) :                             | 3.35             | 3.37            | 3.36            | 3.35            | 3.35            |
| Cell vent temperature (°C) .....                                   | 231.4            | 201.8           | 200.7           | 208.5           | 203.6           |
| Thermal runaway onset temperature (°C) .....                       | 328.8            | 306.3           | 283.5           | 291.4           | 301.6           |
| Average cell vent temperature (°C) <sup>2)</sup> .....             | --               | 203.7           |                 |                 |                 |
| Average thermal runaway onset temperature (°C) <sup>2)</sup> ..... | --               | 295.7           |                 |                 |                 |

Note:

1) The sample (#1) is for gas vent capture.

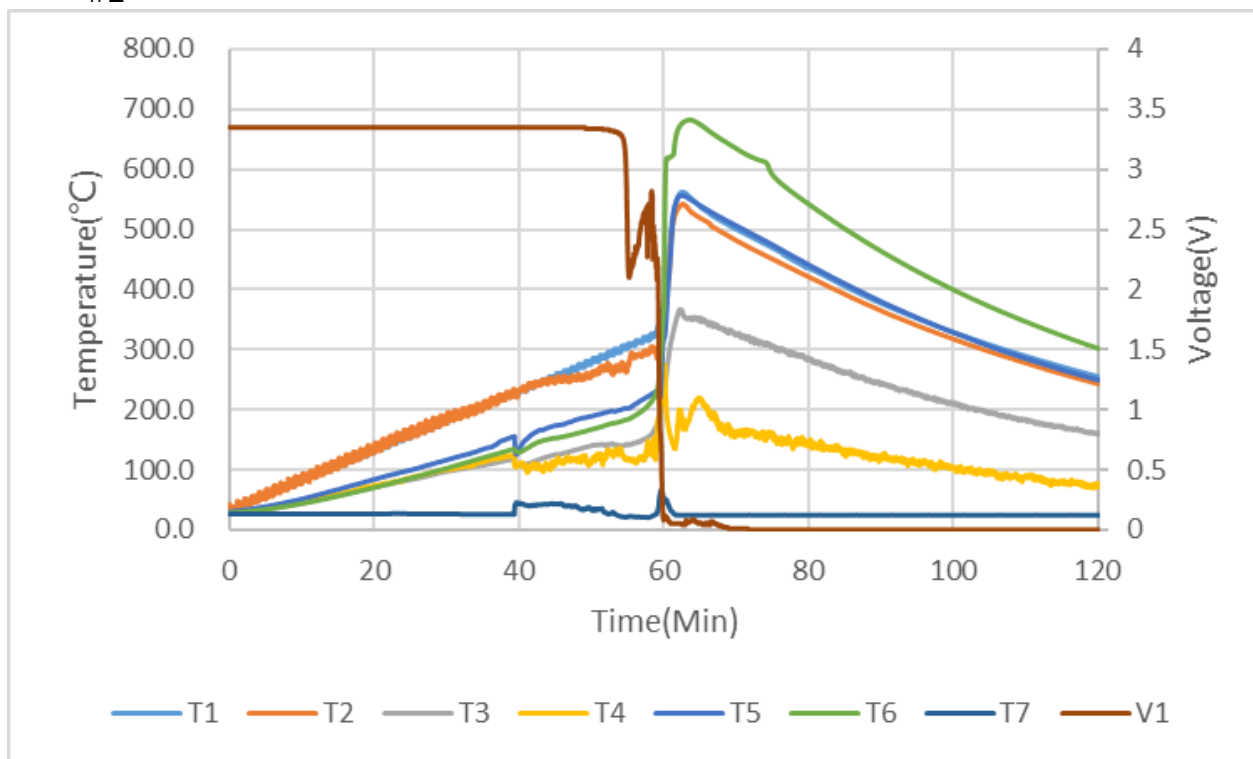
2) The temperatures were averaged over the tested samples (#1, #2, #3, #4, #5) excluding the gas vent capture sample (#1).

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### 3.3.3 Temperature/voltage vs time curve

#1



| Thermalcouple No. | Location                                           |
|-------------------|----------------------------------------------------|
| T1                | Cell center below the heater(A side)               |
| T2                | Cell center below the heater(B side)               |
| T3                | Positive eletrode tap                              |
| T4                | Near pressure relief valve                         |
| T5                | Cell narrow side                                   |
| T6                | Cell bottom                                        |
| T7                | Ambient temperature<br>(Inside of pressure vessel) |
| V1                | Cell Voltage                                       |

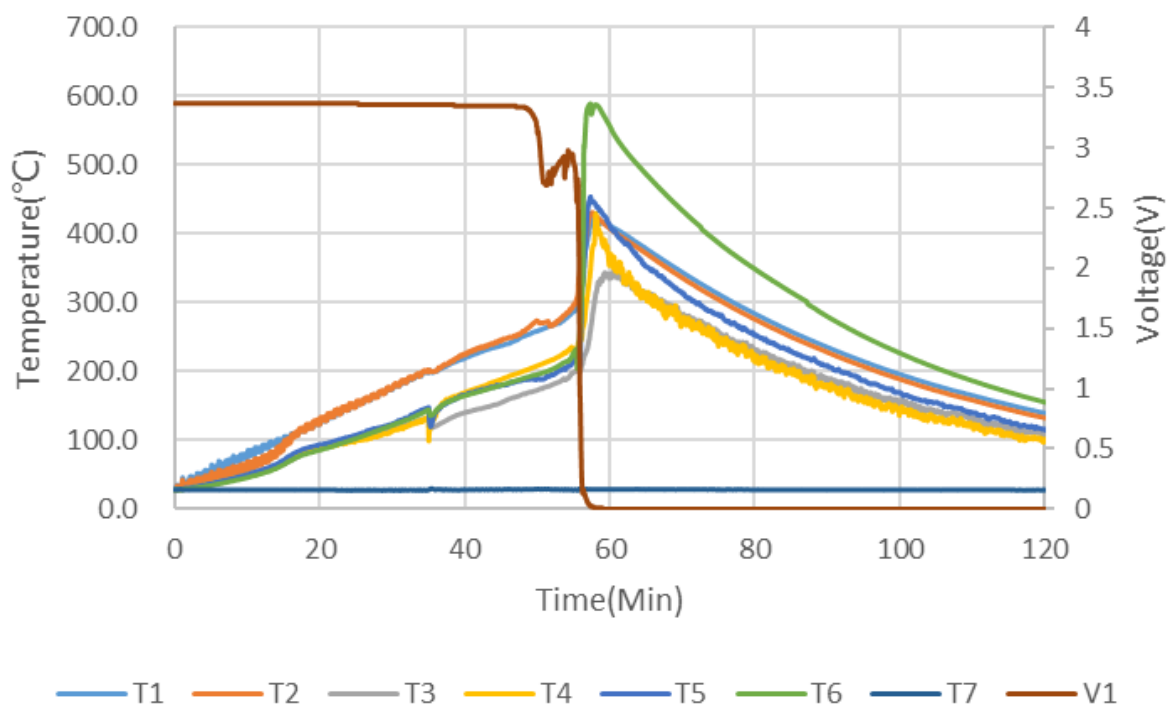
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#2



| Thermalcouple No. | Location                             |
|-------------------|--------------------------------------|
| T1                | Cell center below the heater(A side) |
| T2                | Cell center below the heater(B side) |
| T3                | Positive eletrode tap                |
| T4                | Near pressure relief valve           |
| T5                | Cell narrow side                     |
| T6                | Cell bottom                          |
| T7                | Ambient temperature                  |
| V1                | Cell Voltage                         |



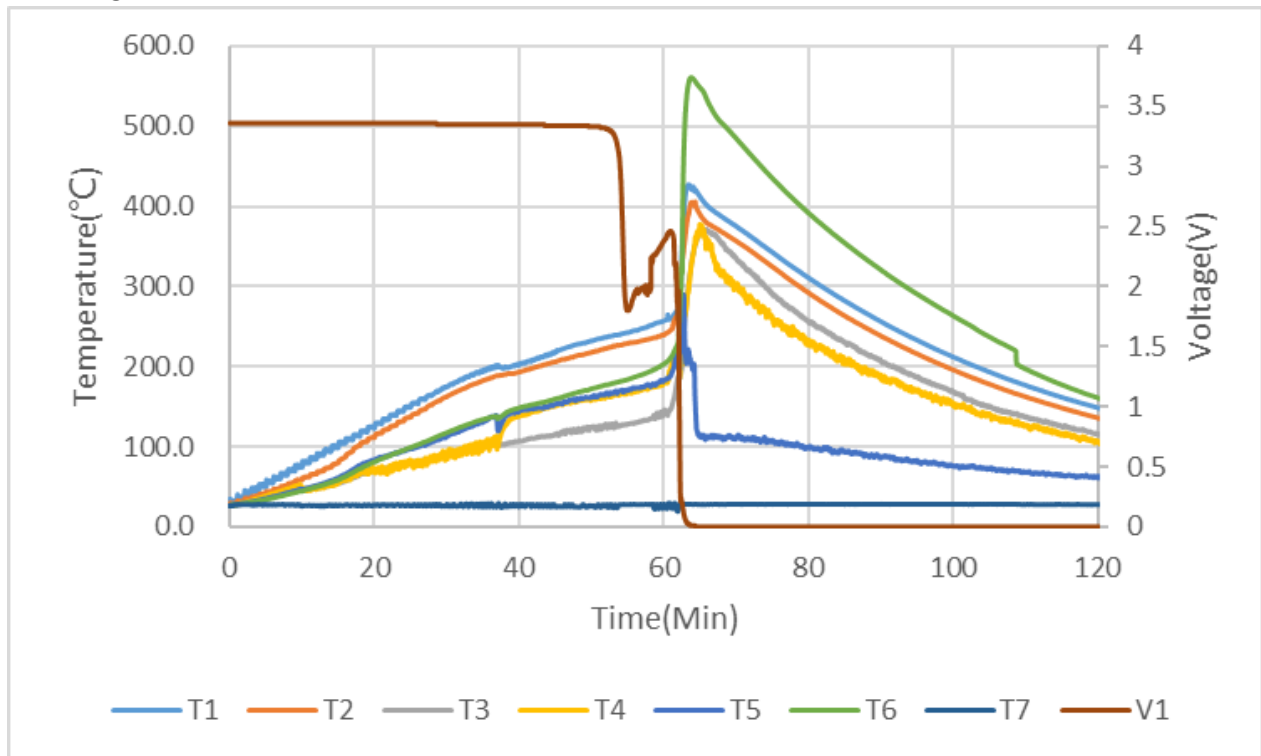
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#3



| Thermalcouple No. | Location                             |
|-------------------|--------------------------------------|
| T1                | Cell center below the heater(A side) |
| T2                | Cell center below the heater(B side) |
| T3                | Positive eletrode tap                |
| T4                | Near pressure relief valve           |
| T5                | Cell narrow side                     |
| T6                | Cell bottom                          |
| T7                | Ambient temperature                  |
| V1                | Cell Voltage                         |

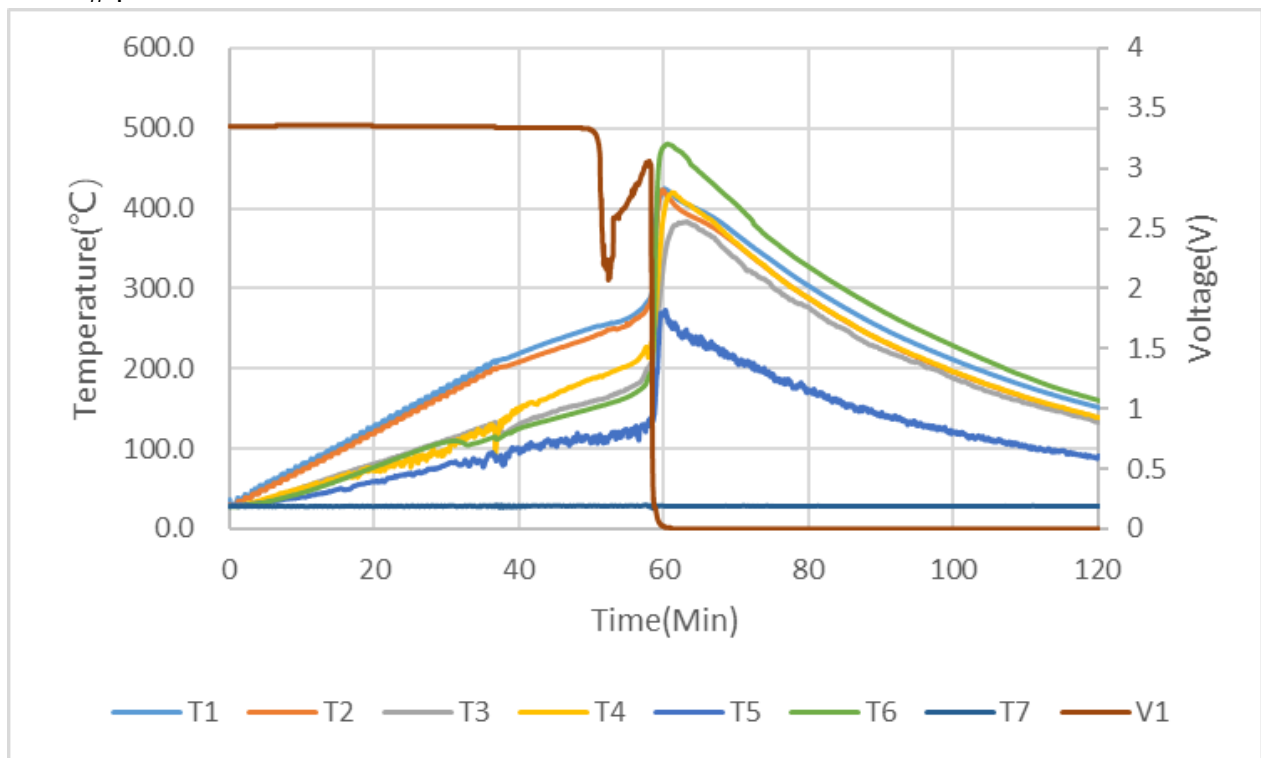
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#4



| Thermalcouple No. | Location                             |
|-------------------|--------------------------------------|
| T1                | Cell center below the heater(A side) |
| T2                | Cell center below the heater(B side) |
| T3                | Positive eletrode tap                |
| T4                | Near pressure relief valve           |
| T5                | Cell narrow side                     |
| T6                | Cell bottom                          |
| T7                | Ambient temperature                  |
| V1                | Cell Voltage                         |

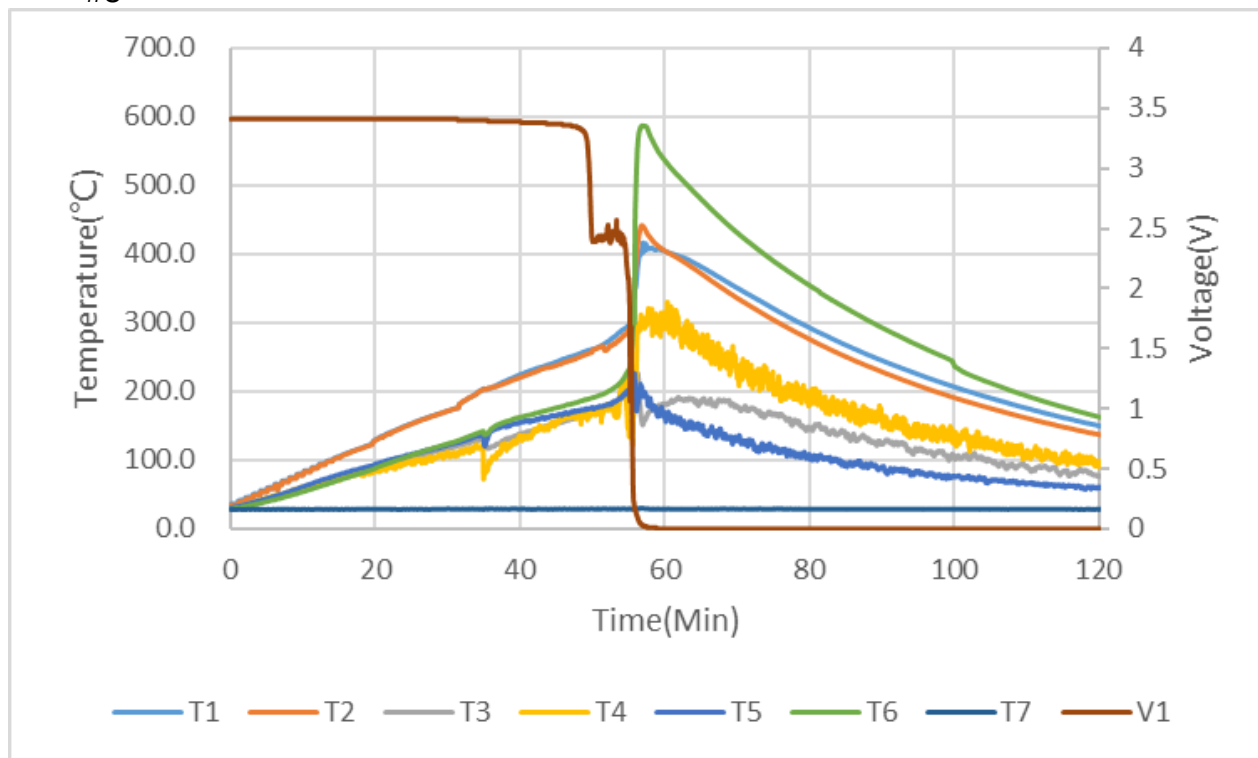
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#5



| Thermalcouple No. | Location                             |
|-------------------|--------------------------------------|
| T1                | Cell center below the heater(A side) |
| T2                | Cell center below the heater(B side) |
| T3                | Positive eletrode tap                |
| T4                | Near pressure relief valve           |
| T5                | Cell narrow side                     |
| T6                | Cell bottom                          |
| T7                | Ambient temperature                  |
| V1                | Cell Voltage                         |

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### **3.4 Cell vent gas generation and capturing**

#### **3.4.1 Test method and description**

The cells to be tested were charged to 100% SOC and allowed to stabilize for a minimum of 1 h and a maximum of 8 h before the start of the test.

A cell was forced into thermal runaway by the external heating as determined in cell thermal runaway methodology test inside an 280L pressure vessel.

Before testing, the vessel was purged with N<sub>2</sub> to reduce the oxygen content below 1% by volume.

Gas mixtures were collected before and after thermal runaway testing. 0.3L gas collection bag with two valve were used for the gas collection.

Two bags after thermal runaway were used to determine the vent gas composition.

Cell weight was measured before and after test for reference.

Pressure was measured before and after thermal runaway to calculate the total gas produced for reference.

#### **3.4.2 Test result**

|                                           |                   |
|-------------------------------------------|-------------------|
| Ambient conditions .....                  | 26.1 °C, 51 % R.H |
| Sample number .....                       | #1                |
| Open circuit voltage before test (V) .... | 3.35              |
| Pressure vessel size .....                | 280L              |
| Initial oxygen content by volume (%) ..   | < 0.1%            |
| Cell weight before test (g) .....         | 5626.0            |
| Cell weight after test (g) .....          | 4474.1            |
| Total vent gas produced (L) .....         | 130               |

## 3.5 Determination of cell vent gas composition

### 3.5.1 Test method

Cell vent gas composition was determined using Gas Chromatography (GC) with detection techniques for quantifying component gases.

The gases make up in table 1 is the gas composition after cell thermal runaway.

Table 2 contains normalized volumetric gas compositions by removing the N<sub>2</sub> contributions. This information was used to synthetically replicated gas mixture for further flammability character parameter tests.

### 3.5.2 Test result

Table 1: Vent gas components

| Gas component                       | Concentration (v, %) |
|-------------------------------------|----------------------|
| CH <sub>4</sub>                     | 1.1092               |
| C <sub>2</sub> H <sub>6</sub>       | 0.1655               |
| C <sub>2</sub> H <sub>4</sub>       | 0.4196               |
| C <sub>3</sub> H <sub>8</sub>       | 0.0545               |
| C <sub>3</sub> H <sub>6</sub>       | 0.2250               |
| n-C <sub>4</sub> H <sub>10</sub>    | 0.0207               |
| n-C <sub>4</sub> H <sub>8</sub>     | 0.0666               |
| n-C <sub>5</sub> H <sub>12</sub>    | 0.0230               |
| iso- C <sub>5</sub> H <sub>12</sub> | 0.0339               |
| n-C <sub>5</sub> H <sub>10</sub>    | 0.0160               |
| CO                                  | 4.8960               |
| CO <sub>2</sub>                     | 8.1173               |
| H <sub>2</sub>                      | 15.0719              |
| N <sub>2</sub>                      | 69.7808              |

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Table 2: Vent gas components (normalized)

The gas components N<sub>2</sub> was removed.

| Gas component                      | Concentration (v, %) |
|------------------------------------|----------------------|
| CH <sub>4</sub>                    | 3.671                |
| C <sub>2</sub> H <sub>6</sub>      | 0.548                |
| C <sub>2</sub> H <sub>4</sub>      | 1.389                |
| C <sub>3</sub> H <sub>8</sub>      | 0.18                 |
| C <sub>3</sub> H <sub>6</sub>      | 0.745                |
| n-C <sub>4</sub> H <sub>10</sub>   | 0.068                |
| n-C <sub>4</sub> H <sub>8</sub>    | 0.22                 |
| n-C <sub>5</sub> H <sub>12</sub>   | 0.076                |
| iso-C <sub>5</sub> H <sub>12</sub> | 0.112                |
| n-C <sub>5</sub> H <sub>10</sub>   | 0.053                |
| CO                                 | 16.202               |
| CO <sub>2</sub>                    | 26.861               |
| H <sub>2</sub>                     | 49.875               |



## 3.6 Flammability character parameters of the cell vent gas

### 3.6.1 Test method

Upon determination of the cell vent gas composition, the flammability character parameters were determined on sample of the synthetically replicated gas mixture with maximum uncertainty 2%.

Lower flammability limit (LFL) of the cell vent gas was determined in accordance with ASTM E918, testing at both ambient and cell vent temperatures.

The gas burning velocity was determined in accordance with the Method of Test for Burning Velocity Measurement of Flammable Gases Annex in ISO 817.

The maximum explosion pressure  $P_{\text{Iax}}$  was determined on samples of the synthetically replicated gas mixture in accordance with EN 15967.

Below table show the test result only. Detailed test report refer to Appendix A, Appendix B and Appendix C.

#### References:

ASTM E 918-19 – Standard Practice for Determining Limits of Flammability of Chemicals at Elevated Temperature and Pressure

ISO 817: 2014/Amd 1: 2017 – Refrigerants- Designation and safety classification

EN 15967: 2011 – Determination of maximum explosion pressure and the maximum rate of pressure rise of gases and vapours

### 3.6.2 Test result

|                                                        |       |                              |
|--------------------------------------------------------|-------|------------------------------|
| LFL at 25°C±5°C and 101±5kPa .....                     | 8.1%  | (see Appendix A for details) |
| LFL at 205°C±5°C and 101±5kPa .....                    | 6.5%  | (see Appendix A for details) |
| Burning Velocity $S_u$ (m/s) at room temperature ..... | 0.779 | (see Appendix B for details) |
| $P_{\text{max}}$ (MPa) at room temperature .....       | 0.78  | (see Appendix C for details) |

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### 3.7 Photos

Sample #1: Gas generation and capturing setup



Sample #1: After thermal runaway test



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Sample #2: Thermal runaway test setup



Sample #2: After thermal runaway test



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## 4 List of Test and Measurement Instruments

| No. | Equipment                                | Model                                     | Rating                               | Last Cal. date                         |
|-----|------------------------------------------|-------------------------------------------|--------------------------------------|----------------------------------------|
| 1   | Gas Chromatography                       | 8890                                      | --                                   | 2023.09.06                             |
| 2   | Hybrid Recorder                          | TWC-2A                                    | -50~700°C                            | 2023.03.17                             |
| 3   | Data Acquisition                         | 34970A                                    | 10mA-1000mA<br>0.1-300V              | 2023.07.06                             |
| 4   | Battery Testing System                   | CT-4004-<br>5V200A-ATL                    | 5V/200A                              | 2023.07.10                             |
| 5.  | Digital multi-meter                      | 15B+                                      | 400mVdc~100Vdc                       | 2023.07.10                             |
| 6.  | Electronic Weight                        | CHS-D                                     | 0-10kg                               | 2023.03.17                             |
| 7.  | Gas acquisition system                   | WRNK-191<br>HM90-H3-2-<br>BD-801KZ<br>DTM | 0-1200°C<br>-0.1~1.5 MPa<br>0-1000°C | 2023.09.07<br>2023.09.07<br>2023.09.07 |
| 8.  | Oxygen analyzer                          | HG-BX-O2                                  | 0-30%                                | 2023.09.07                             |
| 9.  | Gas lower flammability limit test system |                                           |                                      |                                        |
|     | Temperature measurement                  | TJ120-CAXL-<br>116U-10-SPW-<br>M          | 0-300°C                              | 2023.09.07                             |
|     | Pressure transducer                      | PTX50G2-TC-<br>A3-CA-H0-PB                | -100~150KPa                          | 2023.09.07                             |
| 10. | Gas explosion test system                |                                           |                                      |                                        |
|     | Temperature measurement                  | TJ120-CAXL-<br>116U-10-SPW-<br>M          | 0-300°C                              | 2023.09.07                             |
|     | Pressure transducer                      | Kistler 603CAA                            | 0~100MPa                             | 2023.09.07                             |
|     | Pressure sensor                          | HM90-H3-2-V2-<br>F1-W2                    | -0.1~2.0 MPa<br>-0.1~0.15 MPa        | 2023.09.07                             |
| 11. | High speed camera                        | MV-<br>XG1205GC/M-T<br>MV-XG280GC-T       | 90fps<br>409fps                      | --                                     |
| 12. | Combustible gas combustion rate device   |                                           |                                      |                                        |
|     | Temperature measurement                  | TJ120-CAXL-<br>116U-10-SPW-<br>M          | 0-300°C                              | 2023.09.07                             |
|     | straight steel ruler                     | dawn 1m                                   | 1000mm                               | 2023.09.07                             |

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## Appendix A: Cell vent gas lower flammability limit (LFL) test

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Method                 | ASTM E918-19 Standard Practice for Determining Limits of Flammability of Chemicals at Elevated Temperature and Pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Test Item                   | The lower flammability of gas mixture                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Test Apparatus              | Test Vessel: 5L closed sphere<br>Ignition system: Fusing Wire                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Preparation of Test Mixture | Partial pressure method used inside the vessel;<br>Accuracy: within 0.2% absolute                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Symbol and definition       | <p>The symbols used in this report are defined as below except otherwise defined:</p> <p><math>c_s</math> — Concentration of sample;<br/> <math>T_i</math> — Initial temperature in each trial;<br/> <math>p_i</math> — Initial pressure in each trial;<br/> <math>p_{ex}</math> — Overpressure in each trial;<br/> It is considered flame occurred, if <math>p_{ex} / p_i \geq 1.07</math>.<br/> <math>L_1</math> — The minimum sample concentration that gives flame propagation;<br/> <math>L_2</math> — The maximum sample concentration that does not give flame propagation;<br/> LFL — Lower flammable limit;<br/> LFL is expressed as: <math>LFL = (L_1 + L_2)/2</math><br/> Concentration defined in this report means volume percentage.</p> |
| Remark                      | This report is effective under the specific condition; please seek for the advice of expert for risk assessment in producing, processing, transportation and storage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

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| LFL test data at room temperature (part) |        |                                                               |          |                       |                      |           |
|------------------------------------------|--------|---------------------------------------------------------------|----------|-----------------------|----------------------|-----------|
| Test Condition                           |        | Initial Temperature: 25(±5)°C<br>Initial Pressure: 101(±5)kPa |          |                       |                      |           |
| No.                                      | cs [%] | Ti [°C]                                                       | pi [kPa] | p <sub>ex</sub> [kPa] | p <sub>ex</sub> / pi | Ignition? |
| 1                                        | 7.8    | 22                                                            | 101.98   | 108.35                | 1.062                | N         |
| 2                                        | 8.0    | 22                                                            | 101.73   | 107.67                | 1.058                | N         |
| 3                                        | 8.0    | 23                                                            | 101.88   | 108.50                | 1.065                | N         |
| 4                                        | 8.0    | 23                                                            | 101.92   | 108.31                | 1.063                | N         |
| 5                                        | 8.2    | 23                                                            | 102.04   | 109.65                | 1.075                | Y         |
| 6                                        | 8.2    | 23                                                            | 101.88   | 109.98                | 1.080                | Y         |
| 7                                        | 8.2    | 23                                                            | 101.54   | 109.06                | 1.074                | Y         |
| Test result                              |        | L1=8.2 %, L2=8.0%, LFL=8.1 % at 25(±5)°C and 101(±5)kPa       |          |                       |                      |           |

| LFL test data at cell vent temperature (part) |        |                                                                |          |                       |                      |           |
|-----------------------------------------------|--------|----------------------------------------------------------------|----------|-----------------------|----------------------|-----------|
| Test Condition                                |        | Initial Temperature: 205(±5)°C<br>Initial Pressure: 101(±5)kPa |          |                       |                      |           |
| No.                                           | cs [%] | Ti [°C]                                                        | pi [kPa] | p <sub>ex</sub> [kPa] | p <sub>ex</sub> / pi | Ignition? |
| 1                                             | 6.2    | 205                                                            | 101.00   | 105.12                | 1.041                | N         |
| 2                                             | 6.4    | 206                                                            | 101.46   | 107.17                | 1.056                | N         |
| 3                                             | 6.4    | 207                                                            | 100.83   | 107.69                | 1.068                | N         |
| 4                                             | 6.4    | 206                                                            | 101.60   | 106.46                | 1.048                | N         |
| 5                                             | 6.6    | 206                                                            | 101.21   | 108.56                | 1.073                | Y         |
| 6                                             | 6.6    | 207                                                            | 101.33   | 110.73                | 1.093                | Y         |
| 7                                             | 6.6    | 203                                                            | 100.98   | 109.44                | 1.084                | Y         |
| Test result                                   |        | L1=6.6%, L2=6.4%, LFL=6.5% at 205(±5)°C and 101(±5)kPa         |          |                       |                      |           |



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## Appendix B: Cell vent gas burning velocity ( $S_u$ ) test

Same synthetically replicated gas mixture as LFL test was used for the test.

|                             |                                                                                                                                                                                                                                                                                                         |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Method                 | ISO 817: 2014 / Amd 1: 2017<br>Refrigerants - Designation and safety classification                                                                                                                                                                                                                     |
| Test Item                   | Burning velocity of flammable gases                                                                                                                                                                                                                                                                     |
| Test Apparatus              | Test vessel: Glass tube; length 1500 mm; inner diameter 40 mm<br>Ignition system: Electric spark<br>Recorder: High speed camera                                                                                                                                                                         |
| Preparation of Test Mixture | Partial pressure method used inside the vessel;<br>Accuracy: within 0.2% absolute                                                                                                                                                                                                                       |
| Symbol and definition       | The symbols used in this report are defined as below except otherwise defined:<br>$c_s$ — Concentration of sample;<br>$S_s$ — Flame propagation speed;<br>$a_f$ — Cross-sectional area of flame bottom;<br>$A_f$ — Flame surface area;<br>$S_u$ is calculated as:<br>$S_u = S_s \times \frac{a_f}{A_f}$ |
| Remark                      | This report is effective under the specific condition; please seek for the advice of expert for risk assessment in producing, processing, transportation and storage.                                                                                                                                   |

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| Burning velocity test data (part) |                       |                                                                                                                                                                                   |                                                      |                         |
|-----------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-------------------------|
| Test Condition                    |                       | Initial temperature: room temperature<br>Initial pressure: atmospheric pressure<br>The oxidant used: synthetic air<br>Smallest flammable substance content increment: 1.0% volume |                                                      |                         |
| No                                | C <sub>s</sub><br>[%] | S <sub>s</sub><br>[m/s]                                                                                                                                                           | a <sub>f</sub> / A <sub>f</sub><br>[m <sup>2</sup> ] | S <sub>u</sub><br>[m/s] |
| 1                                 | 21%                   | 1.032                                                                                                                                                                             | 0.492                                                | 0.508                   |
| 2                                 | 22%                   | 1.267                                                                                                                                                                             | 0.510                                                | 0.646                   |
| 3                                 | 23%                   | 1.366                                                                                                                                                                             | 0.511                                                | 0.698                   |
| 4                                 | 24%                   | 1.426                                                                                                                                                                             | 0.506                                                | 0.722                   |
| 5                                 | 25%                   | 1.483                                                                                                                                                                             | 0.509                                                | 0.755                   |
| 6                                 | 26%                   | 1.524                                                                                                                                                                             | 0.511                                                | 0.779                   |
| 7                                 | 27%                   | 1.467                                                                                                                                                                             | 0.506                                                | 0.742                   |
| 8                                 | 28%                   | 1.432                                                                                                                                                                             | 0.504                                                | 0.722                   |
| 9                                 | 29%                   | 1.393                                                                                                                                                                             | 0.501                                                | 0.698                   |
| Test result                       |                       | Su= 0.779m/s at room temperature and atmosphere pressure.                                                                                                                         |                                                      |                         |

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## Appendix C: Cell vent gas maximum pressure ( $P_{\max}$ ) test

Same synthetically replicated gas mixture as LFL test was used for the test.

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Method                 | EN 15967:2011 Determination of maximum explosion pressure and the maximum rate of pressure rise of gases and vapours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Test Item                   | Maximum explosion pressure of the gas mixture                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Test Apparatus              | Test Vessel: 5L closed sphere<br>Ignition system: Fusing Wire                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Preparation of Test Mixture | Partial pressure method used inside the vessel;<br>Accuracy: within 0.2% absolute                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Symbol and definition       | <p>The symbols used in this report are defined as below except otherwise defined:</p> <p><math>c_s</math> — Content of flammable substance by volume;</p> <p><math>p_{\text{exn}}</math> — Explosive overpressure in the <math>n^{\text{th}}</math> ignition test at a certain concentration;</p> <p><math>p_{\text{ex}}</math> — Highest pressure occurring in a closed vessel during the explosion of a specific mixture of flammable substances with air or air and inert gases determined under specified test conditions;</p> <p><math>P_{\text{Mean}}</math> — The average value of the explosion overpressure at a certain concentration;</p> <p><math>P_{\max}</math> — Maximum explosion pressure;</p> <p><math>p_{\max}</math> is expressed as the maximum value of <math>p_{\text{ex}}</math>.</p> |
| Remark                      | This report is effective under the specific condition; please seek for the advice of expert for risk assessment in producing, processing, transportation and storage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

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| P <sub>max</sub> test data (part) |                       |                           |                               |                           |                           |                           |
|-----------------------------------|-----------------------|---------------------------|-------------------------------|---------------------------|---------------------------|---------------------------|
| Test Condition                    |                       |                           | Initial Temperature: 25(±2)°C |                           |                           |                           |
|                                   |                       |                           | Initial Pressure: 101(±5)kPa  |                           |                           |                           |
| Part of Test Data                 |                       |                           |                               |                           |                           |                           |
| No.                               | C <sub>s</sub><br>[%] | p <sub>ex1</sub><br>[MPa] | p <sub>ex2</sub><br>[MPa]     | p <sub>ex3</sub><br>[MPa] | p <sub>ex4</sub><br>[MPa] | p <sub>ex5</sub><br>[MPa] |
| 1                                 | 19                    | 0.6106                    | 0.6213                        | 0.6119                    | --                        | --                        |
| 2                                 | 21                    | 0.6593                    | 0.6599                        | 0.6587                    | --                        | --                        |
| 3                                 | 23                    | 0.7070                    | 0.6801                        | 0.6942                    | --                        | --                        |
| 4                                 | 25                    | 0.7319                    | 0.7286                        | 0.7308                    | --                        | --                        |
| 5                                 | 27                    | 0.7571                    | 0.7565                        | 0.7562                    | --                        | --                        |
| 6                                 | 29                    | 0.7550                    | 0.7691                        | 0.7644                    | --                        | --                        |
| 7                                 | 29.8                  | 0.7667                    | 0.7693                        | 0.7713                    | 0.7702                    | 0.7688                    |
| 8                                 | 31                    | 0.7796                    | 0.7805                        | 0.7784                    | 0.7815                    | 0.7820                    |
| 9                                 | 31.2                  | 0.7764                    | 0.7782                        | 0.7758                    | 0.7773                    | 0.7672                    |
| 10                                | 31.4                  | 0.7745                    | 0.7675                        | 0.7583                    | 0.7726                    | 0.7747                    |
| 11                                | 33                    | 0.7562                    | 0.7517                        | 0.7537                    | --                        | --                        |
| 12                                | 35                    | 0.7350                    | 0.7351                        | 0.7355                    | --                        | --                        |

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**Determination of the explosion pressure**

| No. | C <sub>s</sub><br>[%] | P <sub>Mean</sub><br>[MPa] | P <sub>max</sub><br>[MPa] |
|-----|-----------------------|----------------------------|---------------------------|
| 1   | 19                    | 0.6146                     | 0.6213                    |
| 2   | 21                    | 0.6593                     | 0.6599                    |
| 3   | 23                    | 0.6938                     | 0.7070                    |
| 4   | 25                    | 0.7304                     | 0.7319                    |
| 5   | 27                    | 0.7566                     | 0.7571                    |
| 6   | 29                    | 0.7628                     | 0.7691                    |
| 7   | 29.8                  | 0.7693                     | 0.7713                    |
| 8   | 31                    | 0.7804                     | 0.7820                    |
| 9   | 31.2                  | 0.7750                     | 0.7782                    |
| 10  | 31.4                  | 0.7695                     | 0.7747                    |
| 11  | 33                    | 0.7539                     | 0.7562                    |
| 12  | 35                    | 0.7352                     | 0.7355                    |

**Test result**

|                                                |               |
|------------------------------------------------|---------------|
| Content of flammable substance                 | 31 % volume   |
| Smallest flammable substance content increment | 0.2% absolute |
| Maximum explosion pressure (P <sub>max</sub> ) | 0.78 MPa      |

**End of Test Report**

## Fire Protection System of ESS Container

### 1. Introduction

This document describes the layout and the control logic of various fire protection systems in the ESS container (Hithium ∞Block L5015-0.5P V2.0).

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### 2. Layout and Descriptions

The fire protection system is designed following the NFPA855 installation standard for stationary energy storage system.

The fire protection system includes FACP (Fire alarm control panel), automatic alarm system, ventilation system, aerosol fire extinguishing system and water spray system (Optional).

The ESS container enclosure plates are three-layer structure composed of double steel plate and fireproof rock wool, and the fire resistance rating is greater than 1h.

The interior and exterior decoration materials are all flame retardant materials, and the fire protection grade of the materials is UL94-V0. The combustible gas concentration reduction system is provided with a minimum of 2 hours of standby power according to NFPA 855-2023 section 9.6.5.6.7 (3). The gas detection system is provided with a minimum of 24 hours of standby power and 2 hours in alarm according to NFPA 855-2023 section 9.6.5.6.7 (4).

A secondary power supply is provided for smoke and fire detection systems in accordance with NFPA 72 capable of 24 hours in standby and 2 hours in alarm according to NFPA 855-2023 section 4.8.3.

Table2-1 Introduction of fire protection system button

| No. | Item                                           | Quantity | Function                                                                                                 |
|-----|------------------------------------------------|----------|----------------------------------------------------------------------------------------------------------|
| 1   | Ventilation system emergency start/stop button | 1        | Manually Start or Stop the Fan.                                                                          |
| 2   | Manual Pull Station                            | 1        | When a fire has occurred, aerosol can be manually released.                                              |
| 3   | Abort Switch                                   | 1        | During the delay release period, it can abort the execution of the firefighting operation.               |
| 4   | Disablement Switch                             | 1        | During maintenance period, disconnect the aerosol release circuit to prevent accidental aerosol release. |

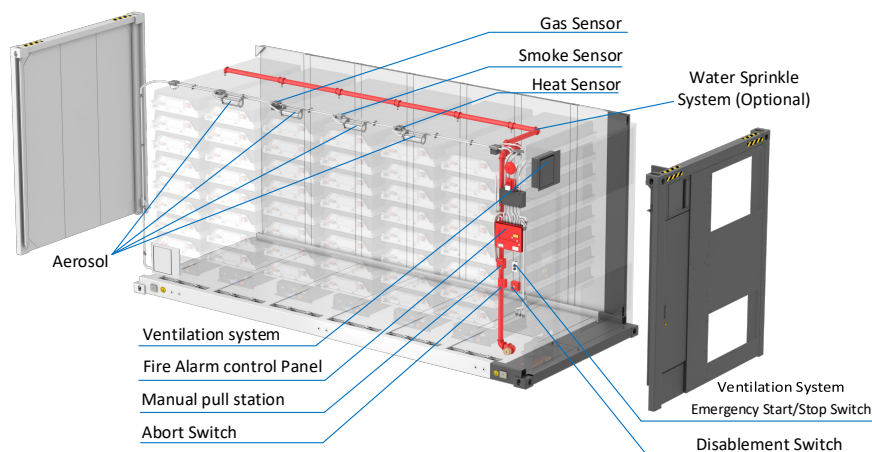


Fig2-1 Fire Protection System



## 2.1. Automatic Alarm System

The automatic alarm system is mainly composed of FACP, heat detector, smoke detector, alarm bell, horn/strobe, disablement switch, abort switch and manual pull station.

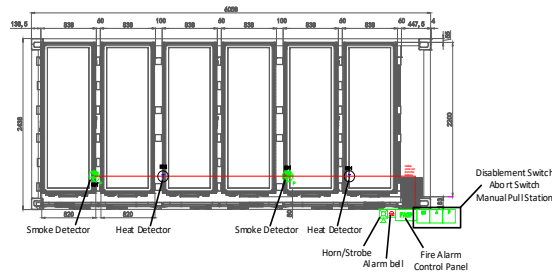


Fig2-2 Automatic Alarm System

## 2.2. Ventilation System

The ventilation system mainly consists of combustible gas detector, fan controller, air inlet electric shutter and exhaust fan.

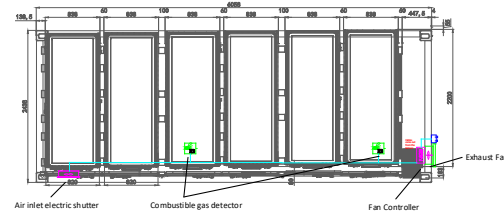


Fig2-3 Air Inlet and Exhaust System

## 2.3. Aerosol Fire Extinguishing System

The aerosol fire extinguishing system is mainly composed of 4 aerosols.

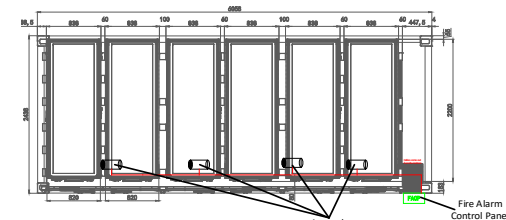


Fig2-4 Aerosol Fire Extinguishing System

## 2.4. Water Spray System

The water spray system is mainly composed of sprinklers and pipes.

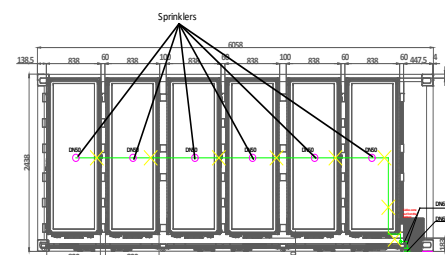


Fig2-5 Water Spray System

DN65 quick connector shall be reserved for connecting outdoor fire hydrant or fire truck.

## 2.5. Fire Protection System Diagram

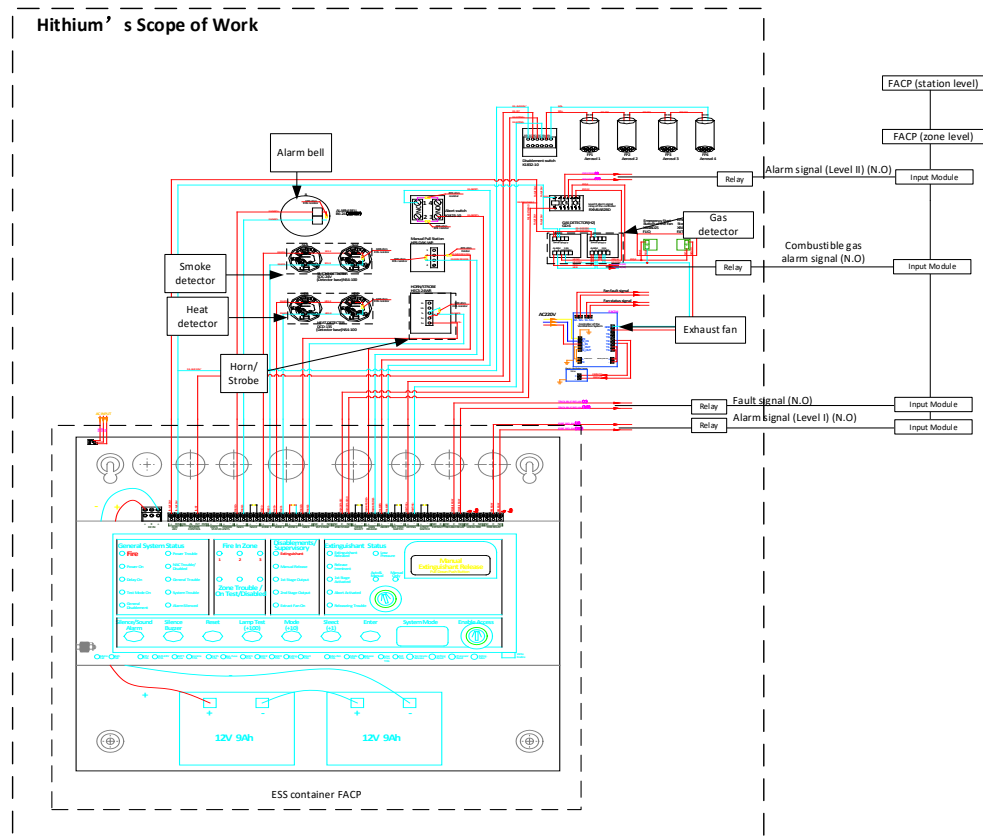
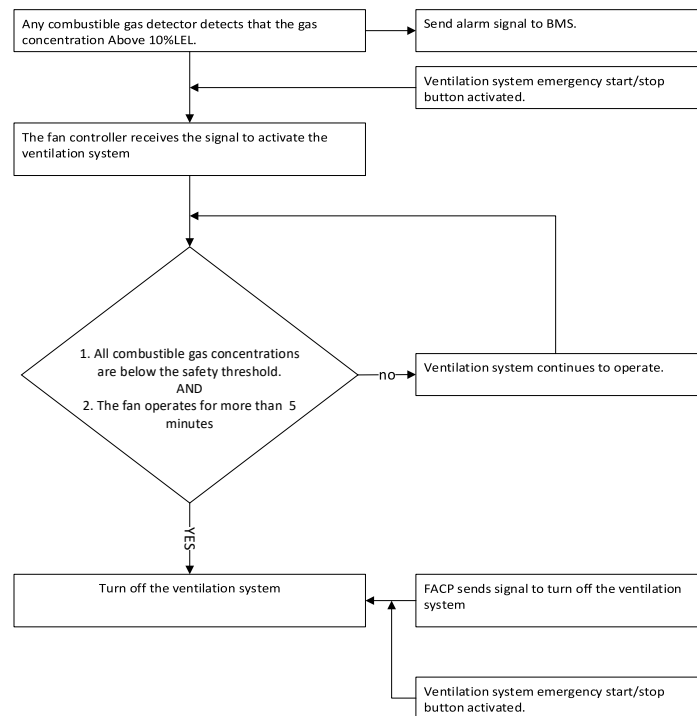


Fig2-6 Fire Protection System Diagram

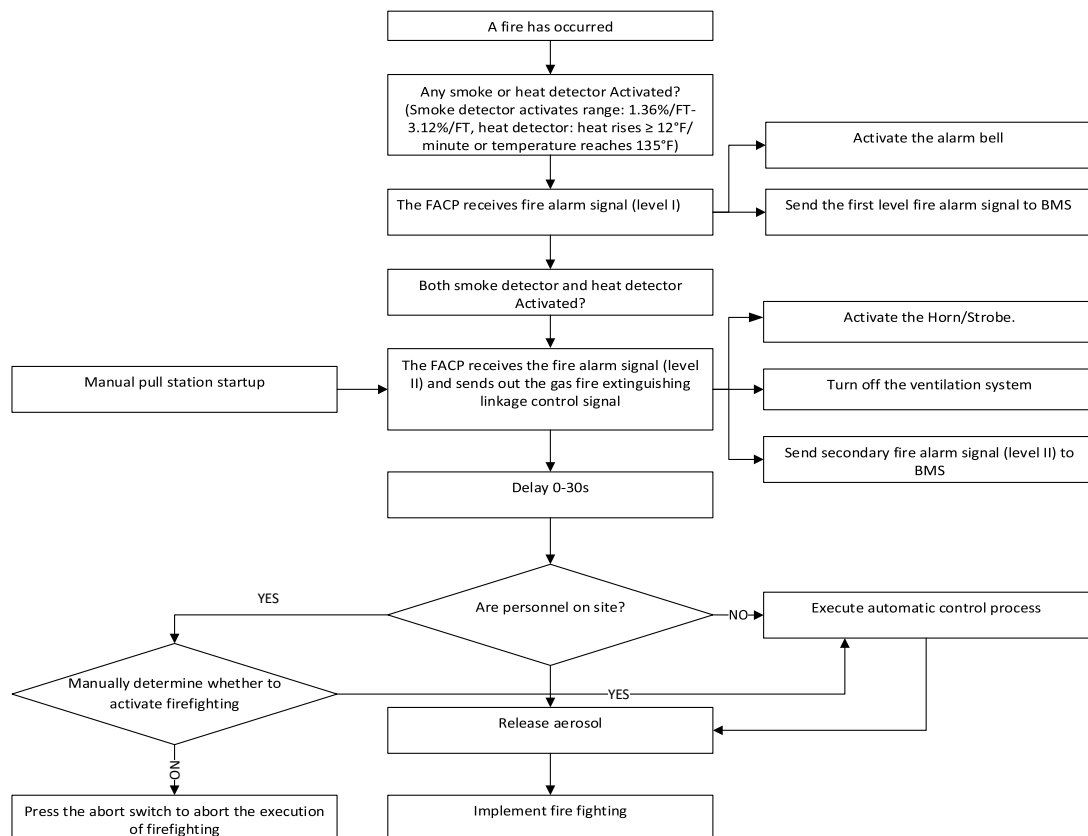
As shown above, four of dry contact output signals will be exported from the ESS fire protection system, which include Alarm signal (level I), Alarm signal (level II), Fault signal and Combustible gas alarm signal. These four signals shall be transmitted to the input modules in the ESS container, and then connects to the station level FACP/zone level FACP (for large projects) for communications.

### 3. Control Logic of Fire Extinguishing Process

#### 3.1. Control Logic of Air Inlet and Exhaust System



#### 3.2. Control Logic of Automatic Fire Protection System



#### 4. Configuration List

| No | Item                                           | Unit | Quantity | Compliance   |
|----|------------------------------------------------|------|----------|--------------|
| 1  | Fire alarm control panel                       | pcs  | 1        | UL 864       |
| 2  | Battery                                        | pcs  | 2        | UL 1989      |
| 3  | Smoke detector                                 | pcs  | 2        | UL 268       |
| 4  | Heat detector                                  | pcs  | 2        | UL 521       |
| 5  | Detector base                                  | pcs  | 4        | UL 521       |
| 6  | Abort switch                                   | pcs  | 1        | UL 864       |
| 7  | Manual pull station                            | pcs  | 1        | UL 38        |
| 8  | Disablement switch                             | pcs  | 1        | UL 864       |
| 9  | Horn/Strobe                                    | pcs  | 1        | UL 1971      |
| 10 | Alarm bell                                     | pcs  | 1        | UL 464       |
| 11 | Relay                                          | pcs  | 1        | UL 508       |
| 12 | Aerosol                                        | pcs  | 4        | UL 2775      |
| 13 | Aerosol bracket                                | pcs  | 4        | N/A          |
| 14 | Hydrogen detector (H2)                         | pcs  | 2        | UL 61010     |
| 15 | Electric ventilation louver                    | pcs  | 1        | UL 962       |
| 16 | Exhaust fan                                    | pcs  | 1        | EN IEC 60079 |
| 17 | Ventilation system emergency start/stop button | pcs  | 1        | UL 508       |
| 18 | Sprinkler                                      | pcs  | 6        | UL 199       |
| 19 | Quick connector                                | pcs  | 1        | H28          |
| 20 | Installation accessories                       | Set  | 1        | N/A          |

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|                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                      |                       |                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------|--------------------------------|
| <b>Prüfbericht-Nr.:</b><br>Test report no.:                                                                                                                                                                                                                                                                                                                                                                                                         | <b>CN244DBX 001</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Auftrags-Nr.:</b><br>Order no.:                                                   | <b>168460578</b>      | Seite 1 von 40<br>Page 1 of 40 |
| <b>Kunden-Referenz-Nr.:</b><br>Client reference no.:                                                                                                                                                                                                                                                                                                                                                                                                | 2347845                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Auftragsdatum:</b><br>Order date:                                                 | 2023-12-28            |                                |
| <b>Auftraggeber:</b><br>Client:                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Xiamen Hithium Energy Storage Technology Co., Ltd.</b><br>No.1 Benyuan Road, Tongxiang High - Tech Zone, Xiamen, Fujian, China                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                      |                       |                                |
| <b>Prüfgegenstand:</b><br>Test item:                                                                                                                                                                                                                                                                                                                                                                                                                | Battery cluster                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                      |                       |                                |
| <b>Bezeichnung / Typ-Nr.:</b><br>Identification / Type no.:                                                                                                                                                                                                                                                                                                                                                                                         | LC083502                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                      |                       |                                |
| <b>Auftrags-Inhalt:</b><br>Order content:                                                                                                                                                                                                                                                                                                                                                                                                           | Test report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                      |                       |                                |
| <b>Prüfgrundlage:</b><br>Test specification:                                                                                                                                                                                                                                                                                                                                                                                                        | UL 9540A: 2019 (Fourth Edition)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                      |                       |                                |
| <b>Wareneingangsdatum:</b><br>Date of sample receipt:                                                                                                                                                                                                                                                                                                                                                                                               | 2024-03-01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                       |                                |
| <b>Prüfmuster-Nr.:</b><br>Test sample no.:                                                                                                                                                                                                                                                                                                                                                                                                          | Engineering samples                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                      |                       |                                |
| <b>Prüfzeitraum:</b><br>Testing period:                                                                                                                                                                                                                                                                                                                                                                                                             | 2024-03-02 to 2024-03-07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                      |                       |                                |
| <b>Ort der Prüfung:</b><br>Place of testing:                                                                                                                                                                                                                                                                                                                                                                                                        | See page 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                      |                       |                                |
| <b>Prüflaboratorium:</b><br>Testing laboratory:                                                                                                                                                                                                                                                                                                                                                                                                     | TÜV Rheinland (Shenzhen) Co., Ltd.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                      |                       |                                |
| <b>Prüfergebnis*:</b><br>Test result*:                                                                                                                                                                                                                                                                                                                                                                                                              | See main report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                      |                       |                                |
| <b>erstellt von:</b><br>created by:                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>genehmigt von:</b><br>authorized by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                      |                       |                                |
| <b>Datum:</b><br>Date:                                                                                                                                                                                                                                                                                                                                                                                                                              | 2024-04-26                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Ausstellungsdatum:</b><br>Issue date:                                             | 2024-04-26            |                                |
| <b>Stellung / Position:</b>                                                                                                                                                                                                                                                                                                                                                                                                                         | Project Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Stellung / Position:</b>                                                          | Reviewer              |                                |
| <b>Sonstiges / Other:</b>                                                                                                                                                                                                                                                                                                                                                                                                                           | This report does not evidence compliance of the provided sample with the relevant standards but only with the referred tests. This test report documents the findings of examination conducted on the delivered product mentioned above only. This report does not entitle the applicant to carry any safety mark on this or similar products. Further for sales or other application purposes of the tested product, any reference to TÜV Rheinland or a test through TÜV Rheinland is only permissible with prior written consent of TÜV Rheinland. |                                                                                      |                       |                                |
| <b>Zustand des Prüfgegenstandes bei Anlieferung:</b><br>Condition of the test item at delivery:                                                                                                                                                                                                                                                                                                                                                     | Prüfmuster vollständig und unbeschädigt<br>Test item complete and undamaged                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                      |                       |                                |
| * Legende:                                                                                                                                                                                                                                                                                                                                                                                                                                          | P(ass) = entspricht o.g. Prüfgrundlage(n)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | F(ail) = entspricht nicht o.g. Prüfgrundlage(n)                                      | N/A = nicht anwendbar | N/T = nicht getestet           |
| * Legend:                                                                                                                                                                                                                                                                                                                                                                                                                                           | P(ass) = passed a.m. test specification(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | F(ail) = failed a.m. test specification(s)                                           | N/A = not applicable  | N/T = not tested               |
| <b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b><br>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                      |                       |                                |



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**Anmerkungen**  
*Remarks*

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</p> <p>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| 4 | <p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p>                                                                                                                                                                                                                                                                                       |

## INTRODUCTION

Model fire codes and energy storage system standards require energy storage systems to comply with UL 9540, which in turn requires battery cells and modules to comply with UL 1973. Compliance with these standards reduces the risk of batteries and battery energy storage systems (BESS) creating fire, shock or personal injury hazards. However, they don't evaluate the ability of the BESS installed as intended and with fire suppression mechanisms in place if necessary, from contributing to a fire or explosion in the end use installations.

To address these fire and explosion hazards associated with the installation of a BESS, the fire and other codes require energy storage systems to meet certain location, separation, fire suppression and other criteria. Those codes also provide a means to provide an equivalent level of safety based on large scale fire testing of anticipated BESS installations.

UL 9540A is intended to provide a test method that can be used as a basis for validating the safety of a BESS installation in lieu of meeting the specific criteria provided in those codes. The data generated can be used to determine the fire and explosion protection required for installation of a BESS.

The test method is initiated through the establishment of a thermal runaway condition that leads to combustion within the BESS. The test method outlined in UL 9540A consists of several steps – cell level testing, module level testing, unit level testing and installation level testing. The cell and module level testing steps are information gathering steps to inform the unit and installation level testing.

The following outlines the information that may be gathered as part of the testing:

- a) Cell level – An individual cell fails in a manner that leads to thermal runaway and fire through a suitable method such as external heating. Data such as off-gassing contents, temperatures at venting and temperatures at thermal runaway are recorded.
- b) Module level – One or more cells within a BESS module fail in the manner determined during the cell level testing. Data such as fire propagation in the module, temperatures on the failed cells and surrounding cells, off-gassing contents and heat release data are gathered.
- c) Unit level – A complete BESS is installed surrounded by target (e.g. dummy) BESS and walls separated at a distance as intended in its installation. The module level test is repeated on a module located in the BESS in the most unfavorable location. Data such as temperature within the BESS, on surrounding walls and target BESS; incident heat flux on walls and target BESS; observation of fire propagation from BESS to target units and walls as well as observance of explosions or evidence of re-ignition within the BESS; and heat release and off-gassing contents are gathered.
- d) Installation level – This test is a repeat of the unit level test with the test conducted within a test room and with the intended fire suppression system installed as well as any overhead cables (that can lead to fire propagation) installed. This test is intended to validate the fire suppression system for the BESS installation. Data such as temperature within the BESS, on surrounding walls and target BESS; incident heat flux on walls and target BESS; fire propagation from the BESS to target units, walls or overhead cables and any observable explosion incidents or re-ignition within the BESS; and off-gassing contents (if needed) and heat release are gathered.

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## 1 General information

### 1.1 Test specification

**Standard: ANSI/CAN/UL 9540A: 2019 (Fourth Edition)**

**Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems**

This report presents the result of unit level tests of UL 9540A: 2019.

All tests were conducted at TUV Rheinland (Shenzhen) Co., Ltd. and TUV Rheinland's partner labs that were under supervision of TÜV Rheinland's engineer.

Testing period: 2024-03-02 to 2024-03-07

Refer to Clause 4 for test and measurement instruments.

### 1.2 General remarks

This report is descriptive and provide the test data only.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the testing laboratory.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

### 1.3 Revision information

New report, not applicable.

## 1.4 Definitions

**CELL** – The basic functional electrochemical unit containing an assembly of electrodes, electrolyte, separators, container, and terminals. It is a source of electrical energy by direct conversion of chemical energy.

**MODULE** – A subassembly that is a component of a BESS that consists of a group of cells or electrochemical capacitors connected together either in a series and/or parallel configuration (sometimes referred to as a block) with or without protective devices and monitoring circuitry.

**UNIT** – A frame, rack or enclosure that consists of a functional BESS which includes components and subassemblies such as cells, modules, battery management systems, ventilation devices and other ancillary equipment.

**BATTERY SYSTEM (BS)** – Is a component of a BESS and consists of one or more modules typically in a rack configuration, controls such as the BMS and components that make up the system such as cooling systems, disconnects and protection devices.

**BATTERY ENERGY STORAGE SYSTEM (BESS)** – Stationary equipment that receives electrical energy and then utilizes batteries to store that energy to supply electrical energy at future time. The BESS, at a minimum consists of one or more modules, a power conditioning system (PCS), battery management system (BMS) and balance of plant components.

a) **INITIATING BATTERY ENERGY STORAGE SYSTEM UNIT (INITIATING BESS)** – A BESS unit which has been equipped with resistance heaters in order to create the internal fire condition necessary for the installation level test.

b) **TARGET BATTERY ENERGY STORAGE SYSTEM UNIT (TARGET BESS)** – The enclosure and/or rack hardware that physically supports and/or contains the components that comprise a BESS. The target BESS unit does not contain energy storage components, but serves to enable instrumentation to measure the thermal exposure from the initiating BESS.

**Note:** Depending upon the configuration and design of the BESS (e.g. the BESS is composed of multiple separate parts within separate enclosures), the unit level test can be done at battery system level. In such case, the BESS is be read as BS throughout this report.

**NON-RESIDENTIAL USE** – Intended for use in commercial, industrial or utility owned locations.

**RESIDENTIAL USE** – In accordance with this standard, intended for use in one or two family homes and town homes and individual dwelling units of multi-family dwellings.

**THERMAL RUNAWAY**- The incident when an electrochemical cell increases its temperature through self-heating in an uncontrollable fashion. The thermal runaway progresses when the cell's generation of heat is at a higher rate than the heat it can dissipate. This may lead to fire, explosion and gas evolution.

**STATE OF CHARGE (SOC)** – The available capacity in a BESS, pack, module or cell expressed as a percentage of rated capacity.

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## 2 General Product Information

The product information and parameters were provided by the client as below.

### 2.1 Cell

|                                           |                                                                                                                                                                                                                 |                          |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Manufacturer:                             | <b>Xiamen Hithium Energy Storage Technology Co., Ltd.</b><br>201-1, Comprehensive Building 5, No. 11, Butang Middle Road, Industrial Base Of Xiamen Torch High Tech Zone (Tongxiang), Xiamen, Fujian P.R. China |                          |
| Model number:                             | LFP71173207/314Ah                                                                                                                                                                                               |                          |
| Chemistry:                                | <input checked="" type="checkbox"/> LiFePO <sub>4</sub> <input type="checkbox"/> NMC <input type="checkbox"/> NCA <input type="checkbox"/> LTO<br><input type="checkbox"/> Other:                               |                          |
| Physical configuration:                   | <input checked="" type="checkbox"/> Prismatic <input type="checkbox"/> Cylindrical <input type="checkbox"/> Pouch                                                                                               |                          |
|                                           | Weight(kg):                                                                                                                                                                                                     | 5.60±0.20                |
| Electrical rating :                       | Rated capacity (Ah):                                                                                                                                                                                            | 314 (25°C±2°C)           |
|                                           | Nominal voltage (V):                                                                                                                                                                                            | 3.2                      |
| Standard charge method:                   | Charge current (A):                                                                                                                                                                                             | 157(25°C±2°C)            |
|                                           | Standard Charge Voltage (V):                                                                                                                                                                                    | 3.65                     |
|                                           | Cut off current (A):                                                                                                                                                                                            | /                        |
| Standard discharge method:                | Discharge current (A):                                                                                                                                                                                          | 157(25°C±2°C)            |
|                                           | End of discharge voltage (V):                                                                                                                                                                                   | 2.5(T>0°C)<br>2.0(T≤0°C) |
| Maximum continuous charge current (A):    | 314(25°C±2°C)                                                                                                                                                                                                   |                          |
| Maximum continuous discharge current (A): | 314(25°C±2°C)                                                                                                                                                                                                   |                          |
| Compliance with UL 1973:                  | <input checked="" type="checkbox"/> Yes <u>TUV Report No.: CN23RGEH 001</u><br><input type="checkbox"/> No                                                                                                      |                          |



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### Cell level test information

Cell level thermal runaway test information is copy from TUV Rheinland UL 9540A cell level test report No.: CN23F118 001

|                                                         |                                                                                                                                       |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Thermal Runaway Methodology:                            | External heater applied on one side of the cell with surface heating rate at about of 5°C per minute until thermal runaway triggered. |
| Average Cell Surface Temperature at Gas Venting:        | 203.7°C                                                                                                                               |
| Average Cell Surface Temperature Start Thermal Runaway: | 295.7°C                                                                                                                               |

## 2.2 Module

|                            |                                                                                                                                                                                                                        |                                         |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Manufacturer:              | <b>Xiamen Hithium Energy Storage Technology Co., Ltd.</b><br>201-1, Comprehensive Building 5, No. 11, Butang Middle Road,<br>Industrial Base Of Xiamen Torch High Tech Zone (Tongxiang),<br>Xiamen, Fujian, P.R. China |                                         |
| Model number:              | LM010401-A                                                                                                                                                                                                             |                                         |
| Physical configuration:    | Metal base, the other sides are non-metallic material.<br>A mica plate is installed under the top enclosure.                                                                                                           |                                         |
|                            | Weight:                                                                                                                                                                                                                | 680 ±10 kg                              |
|                            | Cells in series/parallel:                                                                                                                                                                                              | 2P52S                                   |
| Cooling method:            | Liquid cooling                                                                                                                                                                                                         |                                         |
| Separation between cells:  | Thermal insulation sheet: Aerogel Heat insulation pad and<br>Polyurethane foam, see Figure 4 for install location details.                                                                                             |                                         |
| Electrical rating:         | Rated capacity:                                                                                                                                                                                                        | 628 Ah                                  |
|                            | Nominal voltage:                                                                                                                                                                                                       | 166.4Vdc                                |
| Standard charge method:    | Charge power:                                                                                                                                                                                                          | 52.25KW                                 |
|                            | End of charge:                                                                                                                                                                                                         | The highest cell voltage reaches 3.65 V |
| Standard discharge method: | Discharge power:                                                                                                                                                                                                       | 52.25KW                                 |
|                            | End of discharge:                                                                                                                                                                                                      | The lowest cell voltage reaches 2.5 V   |
| Compliance with UL 1973:   | <input type="checkbox"/> Yes                                                                                                                                                                                           | <input checked="" type="checkbox"/> No  |

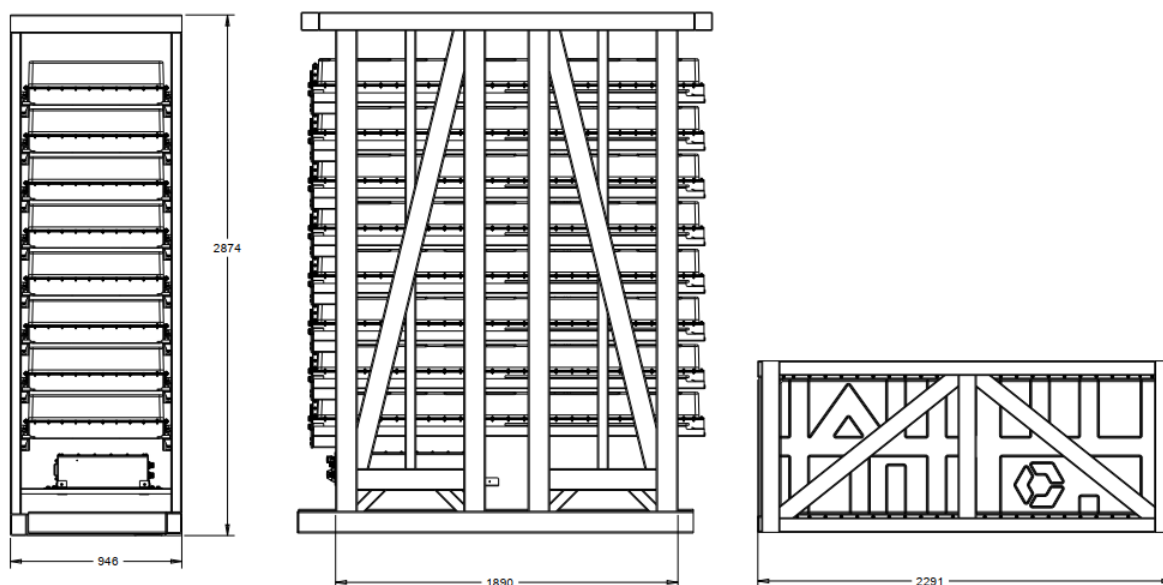
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## 2.3 Unit

|                                                           |                                                                                     |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------|
| Product name                                              | Battery cluster                                                                     |
| Model                                                     | LC083502                                                                            |
| Voltage range                                             | 1040 VDC – 1500 VDC                                                                 |
| Nominal voltage                                           | 1331.2VDC                                                                           |
| Rated capacity                                            | 628Ah                                                                               |
| Operating Temperature                                     | 0-55°C(Cell)(Charge),<br>-30-55°C(Cell)(Discharge)                                  |
| Recommend charging method declared by the manufacturer    | Charged with constant power 417.996kW till cell voltage reaches 3.65V, at 25±2°C.   |
| Recommend discharging method declared by the manufacturer | Discharged with constant power 417.996kW till cell voltage reaches 2.5V, at 25±2°C. |
| Nominal mass                                              | 6500±500kg                                                                          |
| External dimensions (mm)                                  | L*W*H: 946*2291*2874                                                                |

Unit diagram with overall dimension, Unit: mm:



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## 2.4 Photo



Unit

## **3 Unit level test (section 9 of UL 9540A)**

### **3.1 General**

Unit level testing corresponds with the testing anticipated by fire codes and other codes impacting energy storage system installations to evaluate the large scale fire performance of BESS units installed in, on or adjacent to buildings or in other areas and their resultant performance to qualify for exceptions to limits in the codes imposed on these installations. The limitations where exceptions may be sought are limitations on the size of the individual BESS units, the total number of BESS units installed within a room, and the separation distances between BESS units and between BESS units and walls of the building.

In this test the initiating BESS unit is placed a set distance from target BESS units simulating BESS units identical to the initiating BESS unit, and from simulated walls representative on the installation. A thermal runaway is induced in cells, using the same approach as used in the module level testing within one of the modules in the initiating BESS, and a variety of measurements are taken. The results are intended to be used to verify that a fire within a single BESS unit will not spread to other units, nor breach the walls or the BESS enclosure (if provided), and there shall be no flying debris or explosive discharge of gases.

The test arrangement include the largest (energy) BESS unit for the installation to be represented by the test, and minimum spacing to adjacent walls and BESS units. The BESS may be tested with an internal fire suppression system provided by the manufacturer if that fire suppression system is required to be installed in the BESS. Optional internal fire suppression systems are not included in the unit level testing.

The test monitors the fire behavior of the BESS unit and measures heat release rates (convective and chemical); gas generation and composition; smoke release rate; maximum heat flux on the target BESS units, wall surfaces and within the accessible means of egress; maximum surface temperatures of the walls and modules within the target BESS units; and documents any explosions, deflagrations and flying debris from the BESS under test.

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## 3.2 Unit sample preparation

The battery rack is constructed with 8 modules that was considered as a unit for purposes of the test.

All 8 modules samples through 3 charge/discharge cycles per the manufacturer's instructions to verify that the module was functional. Each cycle was defined as a charge to 100% SOC and allowed to rest 30 minutes and then discharged to an end of discharge voltage (EODV) determined by the module specification. Refer to 2.2 for the end of condition of charge and discharge.

## 3.3 Setup of the test

### 3.3.1 Battery system installation information

The installation information was provided by the client as below.

|                             |                                                          |                                                     |
|-----------------------------|----------------------------------------------------------|-----------------------------------------------------|
| Intended use location.....: | <input type="checkbox"/> Residential                     | <input checked="" type="checkbox"/> Non-residential |
|                             | <input type="checkbox"/> Non-residential rooftop         |                                                     |
|                             | <input type="checkbox"/> Non-residential open garage use |                                                     |
| Type of installation.....:  | <input checked="" type="checkbox"/> Indoor               | <input type="checkbox"/> Outdoor                    |
|                             | <input checked="" type="checkbox"/> Floor/ground mounted | <input type="checkbox"/> Wall mounted               |
| Row(s) of installation      | <input checked="" type="checkbox"/> Single               | <input type="checkbox"/> Multiple                   |

### 3.3.2 Test site setup

Walls were constructed of 16-mm (5/8-in) gypsum wall board and painted flat black. Two units were used for the purpose of the test.

The initiating unit was positioned adjacent to the three instrumented wall sections. Minimum separation distance from the unit to wall and between unit were provided by the client, separation distance: A=B=21mm, C=70mm, D=0mm, E=F=134mm, Unit's layout can be seen in Figure 1.

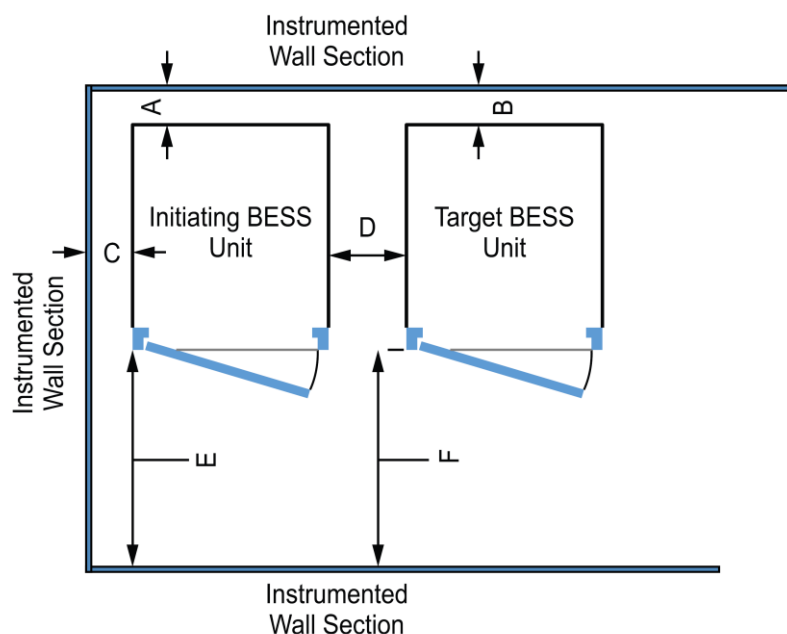


Figure 1 Layout of BESS units



### 3.3.3 Thermal runaway setup

Setup of Unit:

There were two units were marked as initiating unit and target unit, one was initiating unit, and the other was target unit. Each unit had been installed 8 modules.

Module 02 in initiating unit was selected as “initiating module” for the test.

Modules 01, 03 in initiating unit and modules in target unit were used to check the possible propagation between modules in initiating unit and target unit. Figure 2 show the details.

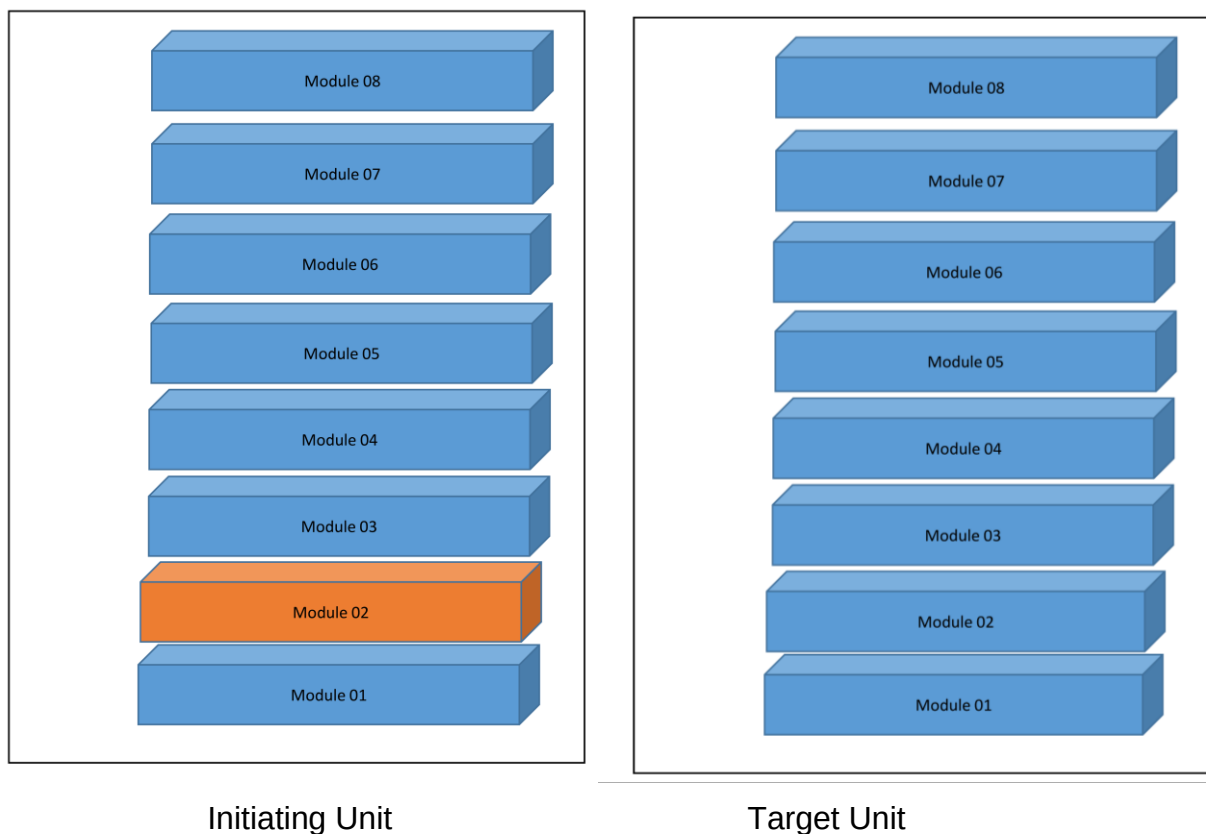
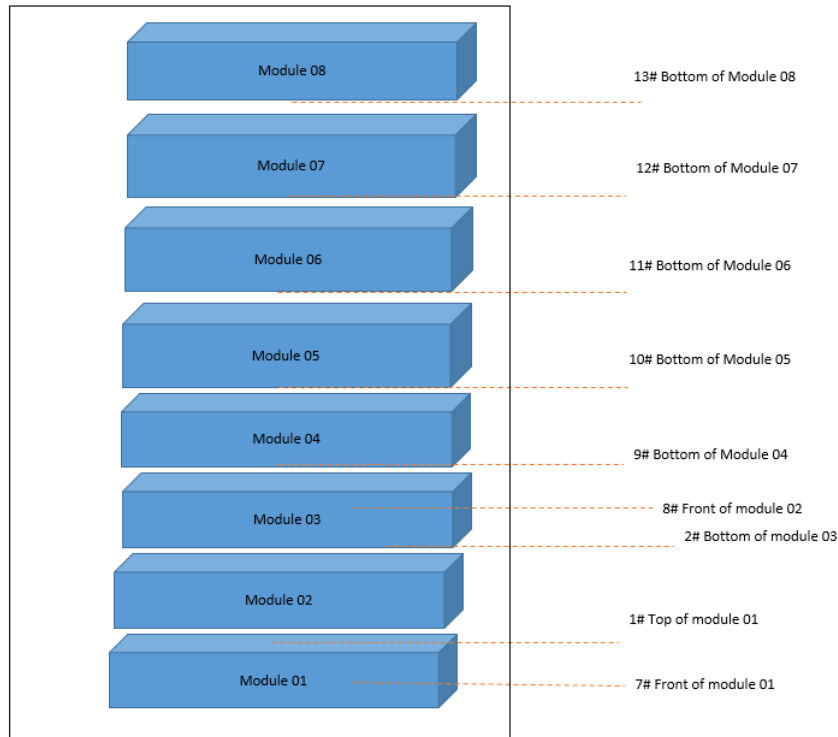


Figure 2 Module numbering in unit

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PS: #3 to #6 is on the front, back, left and right surface side of module 02

Figure 3 Thermocouple in initiating unit

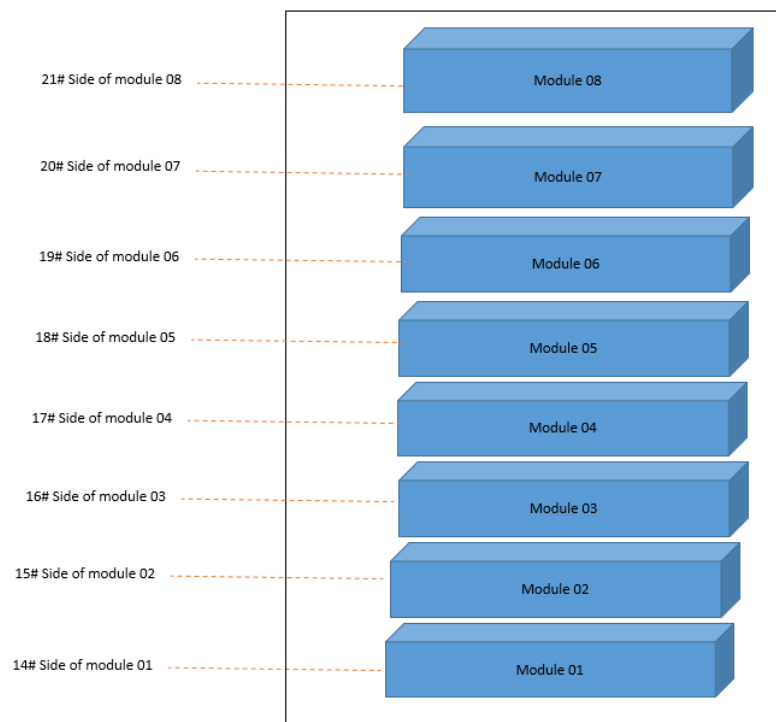


Figure 4 Thermocouple in target unit

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**Setup of module:**

The module consisted of 104 cells 2P52S. All cells in the pack were numbered from #1-1 to #1-26, #2-1 to #2-26, #3-1 to #3-26, #4-1 to #4-26 as below.

External heating method was used to initiate thermal runaway in the module. One metal heater was fitted on cell (rated 220V ac/1000 W, size 190\*160).

Total 11 thermocouples (type K, 24AWG) were attached at the center of the wider side surface of cell and below the hater film in the module. See Figure 5 for the detail locations.

Voltage of the module was monitored during test.

See Figure 5 for the detail locations.

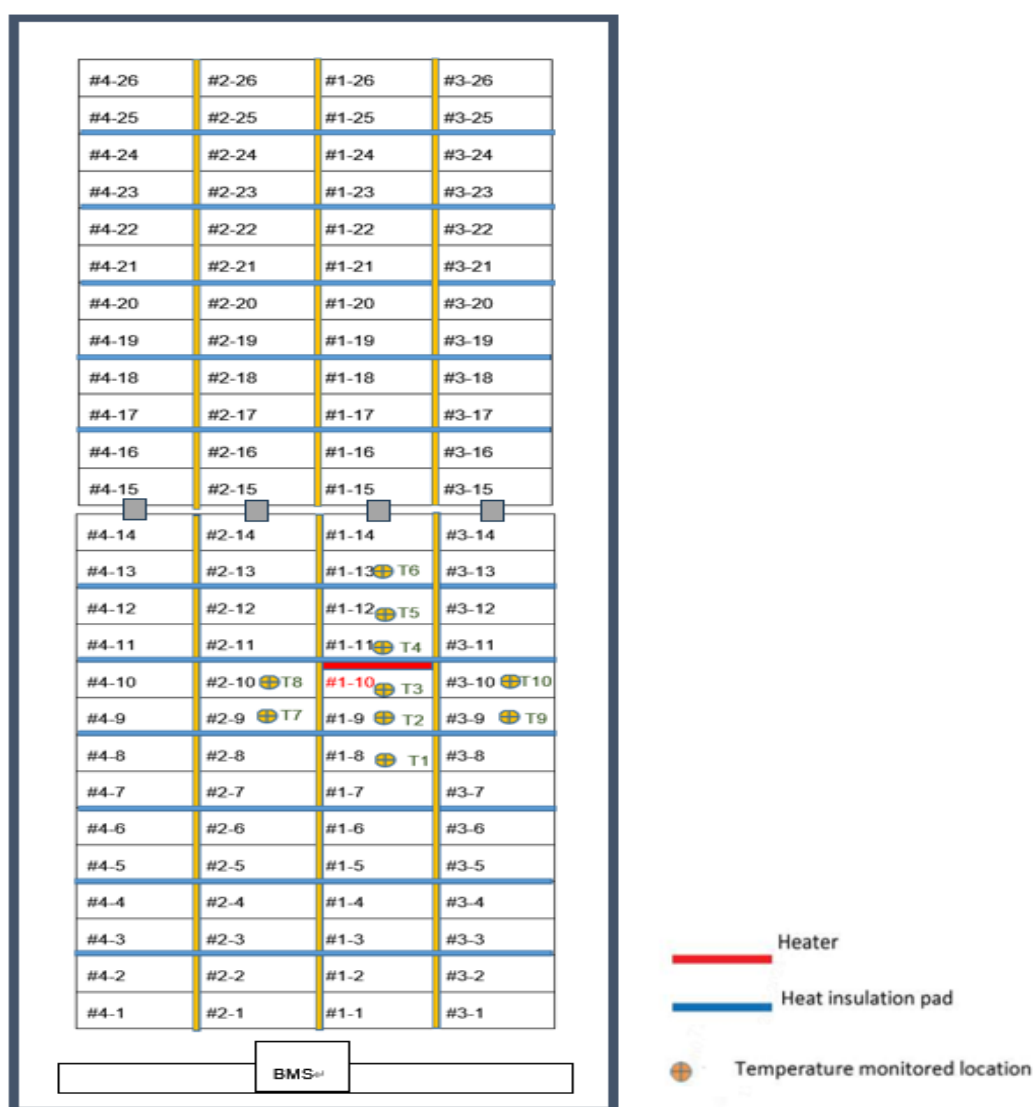


Figure 5 Cell number, location of heater, thermal insulation sheet (Aerogel Heat insulation pad and Polyurethane foam) and thermocouple

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### 3.4 Observations and records

Before test:

The initiating module was charged to 100% SOC and allowed to stabilize for a minimum of 1 h and a maximum of 8 h before the start of the test.

Ambient condition at the initiation of the test was 26.1°C, 62.1% R.H.

Test was performed on 2024-03-07, started at 1:34 PM.

| Before the test, The Module 2 in Initiating unit |       |
|--------------------------------------------------|-------|
| OCV (V)                                          | 173.5 |
| Weight (kg)                                      | 676.5 |

Observations during test:

| Time            | 1        | 2        |
|-----------------|----------|----------|
| Vent time       | 14:30:10 | 14:46:08 |
| Thermal runaway | 14:42:58 | 14:49:49 |

No flying debris or explosive discharge of gases during test.

No sparks, electrical arcs, or other electrical events during test.

No external flaming was observed.

Observations after test:

No damage on target walls.

No damage on target units.

The initiating cells (#1-10) was damaged (thermal runaway) after the test. Cell #1-9 was damaged because of the cell to cell propagation.

| After the test, The Module 2 in Initiating unit |       |
|-------------------------------------------------|-------|
| OCV (V)                                         | 170.1 |
| Weight (kg)                                     | 676.0 |
| Weight loss (kg)                                | 0.5   |

### 3.5 Temperature measurement

#### 3.5.1 Temperature measurement of initiating module

Multiple thermocouples, Type K, 24AWG, were attached on all module and unit. See Figure 3 to Figure 5 for the detailed locations.

The thermocouple temperature of the module 2 in initiating unit was shown in the figure 6 as below.

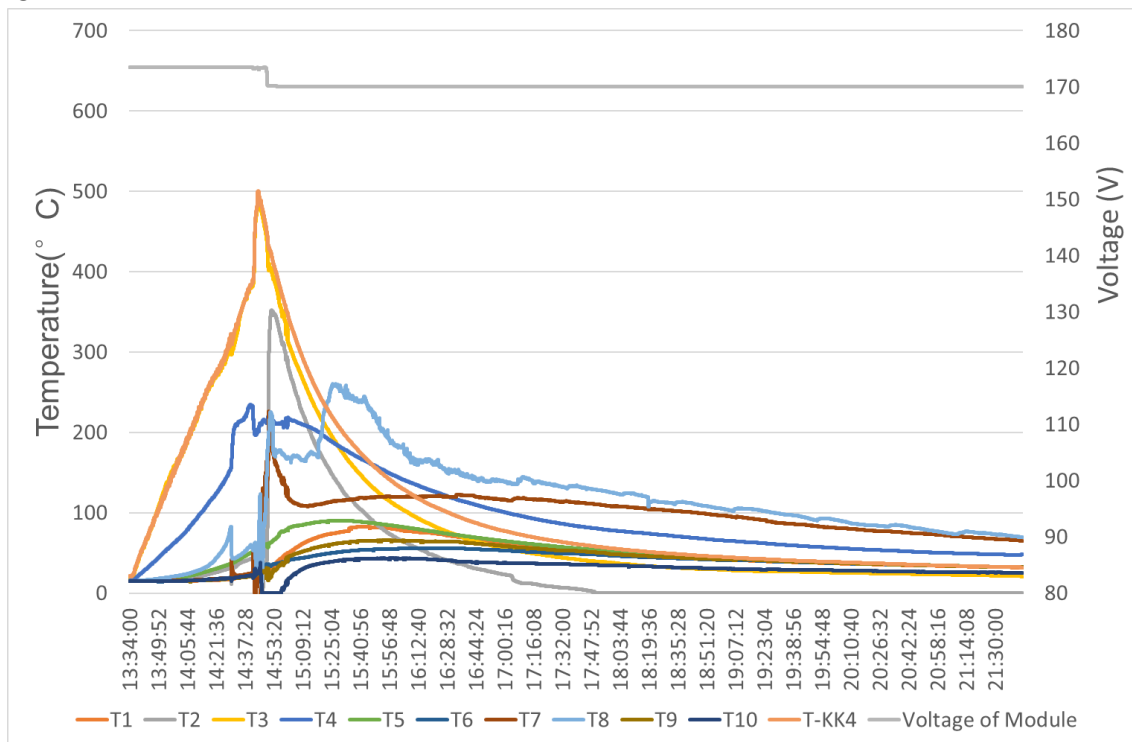


Figure 6 The cells temperature and module voltage in initiating unit

| Thermocouple no. | Location              | Maximum temp. °C |
|------------------|-----------------------|------------------|
| T1               | Surface of cell #1-8  | 82.7             |
| T2               | Surface of cell #1-9  | 352.6            |
| T3               | Surface of cell #1-10 | 491.1            |
| T4               | Surface of cell #1-11 | 234.8            |
| T5               | Surface of cell #1-12 | 90.2             |
| T6               | Surface of cell #1-13 | 56               |
| T7               | Surface of cell #2-9  | 226.3            |
| T8               | Surface of cell #2-10 | 260.5            |
| T9               | Surface of cell #3-9  | 43.5             |
| T10              | Surface of cell #3-10 | 65.7             |
| T-KK4            | Heater                | 500.6            |

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| Voltage no. | Name              | Voltage(V)         |
|-------------|-------------------|--------------------|
| V-Module    | Voltage of Module | 173.5 V to 170.1 V |

### 3.5.2 Temperature measurement of module surface in unit

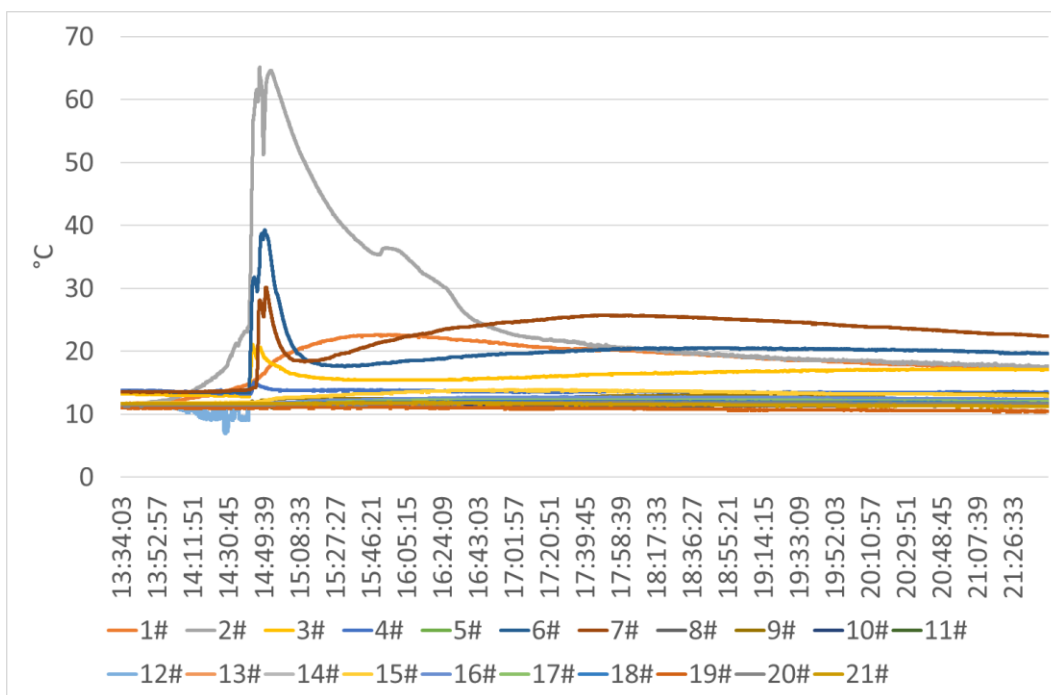


Figure 7 Surface temperatures of module in units

| Unit            | Channel No. | Location                                   | Max Temp. (°C) |
|-----------------|-------------|--------------------------------------------|----------------|
| Initiating Unit | 1#          | Top of module 01 (near the heated cell)    | 22.60          |
|                 | 2#          | Bottom of module 03 (near the heated cell) | 65.20          |
|                 | 3#          | Front of module 02                         | 21.10          |
|                 | 4#          | Back of module 02                          | 15.10          |
|                 | 5#          | Left of module 02                          | 12.00          |
|                 | 6#          | Right of module 02                         | 39.30          |
|                 | 7#          | Front of module 01                         | 30.20          |
|                 | 8#          | Front of module 02                         | 12.10          |
|                 | 9#          | Bottom of Module 04                        | 13.30          |
|                 | 10#         | Bottom of Module 05                        | 11.90          |
|                 | 11#         | Bottom of Module 06                        | 12.40          |
|                 | 12#         | Bottom of Module 07                        | 12.00          |
|                 | 13#         | Bottom of Module 08                        | 12.10          |
| Target unit     | 14#         | Front of module 01                         | 12.50          |



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|     |                    |       |
|-----|--------------------|-------|
| 15# | Front of module 02 | 13.90 |
| 16# | Front of module 03 | 12.80 |
| 17# | Front of module 04 | 12.30 |
| 18# | Front of module 05 | 12.00 |
| 19# | Front of module 06 | 11.10 |
| 20# | Front of module 07 | 11.90 |
| 21# | Front of module 08 | 11.90 |

### 3.5.3 Temperature measurement of instrumented wall

Wall surface temperatures were measured in vertical array at 152 mm intervals for the full height of the instrumented wall sections using Type K, 24 AWG thermocouple. The thermocouple array were collinear with the center line of initiating unit and target unit.

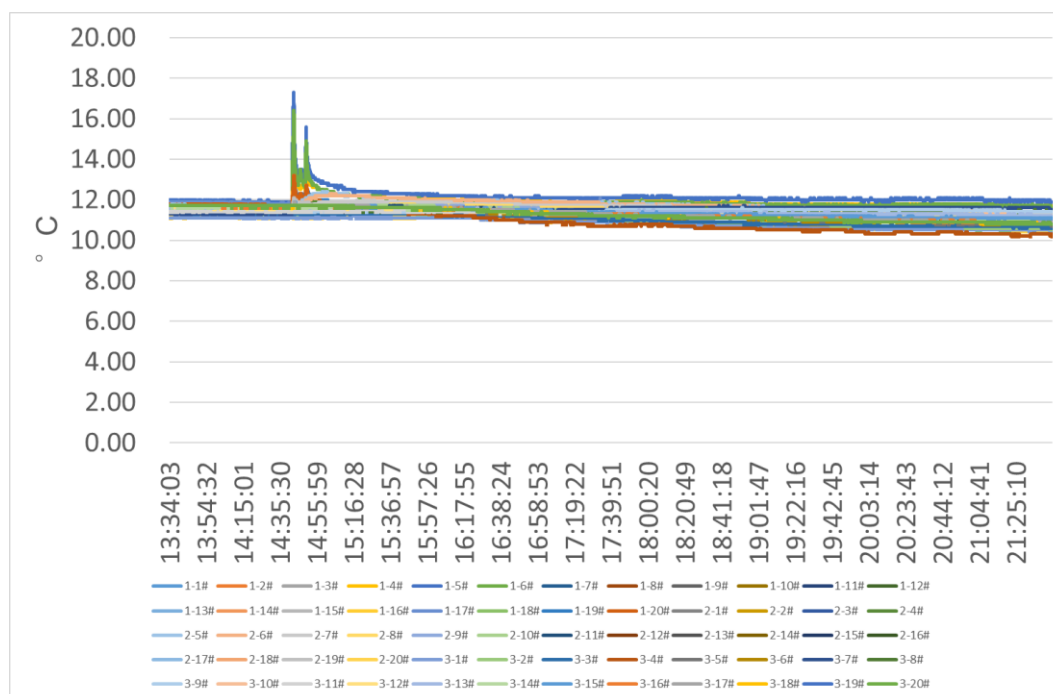


Figure 8 Temperature of instrumented wall A and B

| Number | Location | Channel No.   | Max Temp. (°C) |
|--------|----------|---------------|----------------|
| 1      | Wall A.  | 1-1# to 1-20# | 17.3           |
| 2      | Wall C.  | 2-1# to 2-20# |                |
| 2      | Wall E   | 3-1# to 3-20# |                |

### 3.6 Heat flux measurement

Eight sensors were placed on the instrument wall A, wall C, wall E and target units to measure the heat flux, see below table and figure 9 for details.

| Channel Number | Location                                                                                  |
|----------------|-------------------------------------------------------------------------------------------|
| HF1, HF2       | on the surface of instrumented wall C                                                     |
| HF3, HF4       | on the surface of instrumented wall A                                                     |
| HF5, HF6       | on target unit surface that facing initiating unit                                        |
| HF7            | In the center of the accessible means of egress, at the height of the module 2.           |
| HF8            | In the center of the accessible means of egress, at the mid height of the initiating unit |

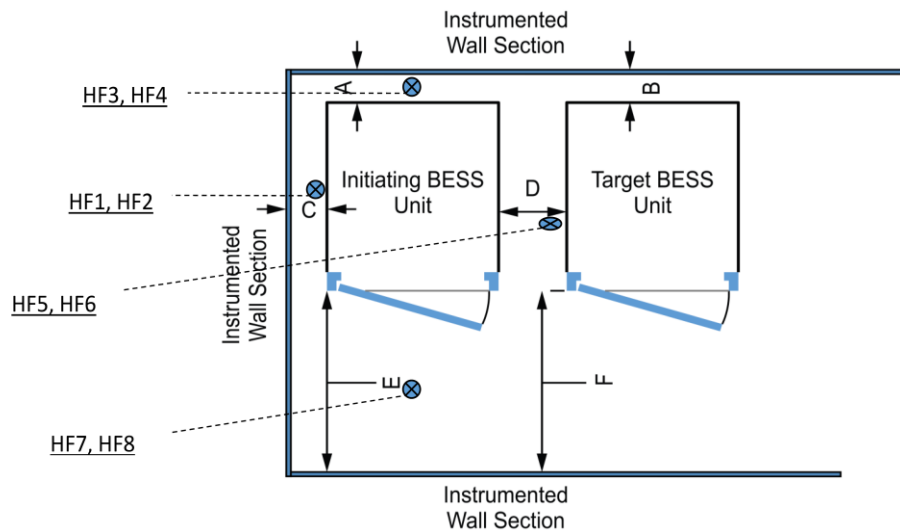


Figure 9 Layout of Heat flux sensor

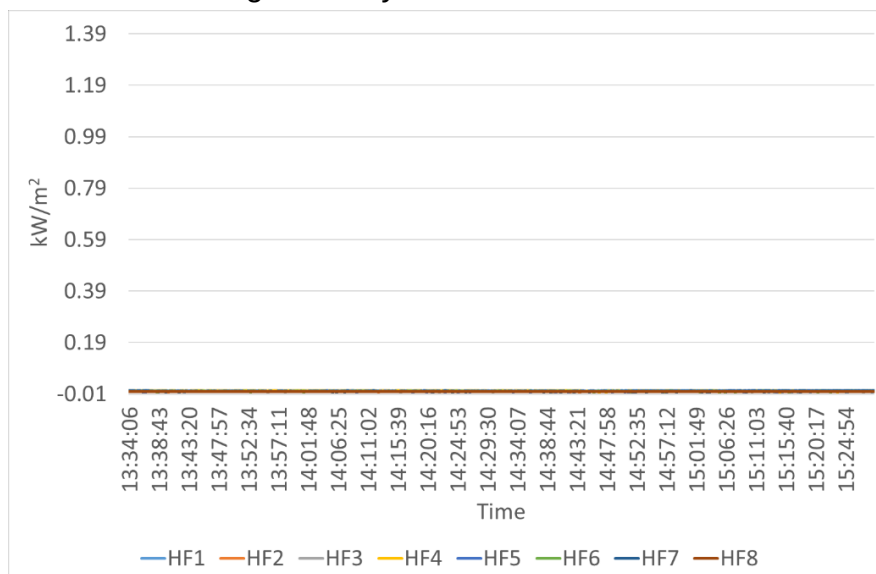


Figure 10 The measured heat flux of target walls and target unit

### 3.7 Chemical heat release rate measurement

The chemical heat release rates were measured by an oxygen consumption calorimeter measurement system consisting of a paramagnetic oxygen analyzer, non-dispersive infrared carbon dioxide and carbon monoxide analyzer, velocity probe, and a Type K thermocouple.

The instrumentations are located in the exhaust duct of the heat release rate calorimeter. The chemical heat release rate was calculated at each of the flows as follows:

$$HRR_1 = \left[ E \times \varphi - (E_{co} - E) \times \frac{1 - \varphi}{2} \times \frac{X_{co}}{X_{O_2}} \right] \times \frac{\dot{m}_e}{1 + \varphi \times (\alpha - 1)} \times \frac{M_{O_2}}{M_a} \times (1 - X_{H_2O}^o) \times X_{O_2}^o$$

In which:

$HRR_t$  = total heat release rate, as a function of time (kW)

$E$  = Net heat released for complete combustion per unit of oxygen consumed (adjusted for oxygen contained within cell chemistry, 13,100 kJ/kg)

$E_{CO}$  = Net heat released for complete combustion per unit of oxygen consumed, for CO (adjusted for oxygen contained within cell chemistry, 17,600 kJ/kg)

$\varphi$  = Oxygen depletion factor (non-dimensional), where:

$$\varphi = \frac{X_{O_2}^o \times [1 - X_{CO_2} - X_{CO}] - X_{O_2} \times [1 - X_{CO_2}^o]}{X_{O_2}^o \times [1 - X_{O_2} - X_{CO_2} - X_{CO}]}$$

$X_{CO}$  = Measured mole fraction of CO in exhaust flow (non-dimensional)

$X_{CO_2}$  = Measured mole fraction of CO<sub>2</sub> in exhaust flow (non-dimensional)

$X_{CO_2}^o$  = Measured mole fraction of CO<sub>2</sub> in incoming air (non-dimensional)

$X_{H_2O}^o$  = Measured mole fraction of H<sub>2</sub>O in incoming air (non-dimensional)

$X_{O_2}$  = Measured mole fraction of O<sub>2</sub> in exhaust flow (non-dimensional)

$X_{O_2}^o$  = Measured mole fraction of O<sub>2</sub> in incoming air (non-dimensional)

$\alpha$  = Combustion expansion factor (non-dimensional; normally a value of 1.105)

$M_a$  = Molecular weight of incoming and exhaust air (29 kg/kmol)

$M_{O_2}$  = Molecular weight of oxygen (32 kg/kmol)

$\dot{m}_e$  = Mass flow rate in exhaust duct (kg/s), in which:

$$\dot{m}_e = C \times \sqrt{\frac{\Delta p}{T_e}}$$

or

$$\dot{m}_e = 26.54 \times \frac{A \times k_c}{f(Re)} \times \sqrt{\frac{\Delta p}{T_e}}$$

$C$  = Orifice plate coefficient (in  $\text{kg}^{1/2}\text{m}^{1/2}\text{K}^{1/2}$ )

$\Delta p$  = Pressure drop across orifice plate or bidirectional probe (Pa)

$T_e$  = Combustion gas temperature at orifice plate or bidirectional probe (K)

$A$  = Cross sectional area of the duct ( $\text{m}^2$ )

$k_c$  = Velocity profile shape factor (non-dimensional)

$f(Re)$  = Reynolds number correction (non-dimensional)

Measured peak chemical heat release rate  $\text{HRR}_t$  was 19.4 kW.

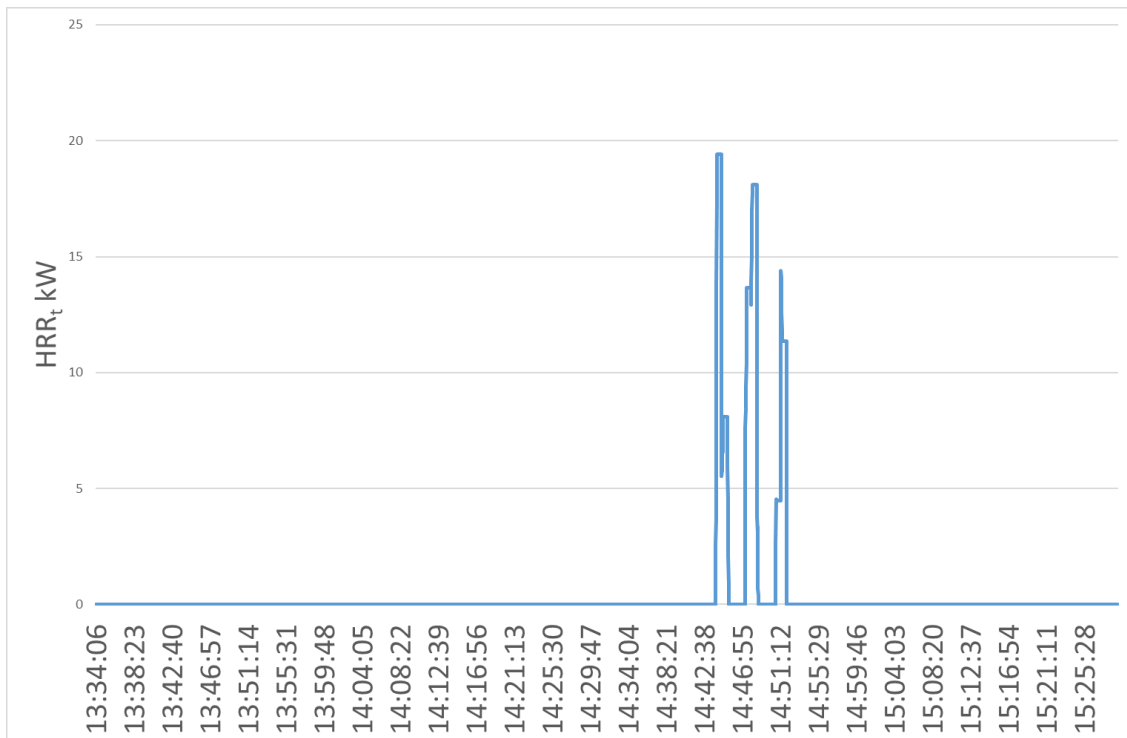


Figure 11  $\text{HRR}_t$  curve

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Measured total heat release THR through the test was 85.48 MJ

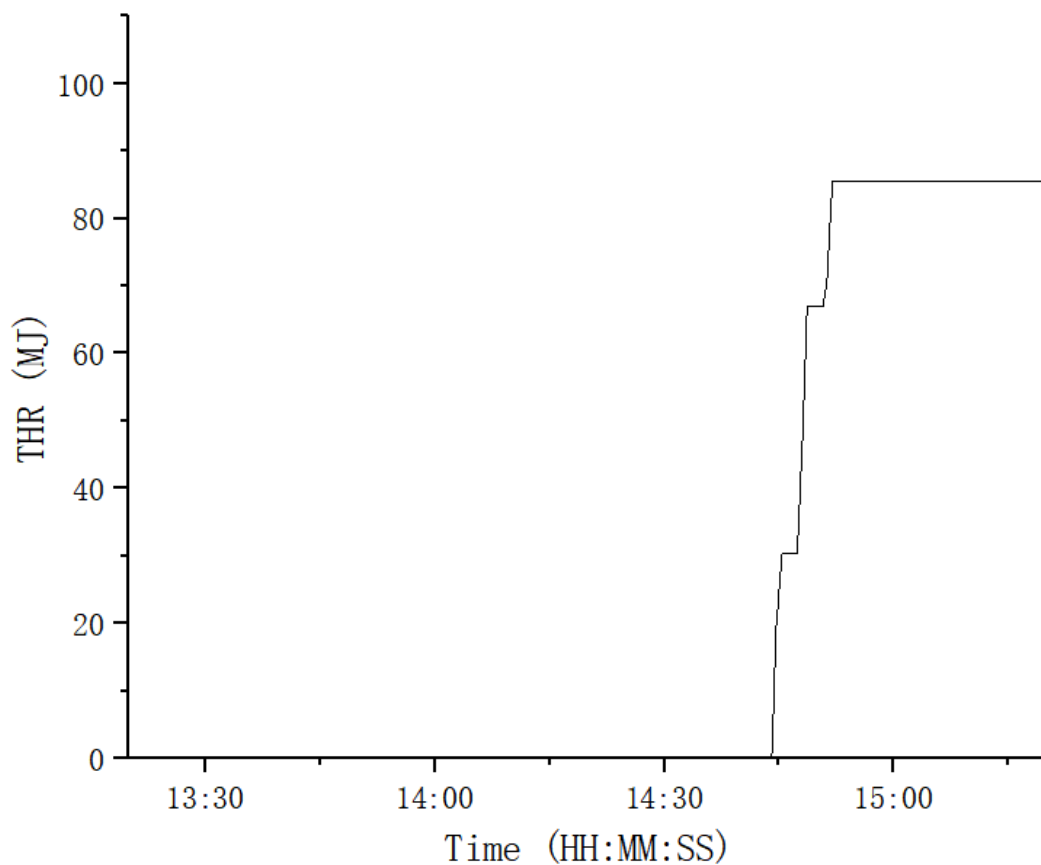


Figure 12 THR curve

### 3.8 Convective heat release rate measurement

The convective heat release rate were measured using thermopile, a velocity probe, and a Type K thermocouple, located in the exhaust system of the exhaust duct.

The convective heat release rate was calculated at each of the flows as follows:

$$HRR_c = V_e A \frac{353.22}{T_e} \int_{T_o}^T C_p dT$$

Where:

$HRR_c$  = The convective heat release rate (kW)

$V_e$  = The exhaust velocity (m/s)

$A$  = The exhaust duct cross sectional area (m<sup>2</sup>)

$T_e$  = The temperature at the location where exhaust velocity is measured (K)

$353.22/T_e$  = The density of air at the velocity measurement location (kg/m<sup>3</sup>)

$T_o$  = The ambient temperature (K) in the test room

$T$  = The thermopile temperature (K)

$$\int_{T_o}^T C_p dT = A_0(T - T_o) + A_1 / 2(T^2 - T_o^2) + A_2 / 3(T^3 - T_o^3) + A_3 / 4(T^4 - T_o^4)$$

$C_p$  = Specific heat of air (kJ/kg-K), given as  $C_p = A_0 + A_1 T + A_2 T^2 + A_3 T^3$ , where:

$$A_0 = 0.9950$$

$$A_1 = -5.29933E-05$$

$$A_2 = 3.21022E-07$$

$$A_3 = -1.22004E-10$$



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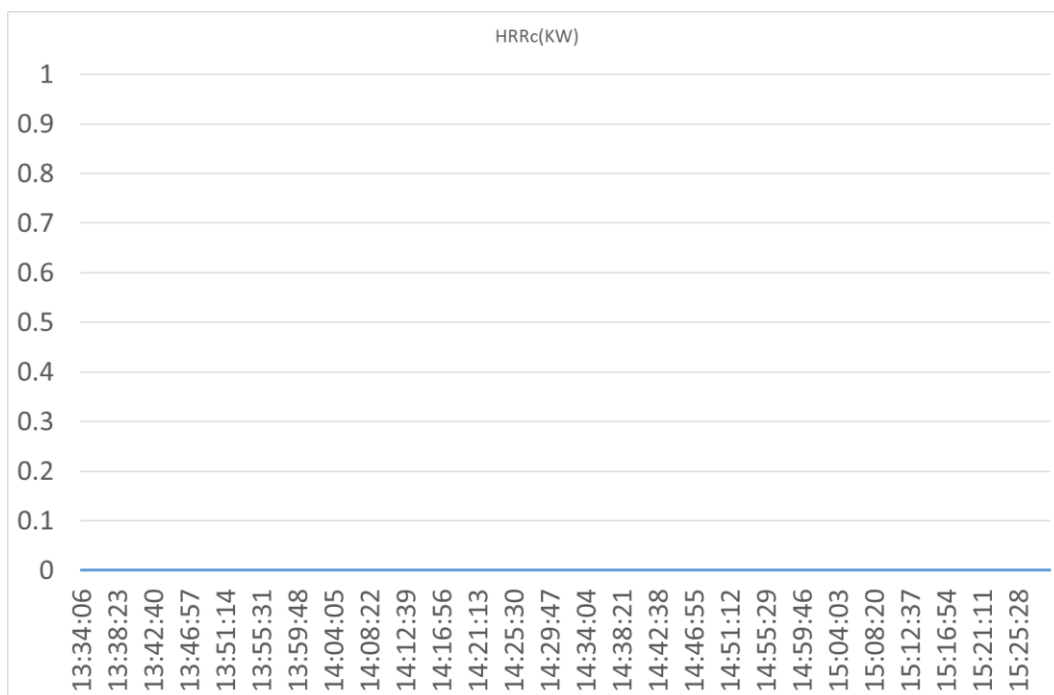


Figure 13 HRRc curve

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## 3.9 Smoke release rate measurement

### 3.9.1 Test method

The light transmission in the calorimeter's exhaust duct was measured using a white light source and photo detector for the duration of the test.

### 3.9.2 Test result

Peak smoke release rate SRR: 0.485 m<sup>2</sup>/s

Total smoke release TSR: 71.2 m<sup>2</sup>

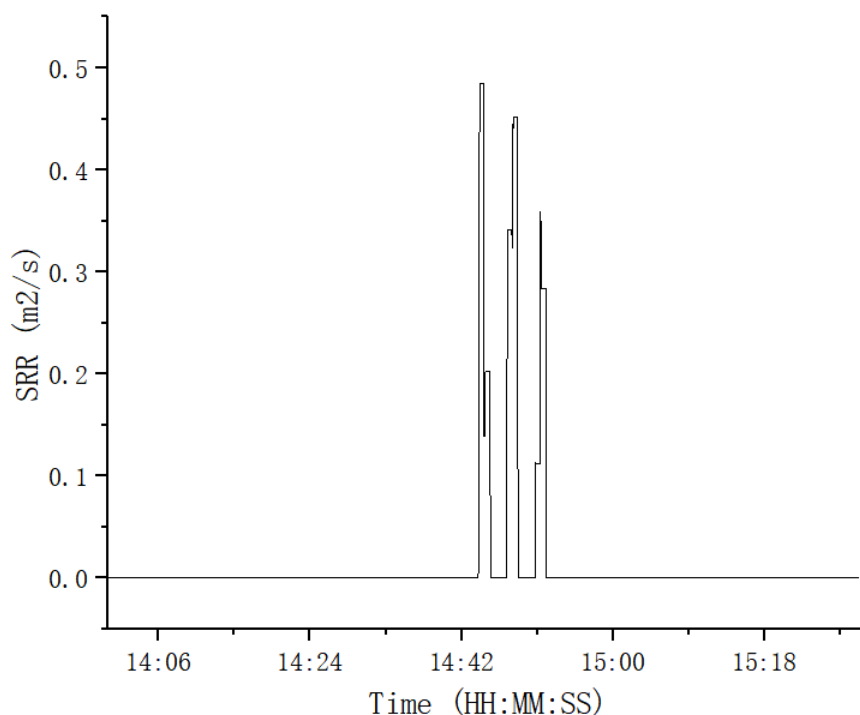


Figure 14 SRR curve

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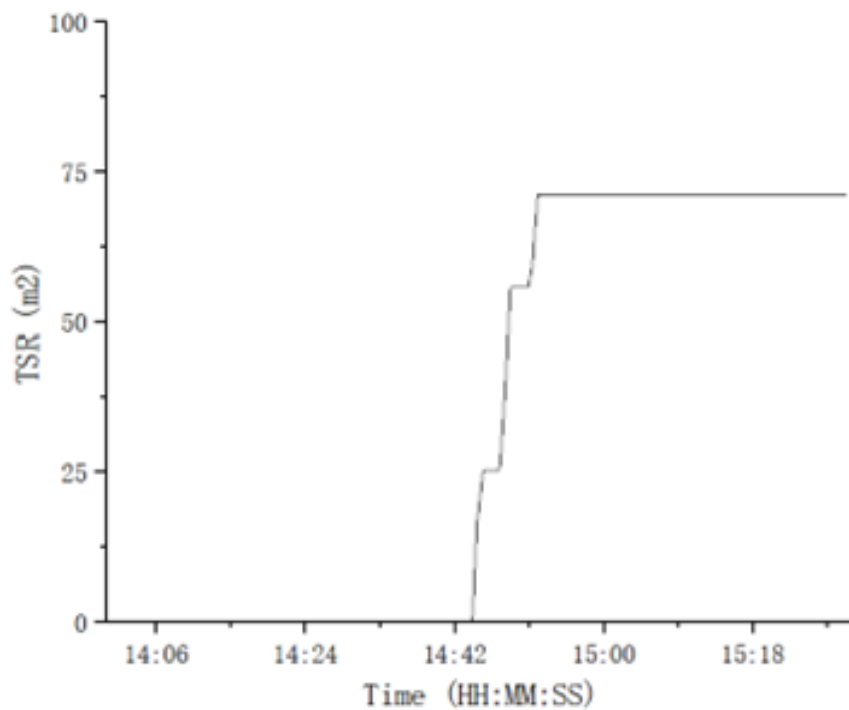


Figure 15 TSR curve

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## 3.10 Gas generation measurement

### 3.10.1 Test method

The composition, velocity and temperature of the vent gases were measured within the calorimeter's exhaust duct.

Gas composition were measured using a Fourier-Transform Infrared Spectrometer with a resolution of  $0.5 \text{ cm}^{-1}$  and a path length of 5.1 m within the calorimeter's exhaust duct.

The hydrocarbon content of the vent gas was measured using flame ionization detection.

Hydrogen gas was measured with a palladium-nickel thin-film solid state sensor.

For reference only, the hydrogen gas was measured with a Electrochemical sensor.

Composition, velocity and temperature instrumentation were collocated with heat release rate calorimetry instrumentation.

### 3.10.2 Total gas release

| Gas type                                                                           | Gas components                                              |                                               | Total volume of gas (L) |
|------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------|-------------------------|
| Hydrocarbon species                                                                | Methane                                                     | CH <sub>4</sub>                               | 24.2                    |
|                                                                                    | Ethylene                                                    | C <sub>2</sub> H <sub>4</sub>                 | 18.3                    |
|                                                                                    | Ethane                                                      | C <sub>2</sub> H <sub>6</sub>                 | 2.5                     |
| Others                                                                             | Carbon Monoxide                                             | CO                                            | 50.4                    |
|                                                                                    | Carbon Dioxide                                              | CO <sub>2</sub>                               | 97.5                    |
|                                                                                    | Hydrogen<br>(Palladium nickel thin film solid state sensor) | H <sub>2</sub>                                | Below detectable limit* |
|                                                                                    | Hydrogen<br>(Electrochemical sensor, for reference only)    | H <sub>2</sub>                                | 237**                   |
|                                                                                    | Diethyl carbonate                                           | C <sub>5</sub> H <sub>10</sub> O <sub>3</sub> | 3.4                     |
|                                                                                    | Ethylmethyl carbonate                                       | C <sub>4</sub> H <sub>8</sub> O <sub>3</sub>  | 10.5                    |
|                                                                                    | Dimethyl carbonate                                          | C <sub>3</sub> H <sub>6</sub> O <sub>3</sub>  | 30.6                    |
| Total Hydrocarbons (equivalent to C <sub>3</sub> H <sub>8</sub> , measured by FID) |                                                             |                                               | 113                     |

\* = The volume of hydrogen released by a single cell after thermal runaway referred to the cell UL 9540A report is about 64.8L. However, it should be noted that the gas

production of a single cell in the current test environment is not exactly equivalent to the gas production of the cell level test, because the test environment is not the same.

\*\* = As there are some factor sensors which can affect the accuracy of hydrogen gas measurements, such as the accuracy for gas voltage signal, airflow rates, and environmental variables, the 237L is only for reference.

### 3.10.3 Gas components

Concentration of different gas components were present according to gas species classification in Figures 16 to 25.

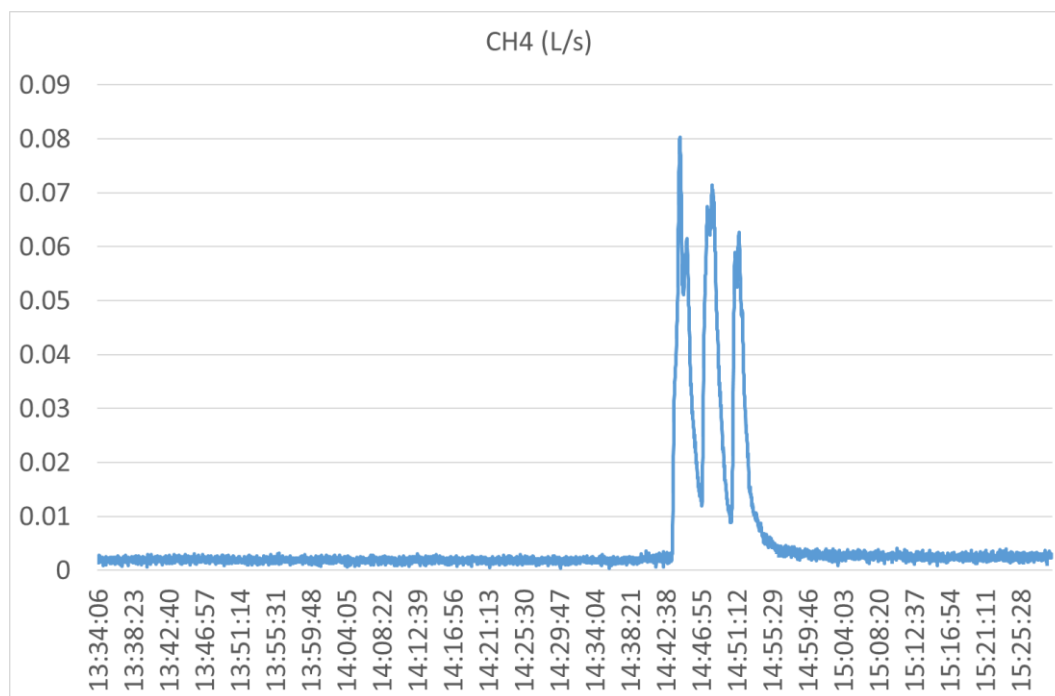


Figure 16 Methane curve

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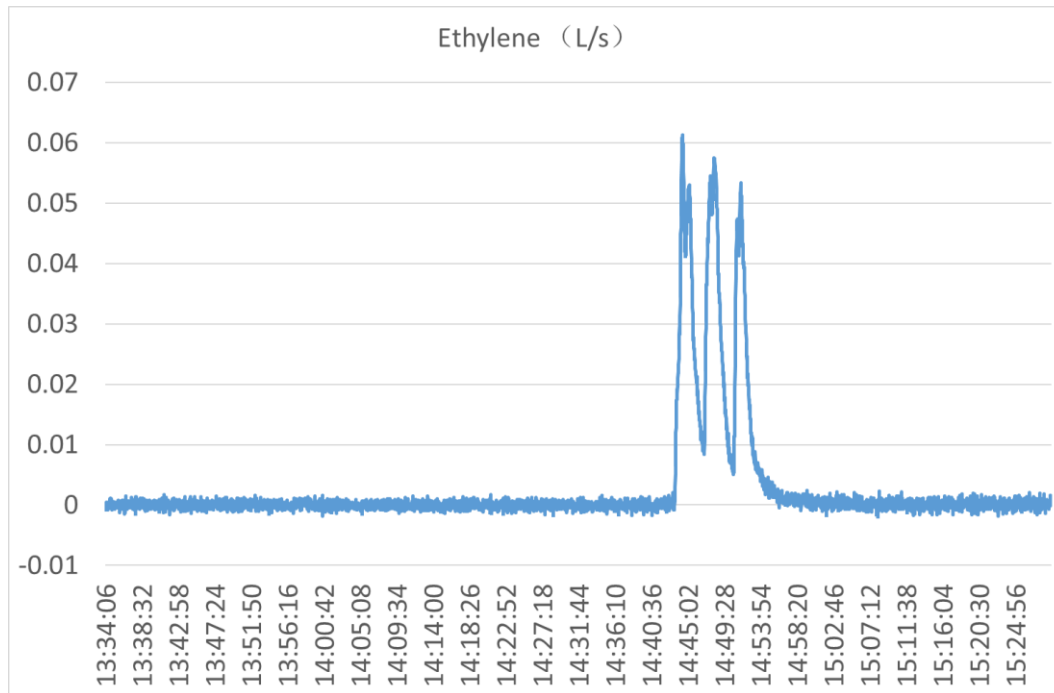


Figure 17 Ethylene curve

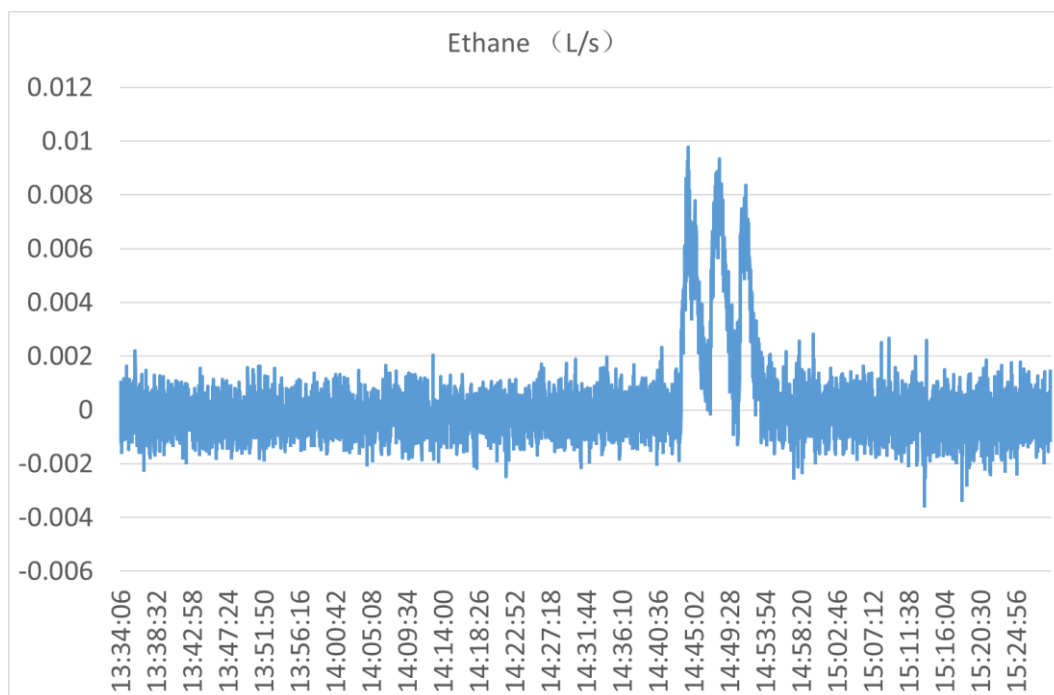


Figure 18 Ethane curve



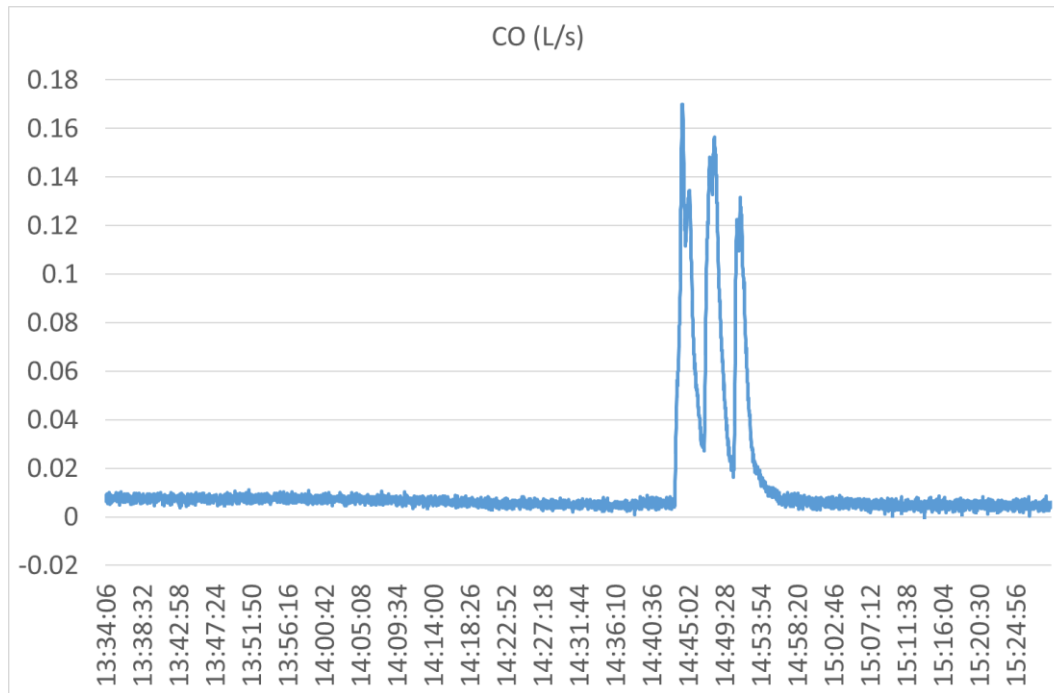


Figure 19 CO curve

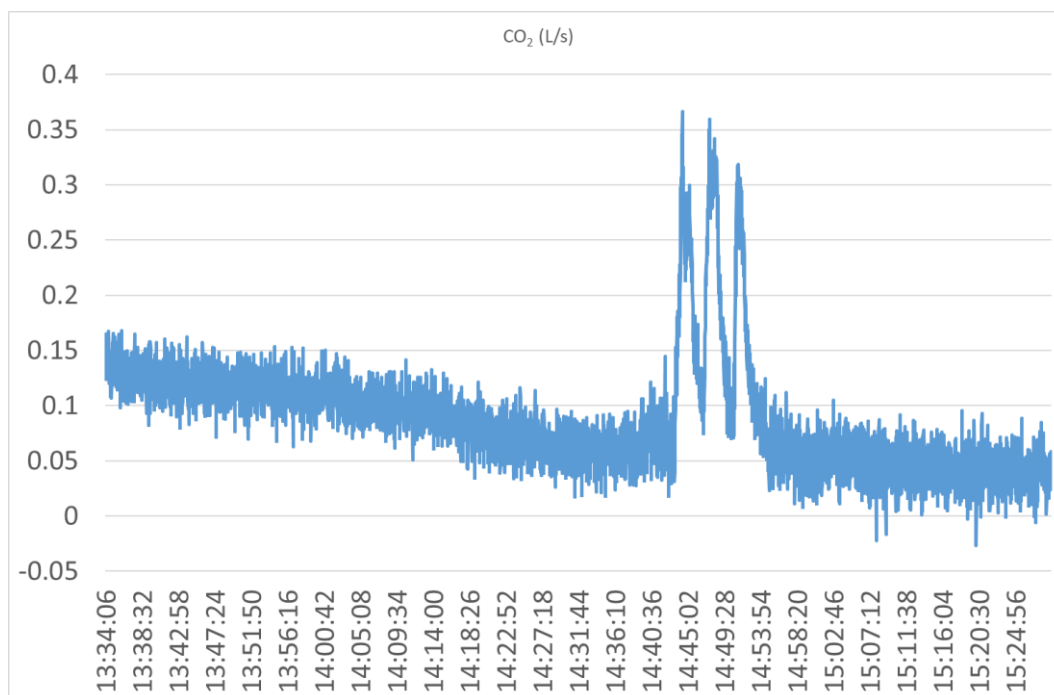


Figure 20 CO<sub>2</sub> curve

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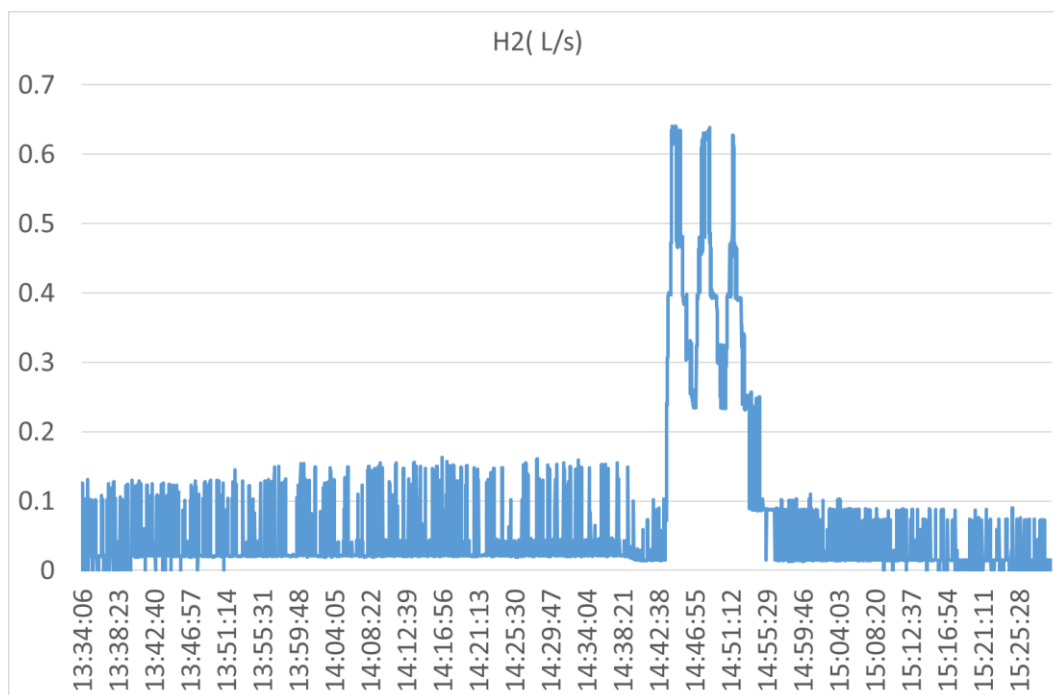


Figure 21 H2 curve (Electrochemical, for reference only)

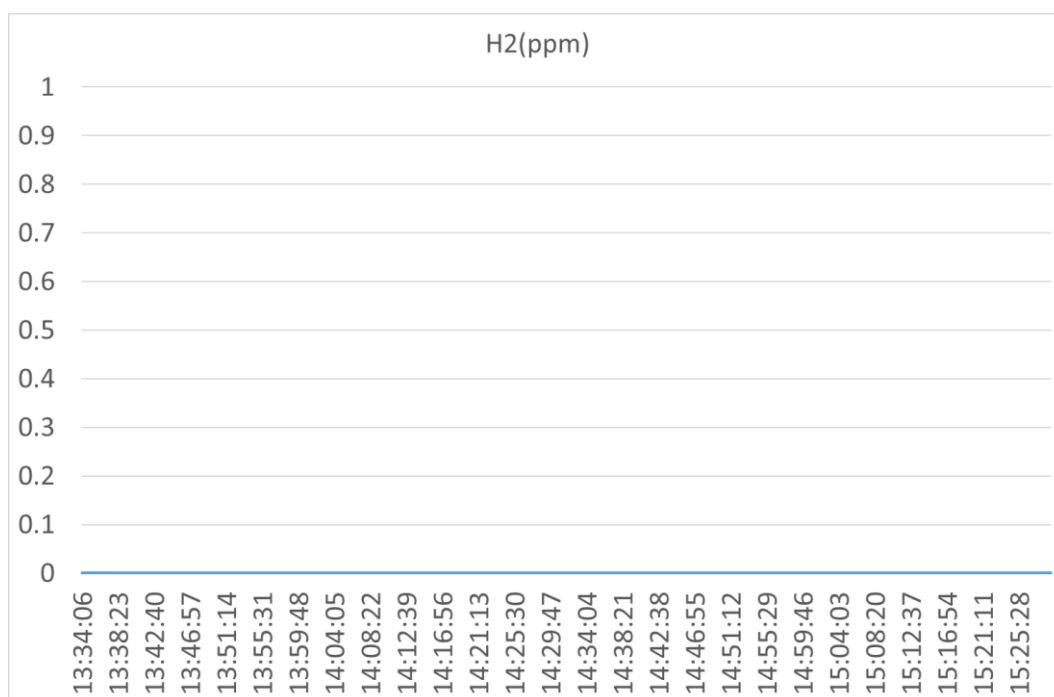


Figure 22 H2 curve (Palladium nickel thin film solid state sensor)

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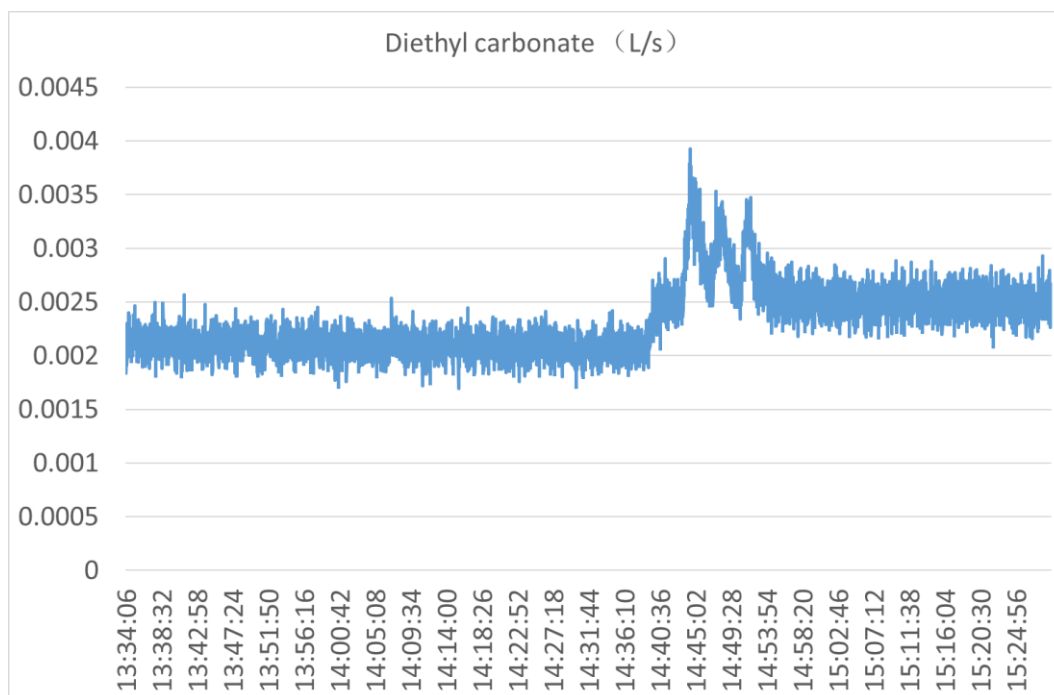


Figure 23 Diethyl carbonate curve

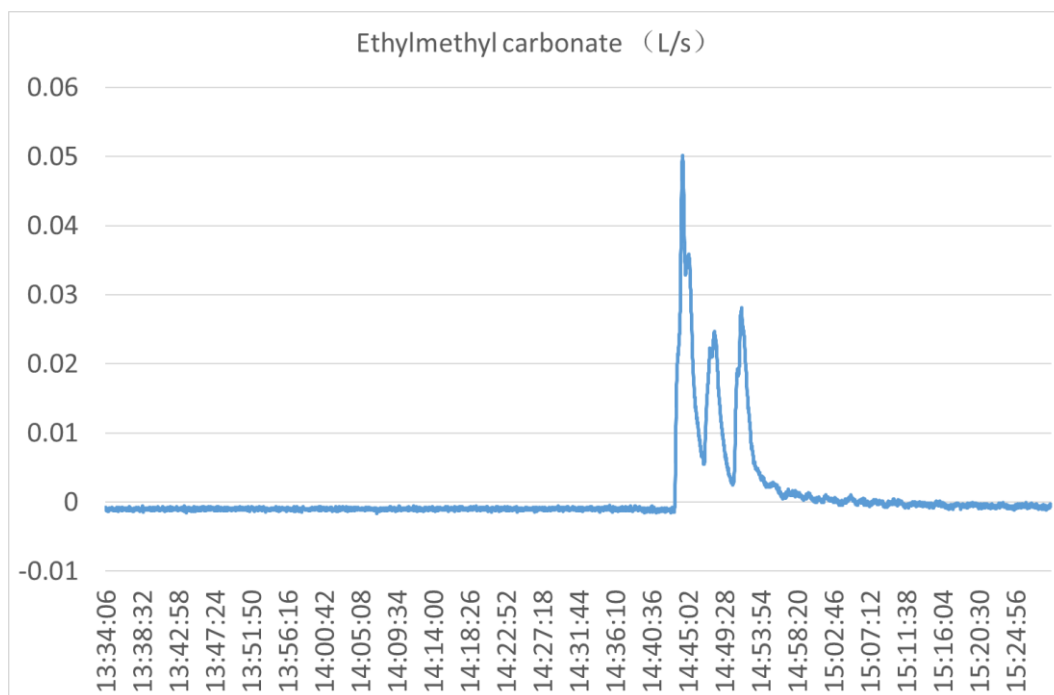


Figure 24 Ethylmethyl carbonate curve

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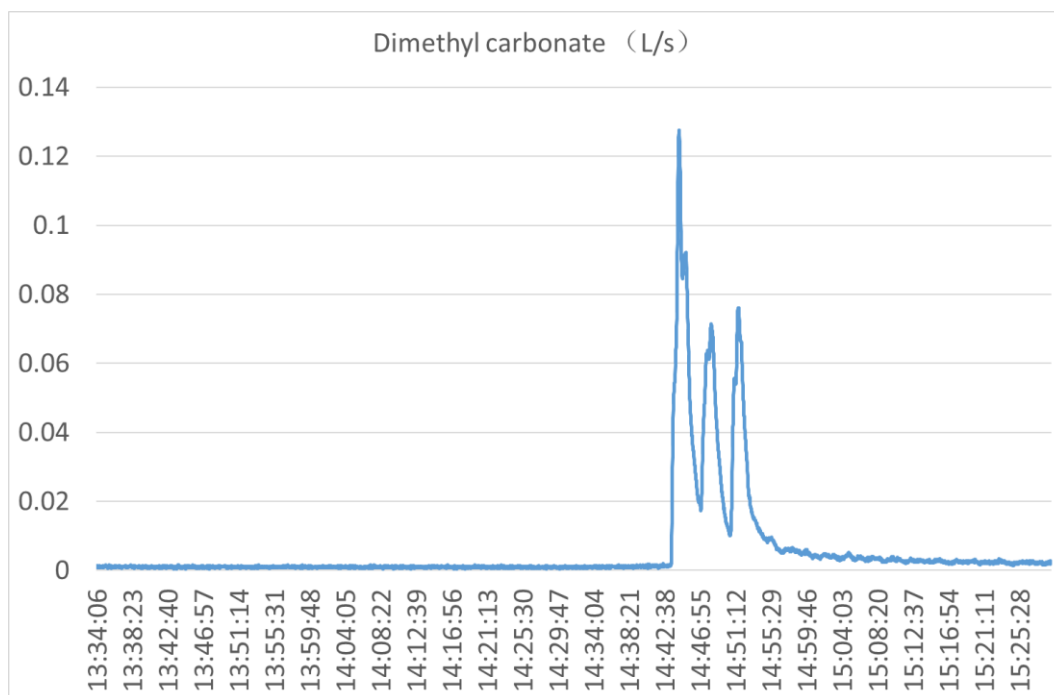


Figure 25 Dimethyl carbonate curve

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### 3.11 Performance Summary Remark Against Criteria

Installation level testing was not required as the following performance conditions were met during the unit level test.

| Performance conditions                                                                                                                                                              | Remark                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a) If flaming outside of the unit observed, separation distances to exposures shall be determined by greatest flame extension observed during test.<br>(No flaming)                 | No flaming observed during the test.                                                                                                                                                                           |
| b) Surface temperatures of modules within the target units adjacent to the initiating unit do not exceed the temperature at which thermally initiated cell venting occurs.          | Surface temperatures of modules within the target units adjacent to the initiating unit was 13.9°C, which is far below the cell venting temperature 203.7°C (From TUV RH cell 9540A report No.: CN23F118 001). |
| c) For units intended for intended for near exposures, surface temperature measurements on wall surfaces do not exceed 97°C (175°F) of temperature rise above ambient installation. | Surface temperature measurements on wall surfaces was 17.3°C, below the 97°C of temperature rise above ambient.                                                                                                |
| d) Explosion hazards are not observed, including deflagration, detonation or accumulation of battery vent gases;<br>(The explosion shall not be observed)                           | Explosion hazards were not observed during the test.                                                                                                                                                           |
| e) Heat flux in the center of the accessible means of egress shall not exceed 1.3kW/m <sup>2</sup>                                                                                  | Less than 1.3 kW/m <sup>2</sup>                                                                                                                                                                                |

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### 3.12 Photos

Before the test:



After the test:

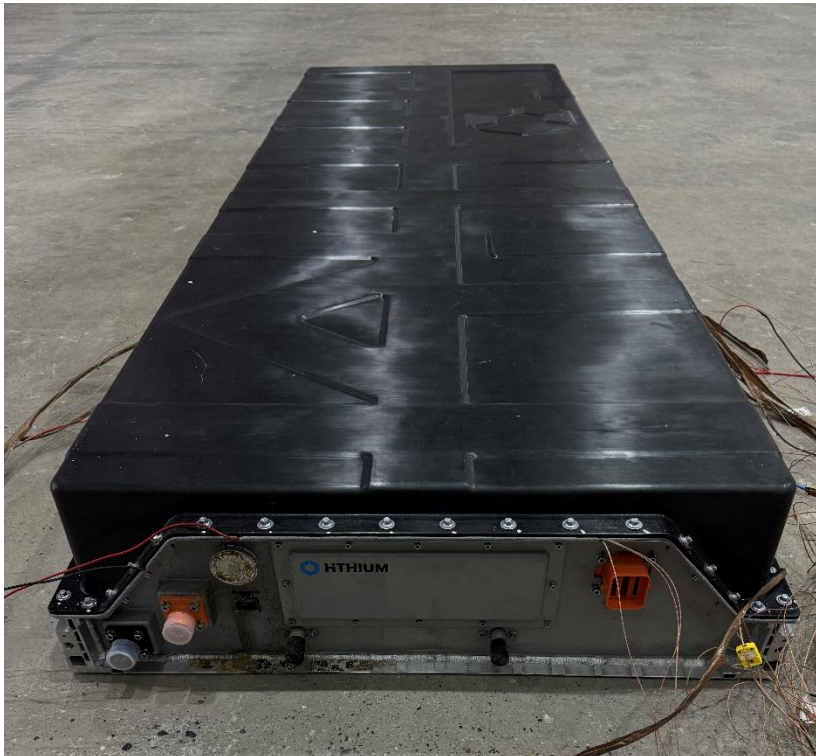




**Prüfbericht - Nr.: CN23XPOX 001**  
Test Report No.:

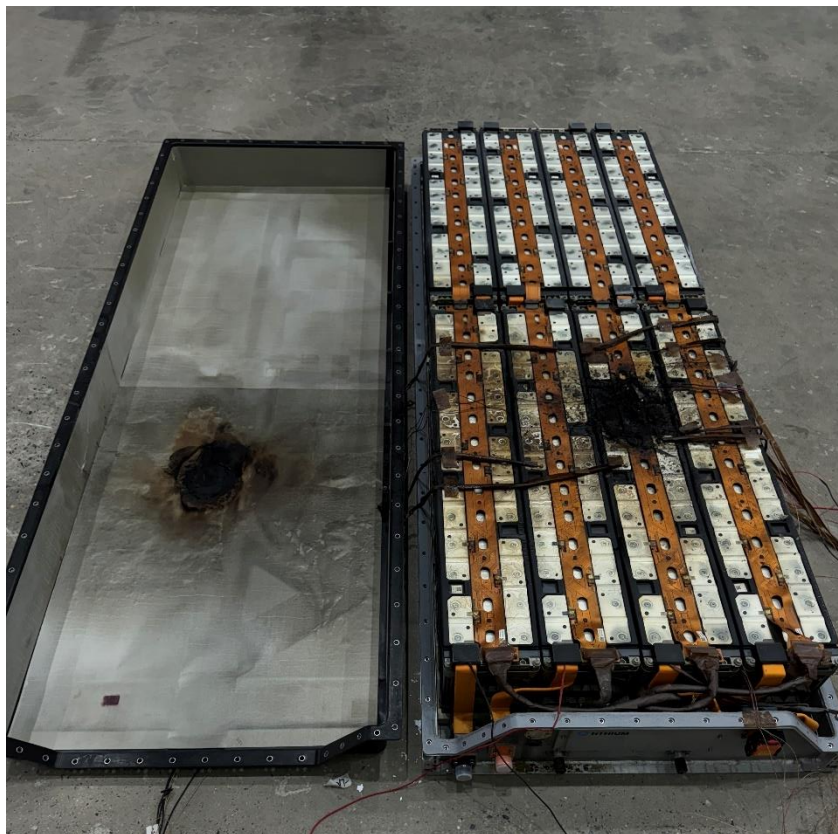
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Initiating module:



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### 3.13 List of Test and Measurement Instruments

| No. | Equipment                                     | Model              | Rating                                                                                                                                                   | Inventory no.          | Last Cal. date |
|-----|-----------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------|
| 1   | Ambient temperature and humidity              | COS-03             | 0°C ~50°C,<br>30%RH~95%RH                                                                                                                                | D-ZNDW23052402         | 2023-05-24     |
| 2   | Data acquisition equipment                    | LR8450-01          | 0~1100°C                                                                                                                                                 | 0221-0704-06           | 2023-10-19     |
| 3   | Electronic scale                              | OCS-2t/1kg         | 1kg~2000kg                                                                                                                                               | 0221-0704-10           | 2023-11-19     |
| 4   | Paramagnetic oxygen analyser                  | AO2020             | Oxygen measurement:<br>6.02%vol~24%vol;<br>Hydrogen concentration:<br>1%~3%;<br>Carbon monoxide:<br>0.2%~0.8%;<br>Carbon dioxide concentration:<br>2%~8% | 0221-0704-03           | 2023-03-06     |
| 5   | Velocity probe                                | DYM3               | 800~1060hPa                                                                                                                                              | D-ZNDW23032210         | 2023-03-10     |
| 7   | Fourier-Transform Infrared Spectrometer       | MULTIGAS 6030      | Methane, propane, acetylene concentration:<br>100µmol/mol~1000µmol/mol;<br>Carbon monoxide concentration:<br>0.2%~0.8%                                   | 0221-0704-08           | 2023-03-06     |
| 9   | Palladium-nickel thin-film solid state sensor | HY-OPTIMA-2720     | Range: 0.4%~5.0%                                                                                                                                         | 0221-0704-01           | 2023-03-20     |
| 10  | Flame ionization detector                     | AO2040             | Methane concentration:<br>100µmol/mol~500µmol/mol                                                                                                        | 0221-0704-04           | 2023-03-06     |
| 11  | Thermopile                                    | TJ120-CAXL-116U-80 | 0~300°C                                                                                                                                                  | 0221-0704-31           | 2023-10-22     |
| 12  | Heat flux measurement equipment               | SBG01-050          | 0-50kW                                                                                                                                                   | G-ZNDW23040306<br>~ 12 | 2023-05-12     |

**End of Test Report**

## Appendix I – Fire Safety Compliance Plan





404 SILVER STREET AGAWAM

# FIRE SAFETY PLAN (FSP)

Rev 0 | May 1<sup>st</sup>, 2025

## Summary

This document serves as the Preliminary Fire Safety Plan (FSP) for the 404 Silver Street Agawam energy storage facility to be located in Agawam, Hampden County, Massachusetts.

Only an FSP with input from the local first responders can provide true guidance and pertinent information regarding the roles, responsibilities, and chain of communication and command of the System Owner / Operator, Property Owner, and other required Subject Matter Experts (SMEs) for preparing for, and safely responding to, a fire, Overpressure event, or other battery-related incident requiring a public safety response at the energy storage facility.

**LIFE SAFETY SHALL BE THE HIGHEST PRIORITY DURING ANY TYPE OF EVENT.**

### Prepared For:

**Silver Street Energy Storage LLC**

**55 Technology Drive**

**Lowell, MA 01851**

### Energy Safety Response Group

8350 US HWY 23 N  
Delaware, OH 43015

[www.energyresponsegroup.com](http://www.energyresponsegroup.com)  
1-833-SAFE-ESS

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## **EMERGENCY CONTACT INFORMATION**

### **IN CASE OF EMERGENCY CALL 911**

#### **LOCAL FIRE DEPARTMENT**

##### **Agawam Fire Department**

**Phone:** (413) 786-2662  
**Address:** 800 Main Street  
Agawam, MA 01001

#### **LOCAL POLICE DEPARTMENT**

##### **Agawam Police Department**

**Phone:** (413) 786-4767  
**Address:** 681 Springfield Street  
Feeding Hills, MA 01030

#### **HOSPITAL EMERGENCY ROOM**

##### **Baystate Medical Center**

**Phone:** (413) 794-0000  
**Address:** 759 Chestnut Street  
Springfield, MA 01199

#### **LOCAL HEALTH FACILITY**

##### **AFC Urgent Care**

**Phone:** (413) 781-0100  
**Address:** 18 Union Street  
West Springfield, MA 01089

#### **LOCAL BURN CENTER**

##### **Sumner Redstone Burn Ctr – MA Gen Hospital**

**Phone:** (617) 726-3712  
**Address:** 55 Fruit Street, GRB 1300  
Boston, MA 02114

#### **SYSTEM OWNER / OPERATOR**

##### **System Owner / Operator**

**Phone:** TBD  
**Address:**

#### **REMOTE MONITORING FACILITY**

##### **Remote Monitoring Facility**

**Phone:** TBD

#### **SUBJECT MATTER EXPERT (SME)**

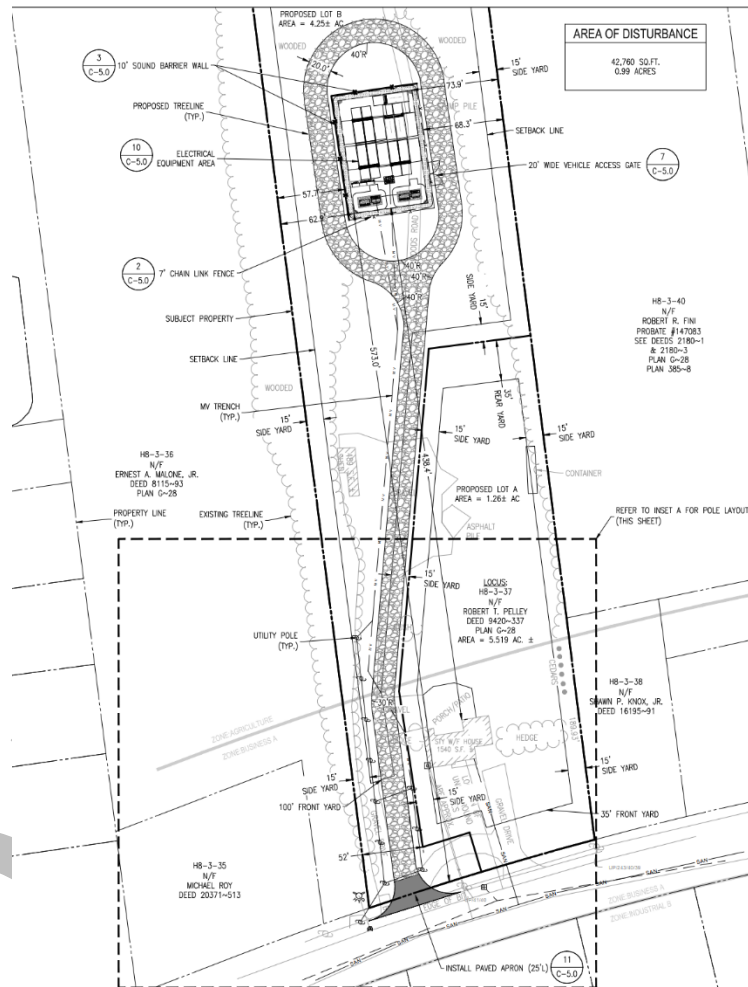
##### **Subject Matter Expert (SME)**

**Phone:** TBD  
**Address:**



## 404 SILVER STREET AGAWAM ENERGY STORAGE FACILITY

**GPS Coordinates:** 42.06087471490162, -72.64255051832465



**Make / Model:** Hithium 5.015 MWh  
**Total MW / MWh:** 5 MW/ 20 MWh  
**kW / kWh per Unit:** XXX kW / 5016 kWh  
**# Units:** 7

- Two (2) heat detectors per ESS enclosure
- Two (2) smoke detectors per ESS enclosure
- Two (2) gas detectors per ESS enclosure

## PROJECT INFORMATION

|               |                                                                              |
|---------------|------------------------------------------------------------------------------|
| Project Name  | 404 Silver Street Agawam Energy Storage Project FSP                          |
| Project No.   | 25-20261                                                                     |
| Prepared For  | Silver Street Energy Storage, LLC<br>55 Technology Drive<br>Lowell, MA 01851 |
| Revision No.  | Rev 0                                                                        |
| Document No.  |                                                                              |
| Date of Issue | May 1 <sup>st</sup> , 2025                                                   |

## REVISION HISTORY

| Revision No. | Date of Issue | Substance of Change |
|--------------|---------------|---------------------|
|              |               |                     |
|              |               |                     |
|              |               |                     |
|              |               |                     |
|              |               |                     |

**Note 1:** The information in this document is subject to change while in DRAFT status and may be modified in the event of modifications to equipment or other factors affecting the design of the system or site.

**Note 2:** During the operating life span of the project, it is expected that this document shall be reviewed annually, and that all pertinent information shall be appropriately updated as necessary. This FSP is compiled based upon current design and usage at the time of this writing.

## IMPORTANT NOTICE AND DISCLAIMER

Energy Safety Response Group LLC (ESRG) is providing an interim draft of this document based on an “*as-designed*” system. This document should not be provided externally until agreed by all responsible parties.

Upon acceptance of this “as designed” interim draft, which may be made public as an “*as designed release*,” ESRG shall treat this document as ready for release but shall not mark the document as “*as-built final*” until ESRG can confirm, via personnel on site, that the system, “*as-built*” aligns with the reviewed and reported design.

Industry, related technology, and best practices are rapidly evolving and changing regularly. It has been observed that changes often occur to a project through the construction phase, be they to the battery itself or to the balance of system. As such, an “*as-designed release*” document should be considered final only if no changes are made to the system from design to construction to completion. If it is 100% accurate it will be released unchanged. However, should ESRG encounter deviations from the design, the document will be amended accordingly per the design changes and then released as a final document.

This document conveys the results of research, investigations, intellectual property development, experience, and analysis to provide opinions, recommendations, explanations, service offerings, and quotations from ESRG. This document is not meant to serve as professional and credentialed engineering, legal, technical, or emergency response judgment, and should not be used in place of consultation with such appropriate professionals. Appropriate professional advice should be obtained regarding such issues as required.

The contents of this document are in no way meant to address specific circumstances, and the contents are not meant to be exhaustive and do not address every potential scenario associated with the subject matter of the document. Site and circumstance-specific factors and real-time judgment and reason may significantly impact some of the subject matter conveyed in this document. Additional resources and actions, which may be beyond the scope of this document, may be required to address specific issues. Additionally, laws, ordinances, regulatory standards, and best practices related to the contents of this document are subject to change or modification.

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## ACRONYMS

|                     |                                                                            |
|---------------------|----------------------------------------------------------------------------|
| <b>AR</b>           | Arc-Rated                                                                  |
| <b>BMS</b>          | Battery Management System                                                  |
| <b>E-Stop / EPO</b> | Emergency Stop / Emergency Power Off                                       |
| <b>FSP</b>          | Fire Safety Plan                                                           |
| <b>EMS / ESMS</b>   | Emergency Management System / Energy Storage Management System             |
| <b>ERG</b>          | Emergency Response Guide (generic, product-level emergency response guide) |
| <b>ESRG</b>         | Energy Safety Response Group                                               |
| <b>ESS / BESS</b>   | Energy Storage System / Battery Energy Storage Management System           |
| <b>FACP</b>         | Fire Alarm Control Panel                                                   |
| <b>IC</b>           | Incident Commander                                                         |
| <b>ICS</b>          | Incident Command System                                                    |
| <b>kW</b>           | Kilowatt(s)                                                                |
| <b>kWh</b>          | Kilowatt-hour(s)                                                           |
| <b>LFL / LEL</b>    | Lower Flammability Limit / Lower Explosive Limit                           |
| <b>LFP</b>          | Lithium Iron Phosphate                                                     |
| <b>MW</b>           | Megawatt(s)                                                                |
| <b>MWh</b>          | Megawatt-hour(s)                                                           |
| <b>NOC</b>          | Network Operations Center                                                  |
| <b>O&amp;M</b>      | Operations and Maintenance                                                 |
| <b>PCS</b>          | Power Conversion System                                                    |
| <b>PPE</b>          | Personal Protective Equipment                                              |
| <b>SCBA</b>         | Self-Contained Breathing Apparatus                                         |
| <b>SDS</b>          | Safety Data Sheets                                                         |
| <b>SME</b>          | Subject Matter Expert                                                      |
| <b>SOC</b>          | State of Charge                                                            |
| <b>UICS</b>         | Unified Incident Command System                                            |
| <b>UFL / UEL</b>    | Upper Flammability Limit / Upper Explosive Limit                           |

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# 1 INTRODUCTION

## 1.1 Scope and Purpose

This Fire Safety Plan (FSP) is provided for the 404 Silver Street Agawam Battery Energy Storage System (ESS or BESS) facility located at 404 Silver Street, Agawam, Massachusetts 01001. The scope of this FSP includes information and instruction to guide on site personnel for addressing a fire or other emergency associated with the 404 Silver Street Agawam Energy Storage Project. "On-site personnel" include all individuals on the Facility property who are direct employees of the owner/operator and/or affiliated contractors. Each contractor is similarly responsible for establishing and maintaining a contractor specific Fire Safety Plan / Emergency Action Plan, with specific internal reporting procedures that will work in conjunction with the Silver Street Energy Storage, LLC's (The Project) overall plan.

The Operations and Maintenance (O&M) Manager for the project is an employee of XXXXXXXXXX. "On-site personnel" include all individuals on the facility property who are direct employees of the Owner / Operator or affiliated contractors. The Owner / Operator and contractors are similarly responsible for establishing and maintaining contractor-specific Fire Safety Plans and reporting procedures that will work in conjunction with the overall energy storage facility plan.

**Life safety shall be the highest priority during any type of event.**

## 1.2 Activation

This Fire Safety Plan shall be activated during any emergency response to a battery-related incident on-site.

## 1.3 Incident Command System (ICS)

The System Owner / Operator, Subject Matter Experts, Remote Monitoring Facility staff, and all energy storage system related personnel shall comply with the orders of the Incident Commander (IC), both the site and fire department IC, and the command staff.

## 1.4 Operations and Maintenance (O&M)

Operations and maintenance procedures for the energy storage facility and associated equipment are outside the scope of this document.

**Please refer to manufacturer Operations and Maintenance manuals for all associated equipment related to the site prior to beginning any work on this installation.**

## **1.5 FSP Update Process**

### **1.5.1 Issuance and Revisions**

Dates for draft issuance, revisions, and final issuance of this FSP are provided on Page 5 of this document.

Updates to this FSP based on any major material changes to the installation are the responsibility of the System Owner / Operator and other relevant entities required.

### **1.5.2 Annual Review**

During the operating life span of this installation, it is expected that this document shall be reviewed annually, with all pertinent information updated as required.

### **1.5.3 Plan Retirement**

This Fire Safety Plan may be retired once the system is decommissioned. All decommissioning procedures should be performed by trained and knowledgeable persons in alignment with the Decommissioning Plan provided for this installation. Decommissioning shall be performed under supervision of the System Owner / Operator responsible for this installation.

Notification of decommissioning shall be provided to the Fire Department by the System Owner / Operator responsible for this installation.

## **1.6 Training**

Procedures and schedules for conducting drills and training for staff and support contractors on the contents of the plan and appropriate response procedures will be enacted. Employees will be trained in emergency procedures contained in this Fire Safety Plan and all applicable documents. Visitors/ contractors shall operate under functional supervision or be provided an escort through the facility to accomplish their intended work.

The owner/operator will coordinate with and provide training for the jurisdiction that provides the local emergency responders pertaining to emergencies with the BESS. This training will be administered in collaboration with the battery supplier, a Professional Fire System consultant, and coordinated directly with the local emergency teams during the permitting process. Refreshers will be offered periodically as needed and revisions to this document will be made. A log of all training shall be maintained by XXXXXXXXXXXXXXXXXXXX and provided to the AHJ when requested.

## 2 SITE OVERVIEW

### 2.1 Site Location

The 404 Silver Street Agawam energy storage facility is to be located just north of the Massachusetts/Connecticut border in Agawam, Hampden County, Massachusetts. The site will consist of 7 Hithium 5.015 MWh ESS units providing approximately 5 MW / 20 MWh of energy storage power and capacity, respectively.

Figure 1 – Site Map

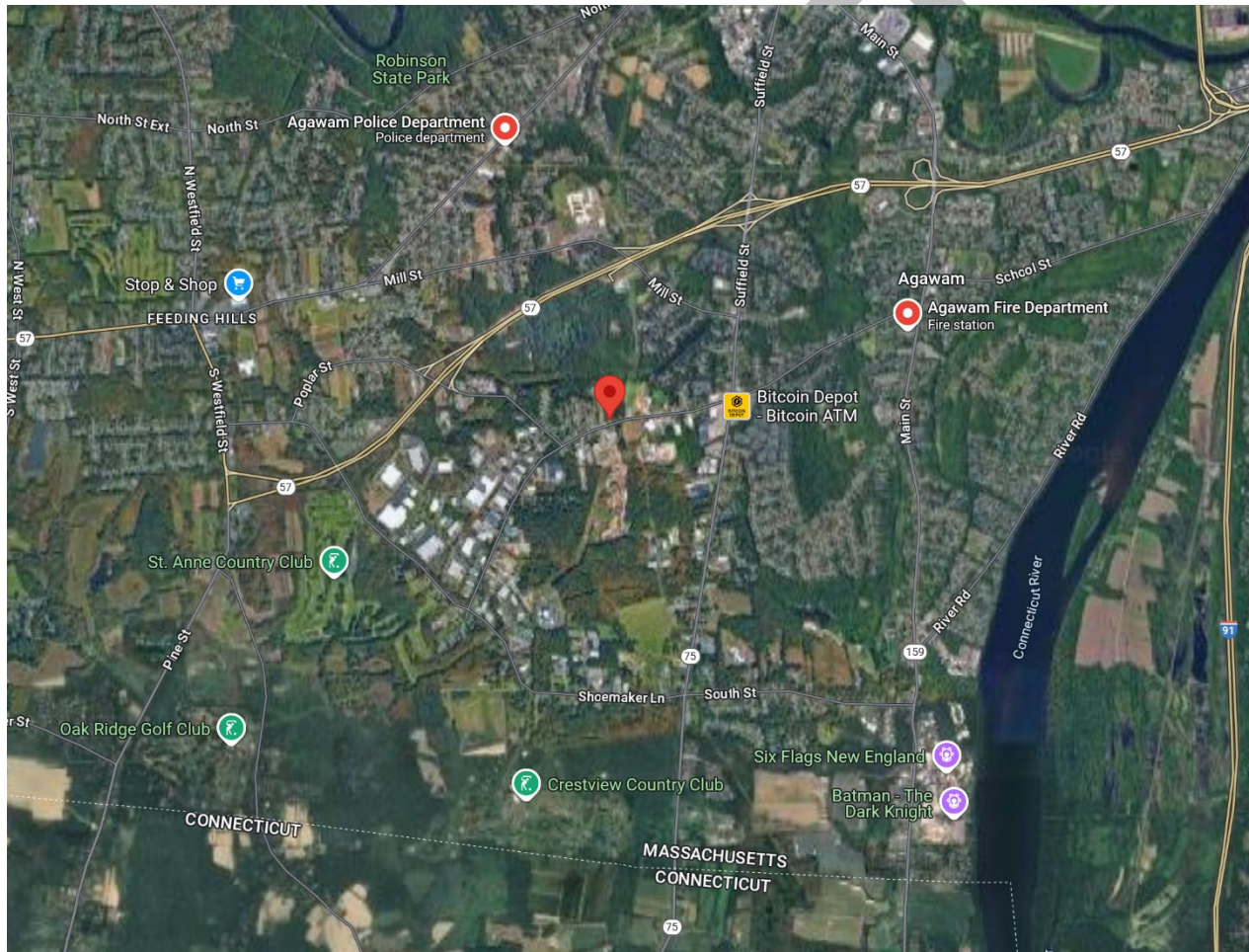
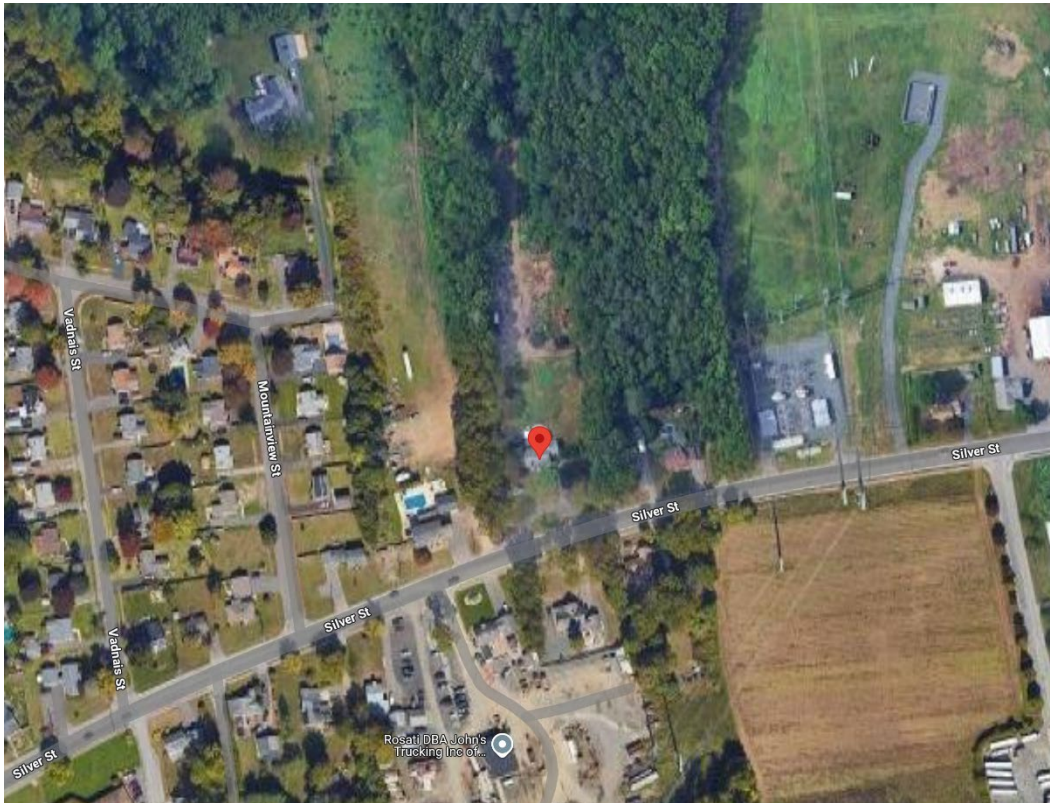




Figure 2 – Enlarged Site Layout



## 2.2 Onsite Personnel Staging Area

The location of the safety assembly area for any onsite personnel is located along Silver Street, outside the facility entrance gate, but will be dependent on wind conditions and wind direction.

Onsite employees should not attempt to reenter the BESS facility without approval of the IC.

## 2.3 Public Safety Staging Area

Public Safety staging area is located at **TBD**. The staging location will be determined by the wind direction.

## 2.4 First Responders Station

Onsite personnel may need to provide the location of the First Responder's Station, which houses physical copies of the Fire Safety Plan (FSP), Emergency Response Plans (ERP), Emergency Operations Plan (EOP), operational permits, O&M logs, and product manuals in a lockbox. The location of the First Responder Station will be determined with input from the local fire department but will be located near the entrance.

## 2.5 Site Access

There will be a 20-foot-wide access road starting at the entrance off of Silver Street that provides access to the site and around all the BESS cabinets (see Page 4). A site access gate will be provided for fire department access. Onsite personnel shall not park in or obstruct the fire department access road or gate.

## 2.6 Lock Box Access

A lock box containing a physical copy of the Fire Safety Plan (FSP), Emergency Response Plans (ERP), operational permits, O&M logs, and product manuals, etc., is provided at the site entrance at the location of the First Responder Station.

## 2.7 Equipment Access

The Hithium 5.015 MWh ESS enclosures are only accessible for maintenance purposes via cabinet-style enclosure doors and cannot be physically entered by personnel at any time. Only trained and approved site personnel shall open an enclosure. During an emergency, enclosures opened by trained and approved personnel shall be with the approval of the IC.

## 2.8 Water Supply

Municipal fire hydrants are located along Silver Street, with the closest one being located beside the facility entrance from Silver Street. Onsite employees shall not block or obstruct any of the hydrants. Hydrants shall only be used by the fire department unless approved by the IC or their designee.

## 2.9 Fire Alarm Control Panel

The primary Fire Alarm Control Panel (FACP) will be provided at a location approved by the local AHJ. Onsite personnel shall relay any information from the FACP to the IC. Onsite personnel shall not silence any alarms or signals on the FACP and shall not reset the FACP without approval from the IC.

## 2.10 Nearby Exposures

It is important for site personnel to be familiar with Nearby Exposures during an incident. The following nearby exposures are located in the immediate area, as shown in Figure 3 below.

- **404 Silver Street, Private House:** A private house at the address 404 Silver Street is located on the same property, directly south of the nearest ESS unit. Also, neighboring private houses at 340, 386, 394, and 416 Silver Street are directly south of the BESS site along Silver Street.
- **Eversource Substation:** At the address 344 Silver Street, Southeast of the BESS site, is the Eversource Silver Street 30A Substation.

- **Malone's Farm & Garden Center:** Directly to the east of the facility, at the address 338 Silver Street.
- **Residential Neighborhood:** Several dozen private houses are located in a residential neighborhood are located directly west of the BESS site between Mountainview Street and Garden Street.
- **South Side of Silver Street:** There are a mix of residential houses, commercial businesses, and industrial businesses along the south side of Silver Street, which are south of the BESS site.

Figure 3 – Nearby Exposures



## 2.11 Associated Electrical Equipment

Site personnel shall not access any electrical equipment unless they are trained and approved by owner/operator. During an emergency, access must be approved by the IC.

- **Energy Storage System:** Hithium 5.015 MWh ESS
- **Inverters / PCS:** TBD

## 2.12 Site Maintenance

Onsite personnel shall ensure that the facility's interior access roads are maintained to guarantee accessibility to the site by emergency personnel, especially during inclement weather. The owner/operator, or their designee, shall ensure snow removal, landscaping, and other ongoing upkeep activities are in place prior to construction.



### 3 ENERGY STORAGE SYSTEM OVERVIEW

Onsite personnel shall call 911 if they see fire or smoke no matter if the fire or smoke is coming from inside the site or outside the site.

It is important for site personnel to understand and become familiar with the energy storage system at the East Setauket site and their safety features. The Silver Street energy storage facility will utilize 7 Hithium 5.015 MWh ESS units, each providing approximately 5015 kWh per unit. They will provide 5 MW for 4 hours of energy storage power and capacity to the electrical grid. Each Hithium ESS unit consists of battery modules utilizing lithium iron phosphate (LFP) battery cells.

Each Hithium ESS unit is equipped with four (2) smoke detectors, two (2) heat detectors, and two (2) gas detectors, a battery management system (BMS), and active NFPA 69 exhaust ventilation system for removal of flammable gases from within the enclosure in the event of a battery failure. Additional information on fire protection systems is provided in Section 4 below.

*Figure 4 – Typical Hithium ESS Enclosure*



## 4 FIRE PROTECTION SYSTEMS

### 4.1 Exhaust Ventilation System

The Hithium ESS unit is equipped with an active exhaust ventilation system designed in accordance with *NFPA 69: Standard on Explosion Prevention Systems* to remove flammable off-gases during thermal runaway and maintain levels below 25% of the lower flammability limit of the volume of the enclosure.

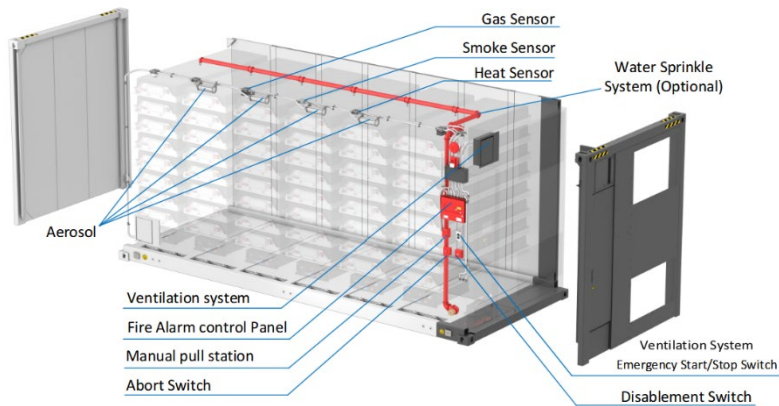
**Site personnel shall not deactivate the exhaust ventilation system unless approved by the IC.**

| WARNING: Risk of Explosion / Deflagration                                          |                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | An explosion / deflagration / over-pressure event is a critical hazard, and any emergency on-site should always be addressed with full awareness of potential factors which may lead to such an event.<br><br><b><u>Any failure or alarm condition should result in the assumption of an explosion risk.</u></b> |
| WARNING: Risk of Re-ignition                                                       |                                                                                                                                                                                                                                                                                                                  |
|  | Do <b>NOT</b> assume the fire is out as the fire event unfolds. A lithium-ion battery fire which has seemingly been extinguished may flare up again if all cells within the enclosure have not been completely consumed.                                                                                         |

### 4.2 Fire Protection

The BESS Facility will be designed to comply with NFPA 1 and NFPA 855. The project will have an active, remote monitoring system with controls including alarm systems that would shut the system down in the event of a fire. Each cabinet will have active fire and gas detection.

Figure 5 – Fire and Life Safety Layout



| WARNING: Risk of Re-ignition                                                      |                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Do <b>NOT</b> assume the fire is out as the fire event unfolds. A lithium-ion battery fire which has seemingly been extinguished may flare up again if all cells within the enclosure have not been completely consumed. The risk of battery re-ignition can remain present for hours or even days after the smoke / flame is initially detected. |
| WARNING: Risk of Explosion / Deflagration                                         |                                                                                                                                                                                                                                                                                                                                                   |
|  | An explosion / deflagration / over-pressure event is a critical hazard, and any emergency on-site should always be addressed with full awareness of potential factors which may lead to such an event.<br><br><b><u>Any failure or alarm condition should result in the assumption of an explosion risk.</u></b>                                  |
| WARNING: Electrical Shock Hazard                                                  |                                                                                                                                                                                                                                                                                                                                                   |
|  | In case of flooding, stay out of the water if any part of the ESS unit(s) or wiring is submerged.                                                                                                                                                                                                                                                 |

### 4.3 Emergency Shutoffs

Emergency shutoffs (E-Stops) is provided at multiple levels and site personnel shall know the locations of the E-Stops. Site personnel shall only use the E-Stops when approved by the site IC or the fire department IC.

**Any interaction with E-Stops should only be initiated in coordination with the System Owner, and other SMEs and the fire department, as is deemed necessary.**

#### 4.3.1 Site-Level E-Stop

Manual Emergency Stop (E-Stop) / Emergency Power Off (EPO) switch(es) are located with the facility. The exact location will be provided once the final layout is approved.

Any interaction with E-Stops should only be initiated in coordination with the System Owner, and other SMEs and the fire department, as is deemed necessary.

#### 4.3.2 Enclosure-Level E-Stop

Each Hithium ESS unit is equipped with AC circuit breaker located within the Electrical Cabinet and is to be used only by trained and approved site personnel.

| <b>CAUTION: Risk of Stranded Energy</b>                                                                                                                                |                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                       | Shutting off power to the ESS unit(s) does not de-energize the battery and shock hazard may still be present. Always treat the batteries as Energetic Hazardous Materials, as they may maintain their State of Charge (SOC) long after the removal of power to the overall ESS. |
| <b>WARNING: Risk of Fire and Explosion</b>                                                                                                                             |                                                                                                                                                                                                                                                                                 |
| <br> | Risk of fire or explosion may be present in the event of a battery failure. The Fire Department should not attempt to engage with any site or enclosure E-stops. Assistance in shutdown should be provided by the System Owner / Operator and any other required SMEs.          |
| <b>WARNING: Electrical Shock Hazard</b>                                                                                                                                |                                                                                                                                                                                                                                                                                 |
|                                                                                       | In case of flooding, stay out of the water if any part of the ESS unit(s) or wiring is submerged.                                                                                                                                                                               |

#### 4.4 Battery Management System (BMS)

Site personnel shall relay any information from the integrated Battery Management System (BMS) to the IC. The integrated Battery Management System (BMS) monitors key datapoints such as voltage, current, and state of charge (SOC) of battery cells, in addition to providing control of corrective and protective actions in response to any abnormal conditions. In the event of any abnormal conditions, the BMS will generally first raise an information warning, and then trigger a corresponding corrective action should certain levels be reached. Critical BMS sensing parameters include, but are not limited to:

- Over / under temperature limits
- Over / under voltage limits
- Over / under current limits
- Communications loss

BMS data is monitored by a 24/7 Network Operations Center (NOC) and is accessible to the System Owner / Operator and, based on the nature of a potential ESS failure, may provide information on the state of the batteries to corporate first responders.

## 5 FIRE DETECTION, ALARMING, AND NOTIFICATION

### 5.1 Fire Detection Systems

Each Hithium ESS enclosure is equipped with four (2) smoke detectors and two (2) heat detectors to provide detection of fire or abnormally high temperatures within the enclosure.

Additionally, each Hithium ESS unit is equipped with two (2) combustible gas detectors which, upon detection of flammable limits within the enclosure, activates the active exhaust ventilation system to remove flammable gases from the enclosure before explosive concentrations are allowed to accumulate.

Activation of smoke, heat, or gas detectors shall result in the following actions:

#### **Actions Triggered Upon Smoke, Heat, and Gas Detection:**

- Activation of any smoke or heat detector will automatically send an alarm signal to the Fire Alarm Control Panel (FACP).
- Activation of a combustible gas detector upon detection of 10% LFL will send a supervisory signal to the FACP and initiate the explosion prevention (exhaust ventilation) system.
- The master FACP reports to a Network Operations Center (NOC) which then transmits to the System Owner / Operator.
- All alarms are tied into the Battery Management System (BMS) and are available to the NOC.

### 5.2 Central Station Monitoring

In the event of heat, smoke, or gas detection within the ESS enclosure, the FACP shall send Alarm and Trouble signals to the Central Station Monitoring which shall then be relayed to the local Fire Department to coordinate dispatch of responding units.

*Table 1 – Central Station Monitoring Facility Information*

#### **Central Station Monitoring Facility Name**

- Phone: TBD
- Additional Information: TBD

### 5.3 Remote Monitoring Facility

In addition to monitoring by the Central Station Monitoring, remote monitoring of BMS operation is provided by the 24/7 Operations Center. In the event of a battery-related failure transmitted by the BMS, alarm notifications and other pertinent information on the

state of the ESS shall be sent to the System Owner to inform potential emergency response procedures as needed.

Additionally, if more detailed information on the state of the Hithium ESS unit is required, the Operations Center should be contacted.

*Table 2 – 24/7 Network Operations Center Information*

**24/7 Network Operations Center (for Emergency Use)**

- **24/7 Emergency Hotline: TBD**
- **Email Support:**



## 6 GENERAL BATTERY HAZARDS

Lithium-ion battery failures pose several major risks, as are briefly described in the sections below. Specific response procedures for different incident scenarios are provided in [Section 8](#) of this document.

### 6.1 Thermal Runaway

The defining characteristic of lithium-ion battery failures is a state known as thermal runaway. Thermal runaway is chemical process where self-heating in a battery exceeds the rate of cooling causing high internal temperatures, melting, off-gassing / venting, and in some cases, fire or explosion. Thermal, mechanical, and electrical abuse can lead to thermal runaway; internal short circuit from manufacturing defects; or the development of metallic dendrites that form an internal short over time.

Flammable and potentially explosive gases (generally white in color) typically evolve when an ESS goes into thermal runaway and may be released in large quantities from battery cells or modules. Fire and explosive incidents may result, and precautions as described in sections below should be observed.

### 6.2 Fire and Re-ignition

Lithium-ion battery fires burn extremely hot (upwards of 1,000 – 1,500°C) and are generally not easily extinguished. Fire growth may be slow, fast, or ultra-fast (e.g., during deflagration event) in nature, and may last for several hours before the battery modules are completely consumed. Furthermore, even when a lithium-ion battery fire appears to be fully extinguished, re-ignition risk may still be present hours or even days after there are no visible signs of fire.

Application of water directly to affected battery modules may potentially prolong the incident, and decision to apply water should be made in coordination with the System Owner / Operator and any other required SMEs.

| WARNING: Risk of Re-ignition                                                        |                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Do <b>NOT</b> assume the fire is out as the fire event unfolds. A lithium-ion battery fire which has seemingly been extinguished may flare up again if all cells within the enclosure have not been completely consumed. The risk of battery re-ignition can remain present for hours or even days after the smoke / flame is initially detected. |

| NOTICE                                                                            |                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>Indicators which may provide insight into what is happening or about to happen during an incident may include:</p> <ul style="list-style-type: none"> <li>▪ Smoke or flames</li> <li>▪ Change in smoke color</li> <li>▪ Change in velocity or volume of smoke production</li> <li>▪ Sounds – popping and / or hissing</li> <li>▪ Smell – sweet smell</li> </ul> |

### 6.3 Deflagration

Lithium-ion batteries release flammable off-gases during thermal runaway which, if allowed to accumulate within the enclosure, may create an explosive atmosphere, posing serious risk to first responders and nearby exposures. These gases may accumulate within the ESS enclosure at levels above the Lower Explosive Limit (LEL). At sufficiently high accumulations, gases can also exceed their Upper Explosive Limit (UEL), at which point ventilation may bring the environment back into flammable limits, thus creating a new explosion risk.

It may be difficult to discern conditions within the enclosure if smoke and gas are not visible outside of the enclosure. Furthermore, a single battery cell may release enough flammable off-gas to generate an explosive atmosphere within the enclosure. Therefore, any failure or alarm condition should always result in the assumption of a potential explosion risk.

| WARNING: Risk of Explosion / Deflagration                                           |                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>An explosion / deflagration / over-pressure event is a critical hazard, and any emergency on-site should always be addressed with full awareness of potential factors which may lead to such an event.</p> <p><b><u>Any failure or alarm condition should result in the assumption of an explosion risk.</u></b></p> |

### 6.4 Electric Shock

Even if a battery may look to be destroyed by fire and / or other means, there is potential that the battery still contains stranded energy and remains energized. De-energization of the system or any removal of the battery or battery component shall only be performed by a trained and competent individual with appropriate PPE.

Normal overhaul the ESS enclosure should not be attempted by the fire department in any circumstances, as there are considerations for handling damaged batteries requiring equipment and expertise not readily available. Once the scene is secured, these actions may be undertaken by trained experts under close supervision.

| WARNING: Risk of Stranded Energy                                                  |                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Always treat the batteries as Energetic Hazardous Materials, as stranded energy is likely to remain present. Traditional Fire Department overhaul should not be conducted due to the potential for stranded energy. |

## 6.5 Arc Flash

All ESS systems and related electrical equipment shall always be treated as energized (Energetic Hazardous Material).

Qualified PPE and training are required when working or accessing equipment within an Arc Flash Boundary. In general, when in direct proximity of the battery enclosure, wear non-melting or untreated natural fiber long-sleeve shirt, long pants, safety glasses, hearing protection, and leather gloves. AR plant clothing is also acceptable. Maintain arc flash boundary until completion of any particular task.

## 6.6 Toxic Smoke and Gas Emission

Lithium-ion batteries may release large quantities of flammable and toxic gas when undergoing failure and pose an inhalation hazard. Chemicals consumed during a thermal runaway event will produce copious amounts of smoke.

The ESS site perimeter should not be entered during a fire or off-gassing event unless there is an imminent threat to life safety, at which time only properly trained and equipped public safety personnel may enter. This entry shall be with full protective gear to include self-contained breathing apparatus (SCBA).

| WARNING: Toxic Gases                                                                |                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>Large quantities of toxic smoke and gas may be emitted from the ESS during battery off-gassing or fire situations.</p> <p><b><u>Proper PPE including SCBA should be worn by first responders.</u></b></p> |

| NOTICE                                                                              |                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>Typical composition of battery off-gassing event may include:</p> <ul style="list-style-type: none"> <li>▪ High concentrations (&gt;10%) of Hydrogen, Carbon Monoxide, Carbon Dioxide</li> <li>▪ Lower concentration (&lt;10%) of Methane, Ethane, or other flammable hydrocarbons</li> </ul> |

## 6.7 Additional Hazards and Considerations

For additional hazards associated with leaked coolant, leaked refrigerant, leaked electrolyte, or emergency considerations during storage, operation, transportation, or first aid measures, and disposal procedures, please see product-level Emergency Response Guide.

## 7 EMERGENCY RESPONSE

### 7.1 Emergency Contacts

A list of emergency contacts associated with this installation is provided on Page 3.

### 7.2 Planning Assumptions

The following assumptions are applied throughout the plan:

- Emergency situations may occur at any time of the year, on any day, and at any time with no warning.
- Emergency situations could be the result of human/intentional hazards, natural hazards, or technological hazards.
- In most serious emergency situations, local law enforcement, fire, and emergency managers will be available for assistance. However, there may be a delay in response. Therefore, staff and members will often be the first on the scene and must carry out the initial incident response activities until responders arrive.
- After a critical incident, the site may have to rely on its own resources in order to self-sustain for an extended period of time.
- Proper prevention, protection, and mitigation actions will prevent or reduce incident-related losses.
- Maintaining and providing frequently exercising the FSP amongst stakeholders can improve the outcomes of incident response.
- Immediate response is required to reduce injuries, save lives, and protect property.

### 7.3 Roles and Responsibilities

This plan is based upon the concept that the incident management functions that must be performed by the organization generally parallel some of their routine day-to-day functions. To the extent possible, the same personnel and material resources used for day-to-day activities will be employed during incidents. Because personnel and equipment resources are limited, certain nonessential functions, as determined by the organization, will be suspended. The personnel, equipment, and supplies that would typically be required for those nonessential functions will be redirected to accomplish assigned incident management tasks. Operations fit within the overall National Response Framework and comply with the National Incident Management System (NIMS) and Incident Command System (ICS) standards. Priorities for all emergency responses are as follows:

1. Life Safety
2. Incident Stabilization
3. Property Preservation

If an incident is within the authorities of the responder community (police, fire/EMS, etc.), command will be transferred upon the arrival of qualified responders. At the discretion of the new Incident Commander, the Site Incident Commander (TBD by XXXXX) may be integrated into the incident response in a new role.

#### 7.4 Equipment and Personnel Protective Equipment (PPE)

In general, when in direct proximity of the battery enclosure, wear non-melting or untreated natural fiber long-sleeve shirt, long pants, safety glasses, hearing protection, and leather gloves. Arc-rated (AR) plant clothing is also acceptable. Jewelry such as necklaces shall be removed to avoid contact with any electrical hazard.

All smoke is not healthy, including smoke from a fire involving an enclosure. Any site personnel working in and around smoke shall have approved respiratory protection as described in section 6.6.

#### 7.5 General Emergency Response Recommendations

Initiation of emergency response shall be activated per current protocol.

*Table 3 - General Emergency Response Recommendations*

##### **General Emergency Response Recommendations:**

- 1. If there is any threat or potential threat to life or safety, 911 shall be called immediately to summon the aid of public safety responders.**
- 2. An initial call to 911** shall include the following in plain language (no code or terms):
  - Where the incident is located
  - What has happened
  - What is occurring
  - Any injuries or unaccounted for individuals
  - What needs or other resources should be requested
- 3. On-site staff (if applicable) shall immediately go to a designated muster point,** which will be the command post location unless designated differently by the Incident Commander.
- 4. Offsite Staff** shall be notified.
- 5. For Law enforcement incidents,** onsite personnel shall find safe areas to muster until law enforcement says it's safe to come out.

##### **Notes:**

- At the same time as these activities are occurring, the System Owner / Operator or other designated SME shall immediately contact the 24/7 Network Operations Center to establish available data from the BMS and communicate this to the Incident Commander or other appropriate individual.

- It is recommended that a safe perimeter is set up and maintained around the site to keep any persons or personnel a safe distance from the incident.

## **7.6 Medical Emergencies: Injury / Illness**

In the event of a medical emergency (injury/illness) within the BESS facility where the person(s) is unconscious, non-ambulatory, or exhibits life-threatening symptoms, 911 should be activated immediately. The owner/operator should also be notified after 911 is called.

If the injury/illness is not life-threatening local emergency responders may be requested as deemed necessary. Owner policies and procedures will be followed for reporting the incident. See Emergency Contacts Section 2, for contact information of medical assets. First aid kits will be located in all service vehicles and other approved locations on the site.

## **7.7 General Weather Emergencies**

Weather shall be monitored continually by the 24/7 for real time information accessed by Site Manager or other onsite personnel. Severe weather conditions that are reasonable to expect at, or near the facility may consist of lightning, high winds, hurricanes, and snow events.

### **7.7.1 Lightning**

When you first see lightning or hear thunder, take shelter in a building or a vehicle. Lightning often precedes rain and operations should be suspended should weather alerts or other signs indicate its presence. Avoid all metal objects (fences, machinery, etc.), trees, and open ground. Seek shelter in fully enclosed metal vehicles or substantial buildings. Operations should remain suspended for at least 30 minutes following the last lightning strike.

### **7.7.2 High Winds, Hurricanes and Snow Events**

Secure material as necessary. Avoid driving through flooded areas. Avoid prolonged periods during wet or cold weather that can lead to hypothermia and frostbite. Seek suitable shelter from the elements in substantial buildings.

## **7.8 Law Enforcement Events**

For suspicious package, bomb threats, workplace violence, terrorist, or active shooter events, law enforcement shall be notified according to section 7.3. Local, County and State protocols shall be followed. Additional guidance for each event listed above can be found in the FEMA Protective Actions website <https://community.fema.gov/ProtectiveActions/s/>

## 7.9 Response to Alarm Signals

In the event of a fire alarm signal in an enclosure, the following should be performed:

Evacuate area to a safe location, a sufficient distance from the troubled enclosure.

If the alarm system has not already signaled the local Fire Department, immediately call the local Fire Department (911).

Call any required offsite personnel.

Notify the BESS Emergency Call Center listed in Section 2.

Establish a safety perimeter of 100 feet (30 meters) around all sides of the BESS and remain outside the fenced area. Do not allow personnel other than firefighters to enter the safety perimeter. (Note: The Safety Perimeter may extend beyond the boundary of the fenced area. Stay upwind out of smoke and off-gassing)

All onsite staff, maintenance personnel, and visitors are required to evacuate the site in the event of an alarm activation, regardless of cause or time. It is the responsibility of the supervisor or designee at the site to determine whether all their personnel evacuated, and if not, to report that to the IC. See section 2.2 for assembly area.

## 7.10 Thermal Runaway or Explosion Incident

In the event of a thermal runaway or explosion event, following the same procedures from section 7.7.

Lithium-ion batteries release flammable off-gases during thermal runaway which, if allowed to accumulate within the enclosure, may create an explosive atmosphere, posing serious risk to first responders and nearby exposures. Furthermore, it may be difficult to discern conditions within the enclosure if smoke and gas are not visible outside of the unit.

A fire or thermal runaway event may cause an explosive or deflagration event potentially subjecting personnel to overpressure and projectile hazards. An initial exclusion area should be established, based on discretion of the Incident Commander, to guard against any blast overpressure. Fire Department staging or operations should not be in direct alignment with the ESS units and should be established at angles relative to the sides of the enclosures if possible. If available, shielding via the built environment should be utilized to protect against high temperatures, overpressure events, or projectile hazards.

**A safe stand-off distance of at least 100 ft shall be maintained between individuals and the ESS enclosure(s) exhibiting fire conditions.**

## 7.11 External Fire / Thermal Exposure Incident

For any type of external heat source or fire impingement (i.e., not stemming from the battery system itself), onsite personnel shall call 911 immediately. Onsite personnel should be advised to look at the state of health information from the BMS data (e.g.,



increasing temperature in target ESS units) available from the 24/7 Network Operations Center to evaluate severity of the incident and potentially treat as an ESS emergency. All precautions previously noted for fire and explosion incidents should be observed.

### **7.12 External Impact Incident**

In the event that an enclosure is severely impacted causing crushing or puncturing of the outer shell of the enclosure, treat this as an emergency - notify 911 and other required parties.

### **7.13 Cyber Security Threat**

Cyber Security Incidents appear in multiple ways. It is imperative that all Silver Street personnel are attentive to possible threats to the facility. In the event of a Cyber Security Incident, all Silver Street personnel should remain calm, gather as much information as possible, and appropriately report the incident.

### **7.14 Incident Monitoring and Evaluation**

Continuous monitoring and feedback on the incident should be provided as the situation evolves. Consultation between the IC and the System Owner / Operator and any other required SMEs should be held to guide incident response and determine appropriate next steps.

If available, real-time BMS data from the 24/7 Network Operations Center should be utilized (e.g., temperature, voltage, or other critical measurements) to monitor the spread of failure and assess the health of adjacent ESS units to help guide response procedures as the event unfolds.

### **7.15 Recovery**

Recovery encompasses both short-term and long-term efforts for returning the site back to normal operating conditions. During the recovery phase, restoration, investigation, and disposal may be conducted. The SME will:

- Utilize the approved Decommissioning Plan to remove any damaged batteries, battery arrays or battery cabinets.
- Industry best practices of allowing the troubled unit to consume itself serve to limit the amount of stranded energy that would need to be dissipated during the restoration phase of the event.
- Work with stakeholders to determine what degree of restoration may be performed with respect to continuity of operations, spoliation of evidence, and overall safety.
- Act as investigator for XXXXX or help begin and facilitate investigation process.
- Work with hazmat and disposal partners following completion of the investigation to ensure the system is properly secured and to determine the appropriate course of action for disposing of the system.
- Utilize the approved Commissioning Plan to bring all units, existing and new, online.

## 7.16 Mitigation

Mitigation, with its focus on the impact of a hazard, encompasses the structural and non-structural approaches taken to eliminate or limit a hazard's presence. Mitigation can be accomplished by ensuring code compliance. Silver Street Energy Storage mitigates hazards by ensuring the batteries and other components are listed and in compliance with all applicable fire and building codes as well as in compliance with NFPA 855.

# 8 COMMUNICATION TRAINING

## 8.1 Training Plan

The purpose of the communication plan is to ensure that timely and accurate information is provided to the media, regulators and other entities, as required.

All Silver Street personnel who are designated to interact with local, state, and federal emergency management officials during emergency events should have received the latest FEMA National Incident Management System (NIMS) training. That training at a minimum shall include the following modules:

- ICS-100: Introduction to the Incident Command System
- ICS-200: ICS for Single Resources and Initial Action Incidents
- ICS-700: National Incident Management System (NIMS)
- ICS-800: National Response Framework

# 9 EMERGENCY STAFFING PLAN

## 9.1 Staffing Plan

Emergency staffing is dependent upon the type and severity of the emergency. Staffing considerations for 404 Silver Street Agawam BESS during an emergency will be determined by the Site Supervisor.

## APPENDICES

### APPENDIX A – Additional Site Photos



## APPENDIX B – Additional Information



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## APPENDIX C – Definitions

For the purpose of this document, the following definitions apply.

**Authority Having Jurisdiction (AHJ)** – An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure. (NFPA 855)

**Battery** – Two or more cells connected together electrically in series, in parallel, or a combination of both to provide the required operating voltage and current levels. (NFPA 70)

**Battery Energy Storage System (BESS)** – See Energy Storage System, based primarily on battery technology.

**Battery Management System (BMS)** – A system that monitors, controls, and optimizes performance of an individual or multiple battery modules in an energy storage system and has the ability to control the disconnection of the module(s) from the system in the event of abnormal conditions. This system can be completely independent of the ESMS. (NFPA 855)

**Cabinet** – See Energy Storage System Cabinet.

**Cell** – The basic electrochemical unit, characterized by an anode and a cathode, used to receive, store, and deliver electrical energy. (NFPA 855 and NFPA 70)

**Container** – See Energy Storage Walk-In Unit.

**Enclosure**- See Energy Storage System Cabinet

**Energy Storage System** – One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time to the local power loads, to the utility grid, or for grid support. (NFPA 855)

**Energy Storage Management System (ESMS)** – A system that monitors, controls, and optimizes the performance of an energy storage system and has the ability to

control the disconnection of the energy storage system in the event of abnormal conditions. (NFPA 85)

**Energy Storage System Cabinet** - A cabinet containing components of the energy storage system that is included in the UL 9540 listing for the system where personnel cannot enter the enclosure other than reaching into access components for maintenance purposes. (NFPA 855) Note: also see “*Cabinet*” or “*Enclosure*”.

**Energy Storage System Walk-In Unit** - A prefabricated structure containing energy storage systems that includes doors that provide walk-in access for personnel to maintain, test, and service the equipment and is typically used in outdoor and mobile energy storage system applications. (NFPA 855) Note: also see “*Container*”.

**Emergency Response Plan (ERP)** – A documented set of actions to address the planning for, management of, and response to natural, technological, and man-made disasters and other emergencies. (NFPA 72)

**Hazard Mitigation Analysis (HMA)** – An evaluation of potential energy storage system failure modes and the safety-related consequences attributed to the failures. (NFPA 855)

**Large-Scale Fire Testing** – Testing of a representative energy storage system that induces a significant fire into the device under test and evaluates whether the fire will spread to adjacent energy storage system units, surrounding equipment, or through an adjacent fire-resistance-rated barrier. (NFPA 855) Note: For the purposes of this document, this shall refer to UL 9540A testing.

**Listed** - Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose. (NFPA 85)

**Lower Flammable Limit (LFL)** – The lowest concentration of a combustible substance in a gaseous oxidizer that will propagate a flame, under defined test conditions. (NFPA 68)

**Off-Gassing** – The event in which the cell case vents due to a rise in internal pressure of the cell. (NFPA 85)

**Upper Flammable Limit (UFL)** – The highest concentration of a combustible substance in a gaseous oxidizer that will propagate a flame. (NFPA 68)

**State of Charge (SOC)** – The stored or remaining capacity of a battery at a given time expressed as a percentage of its rated capacity. (NFPA 72)

**Thermal Runaway** – The incident when an electrochemical cell increases its temperature through self-heating in an uncontrollable fashion and progresses when the cell's heat generation is at a higher rate than it can dissipate, potentially leading to off-gassing, fire, or explosion. (NFPA 855)



## Appendix J – Emergency Operations Plan



404 Silver Street Agawam

# EMERGENCY OPERATIONS PLAN

Rev 0.1 | May 1<sup>st</sup>, 2025

## Summary

This document serves as the Preliminary Emergency Operations Plan (EOP) for the 404 Silver Street Agawam energy storage facility to be located just north of the Massachusetts/Connecticut border in Agawam, Hampden County, Massachusetts. Emergency Operations Plans assign responsibility for carrying out specific actions at projected times and places in an emergency. It describes who will do what, as well as when, with what resources, and by what authority--before, during, and immediately after an emergency. All Emergency Operations Plans shall include five phases of emergency management: prevention, protection, response, recovery and mitigation.

**LIFE SAFETY SHALL BE THE HIGHEST PRIORITY DURING ANY TYPE OF EVENT.**

*The plan shall be updated when conditions that affect the response considerations and procedures change.*

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PRELIMINARY

## PROJECT INFORMATION

|                      |                                                                                     |
|----------------------|-------------------------------------------------------------------------------------|
| <b>Project Name</b>  | <b>404 Silver Street Agawam Energy Storage Project EOP</b>                          |
| <b>Project No.</b>   | 25-20261                                                                            |
| <b>Prepared For</b>  | <b>Silver Street Energy Storage, LLC</b><br>55 Technology Drive<br>Lowell, MA 01851 |
| <b>Revision No.</b>  | Rev 0                                                                               |
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## ACRONYMS

|                     |                                                                            |
|---------------------|----------------------------------------------------------------------------|
| <b>AR</b>           | Arc-Rated                                                                  |
| <b>AHJ</b>          | Authority Having Jurisdiction                                              |
| <b>BMS</b>          | Battery Management System                                                  |
| <b>E-Stop / EPO</b> | Emergency Stop / Emergency Power Off                                       |
| <b>EOP</b>          | Emergency Operations Plan                                                  |
| <b>EMS / ESMS</b>   | Emergency Management System / Energy Storage Management System             |
| <b>ERG</b>          | Emergency Response Guide (generic, product-level emergency response guide) |
| <b>ESRG</b>         | Energy Safety Response Group                                               |
| <b>ESS / BESS</b>   | Energy Storage System / Battery Energy Storage Management System           |
| <b>FACP</b>         | Fire Alarm Control Panel                                                   |
| <b>IC</b>           | Incident Commander                                                         |
| <b>ICS</b>          | Incident Command System                                                    |
| <b>kW</b>           | Kilowatt(s)                                                                |
| <b>kWh</b>          | Kilowatt-hour(s)                                                           |
| <b>LFP</b>          | Lithium Iron Phosphate                                                     |
| <b>MW</b>           | Megawatt(s)                                                                |
| <b>MWh</b>          | Megawatt-hour(s)                                                           |
| <b>O&amp;M</b>      | Operations and Maintenance                                                 |
| <b>PCS</b>          | Power Conversion System                                                    |
| <b>PPE</b>          | Personal Protective Equipment                                              |
| <b>SCBA</b>         | Self-Contained Breathing Apparatus                                         |
| <b>SDS</b>          | Safety Data Sheets                                                         |
| <b>SME</b>          | Subject Matter Expert                                                      |
| <b>SOC</b>          | State of Charge                                                            |
| <b>TSC</b>          | Tesla Site Controller                                                      |
| <b>UICS</b>         | Unified Incident Command System                                            |

## DEFINITIONS

**Annex** - a section of an emergency operations plan that addresses how an entity plans to respond in an emergency involving a specified type of hazard or threat.

**Drill** - an operations-based exercise that is a coordinated, supervised activity employed to test an entity's EOP or a portion of an entity's EOP. A drill may be used to develop or test new policies or procedures or to practice and maintain current skills.

**Emergency** - a situation in which the known, potential consequences of a hazard or threat are sufficiently imminent and severe that an entity should take prompt action to prepare for and reduce the impact of harm that may result from the hazard or threat. The term includes an emergency declared by local, state, or federal government, or PSCO or another reliability coordinator designated by the North American Electric Reliability Corporation and that is applicable to the entity.

**Entity** - an electric utility, transmission and distribution utility, municipally owned utility, electric cooperative.

**Epidemic** - An increase — often sudden — in the number of cases of a disease above what is normally expected in that population in a specific area.

**Hazard** - a natural, technological, or human-caused condition that is potentially dangerous or harmful to life, information, operations, the environment, or property, including a condition that is potentially harmful to the continuity of electric service.

**Incident** - an occurrence, natural or human-caused, that requires a response to protect life or property.

**Pandemic** - a disease outbreak that spans several countries and affects a large number of people, most often caused by viruses which can easily spread from person to person.

**Threat** - the intention and capability of an individual or organization to harm life, information, operations, the environment, or property, including harm to the continuity of electric service.

**Vulnerability** - characteristics of the organization that could make it more susceptible to the identified threats and hazards.

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PRELIMINARY

# 1 INTRODUCTION

## 1.1 Background

Energy Safety Response Group (ESRG) has been retained by Silver Street Energy Storage, LLC to perform a site-specific Emergency Operations Plan (EOP). Emergency Operations Plans are designed to assign responsibility to organizations and individuals for carrying out specific actions at projected times and places in an emergency. It describes who will do what, as well as when, with what resources, and by what authority-before, during, and immediately after an emergency. All Emergency Operations Plans shall include four phases of emergency management: mitigation, preparedness, response, and recovery. For this document, the term “Silver Street staff and members” refers to anyone under the direction of the Silver Street Energy Storage LLC.

The EOP for the 404 Silver Street Agawam Energy Storage project is created according to the Fire Code regulatory requirements for Agawam, MA. Currently, the 2021 *International Fire Code (IFC)* is the applicable Fire Code requirements for this jurisdiction. Additionally, the need for EOPs is also addressed by NFPA 855, the Standard for the Installation of Stationary Energy Storage Systems. In other jurisdictions, the NFPA 855 requirements are often referenced in addition to the IFC requirements since they are generally seen as the latest most updated requirements. Both the IFC and NFPA 855 refer to the NFPA standard that addresses the fundamental criteria for all-hazards preparedness, response, and resiliency program management and a process for the development of pre-incident plans to assist personnel with safe and effective incident management. This NFPA standard is NFPA 1660, Standard for Emergency, Continuity, and Crisis Management: Preparedness, Response, and Recovery, the 2024 Edition. This is a newer standard that brought together emergency planning from other standards into one new, all-encompassing standard. This EOP will follow this new standard as it's the most current and applicable guide available. This plan shall apply to all Silver Street staff and members participating in mitigation, preparedness, response, and recovery efforts.

## 1.2 Purpose

A critical mission of Silver Street Energy Storage is to not only protect the property, but to also protect the lives of its staff, members, and visitors. Through a coordinated planning effort with key internal and external stakeholders, Silver Street Energy Storage has developed an Emergency Operations Plan (EOP) that facilitates the preservation of life and property during an incident. The purpose of the EOP is to define the role and responsibilities of internal and external stakeholders before, during, and after an incident. The development of the plan, and subsequently, training and exercising of the plan empowers community members to react quickly and effectively during an emergency.

This plan provides an all-hazards approach to dealing with incidents and empowering staff and lay leaders to manage incidents at this facility. The EOP consists of the basic

plan and functional and threat-, hazard-, incident-specific annexes that allows for an organized and systematic approach to mitigate, prevent, protect against, respond to, and recover from an incident.

Key stakeholders have been trained to assess the seriousness of incidents and respond according to the established procedures and guidance. Silver Street Energy Storage regularly schedules training and exercises to assure these guidelines are followed, to improve response time and effectiveness, and evaluate performance.

## 1.3 Scope

The 404 Silver Street Agawam Energy Storage Emergency Operations Plan (EOP) outlines the expectations of Silver Street staff and members, defines the roles and responsibilities, identifies direction and control systems, identifies internal and external communications plans, outlines the frequency and types of training, and defines the roles and responsibilities before, during, and after an incident. The plan also includes references and authorities as defined by local, tribal, state, and federal government mandates, common and specialized procedures, and specific hazard/threat vulnerabilities and responses/recovery. With regard to the scope of this plan, incident, hazard, threat, and vulnerability are defined as follows.

**Incident:** An occurrence, natural or human-caused, that requires a response to protect life or property.

**Hazard:** Something that is potentially dangerous or harmful, often the root cause of an unwanted outcome.

**Threat:** Natural, technological, or human-caused occurrence, individual, entity, or action that has or indicates the potential to harm life, information, operations, the environment, and/or property.

**Vulnerability:** Characteristics of the organization that could make it more susceptible to the identified threats and hazards.

## 1.4 EOP Update Process

### 1.4.1 Issuance and Revisions

1. Dates for preliminary version issuance, revisions, and final issuance of this EOP are provided on Page 3 of this document.
2. During project development and the AHJ review process, the design changes or other updates to pertinent information shall be reflected and shared with the AHJ.
3. Updates to this EOP based on any major material changes to the installation are the responsibility of the System Owner / Operator and other relevant entities required.

### 1.4.2 Annual Review

During the operating life span of this installation, it is expected that this document

shall be reviewed annually, with all pertinent information updated as required and shared with the AHJ.

**1.4.3 Plan Retirement**

All Decommissioning procedures shall be in accordance with the locally adopted fire code and shall be performed by trained and knowledgeable persons in alignment with the Decommissioning Plan provided for this installation. Decommissioning shall be performed under supervision of the System Owner / Operator responsible for this installation. Notification of decommissioning shall be provided to the Fire Department by the System Owner / Operator responsible for this installation.

**1.5 Training**

Silver Street Energy Storage recognizes the critical importance of training and exercising as a part of incident response preparation. In order to ensure that all staff, members, and responders are aware of their roles and responsibilities as outlined in this EOP, Silver Street Energy Storage will provide all necessary training. A record of training shall be maintained by Silver Street Energy Storage and provided to the AHJ when requested.

**1.6 Drills**

404 Silver Street Agawam BESS personnel will conduct or participate in at least two drills annually to test this EOP. See the table below for the rotational drill schedule.

Each time a drill is performed, the Emergency Drill Report will be completed and filed with the Asset Manager. Following the annual drills, Silver Street will assess the effectiveness of their emergency response and revise the EOP as needed.

If Silver Street has activated the EOP in response to an emergency within the calendar year, a drill is not required to be conducted in the calendar year the EOP was activated.

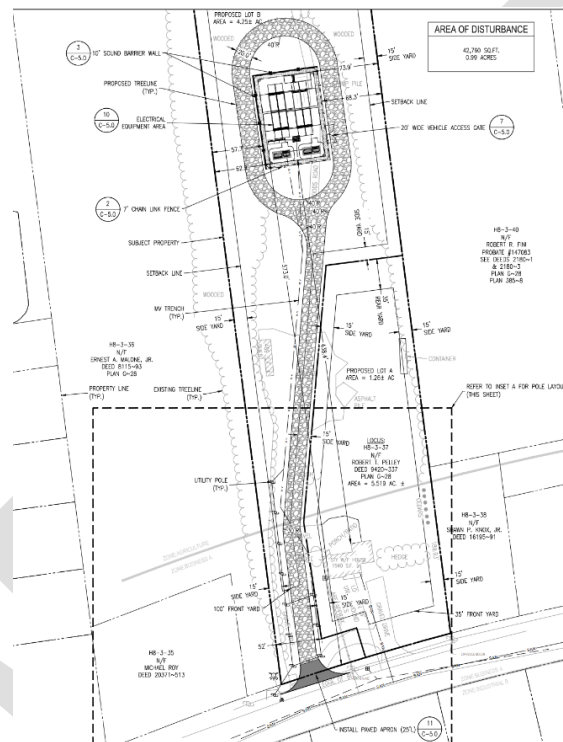
*Rotational Table*

| Rotation Year | Spring Drill                  | Fall Drill                             |
|---------------|-------------------------------|----------------------------------------|
| 1             | General Emergency<br>Wildfire | General Emergency<br>and Cold Weather  |
| 2             | Tornado and Hot Weather       | Medical Emergency<br>and Cold Weather  |
| 3             | Flooding and Hot Weather      | Threat of Violence<br>and Cold Weather |
| 4             | Drought and Hot Weather       | Cyber Security<br>and Cold Weather     |

## 2 SITE OVERVIEW

### 2.1 Site Location

404 Silver Street Agawam energy storage facility is to be located just north of the MA/CT border in Agawam, Hampden County, Massachusetts. The site will consist of 7 Hithium 5.015 MWh ESS units providing approximately 5 MW / 20 MWh of energy storage power and capacity, respectively.



### 2.2 External Support

While Silver Street Energy Storage has the potential to be impacted by a wide variety of emergency situations, it is not a traditional response agency. As a result, Silver Street Energy Storage relies on external response partners to assist with response efforts during an emergency. The external response partners that will assist with a response will vary based on the emergency. External response partners include, but are not limited to, those listed below.

- Agawam Fire Department – Dial 911
- Agawam Police Department – Dial 911
- Baystate Medical Center (ER) – Dial 413-794-0000
- Sumner Redstone Burn Center – Dial 617-726-3712

### 3 ENERGY STORAGE SYSTEM OVERVIEW

The 404 Silver Street Agawam Energy Storage Project utilizes 7 Hithium 5.015 MWh ESS units, providing a total of approximately 5 MW / 20 MWh of energy storage power and capacity to the electrical grid. Each ESS container consists of 6 racks of 8 battery modules each, with each module containing 104 lithium iron phosphate (LFP) battery cells.

## 4 EMERGENCY OPERATIONS PLAN

### 4.1 Planning Assumptions

Emergency planning includes the key areas involved in addressing any threat or hazard: prevention, protection, response, recovery, and mitigation. Integrating the key areas as part of the overall planning effort allows jurisdictions to produce an effective EOP and advance overall preparedness.

The following assumptions are applied throughout the plan:

- Emergency situations may occur at any time of the year, on any day, and at any time with no warning.
- Emergency situations could be the result of human/intentional hazards, natural hazards, or technological hazards.
- The threats and hazards identified in the Threat/Hazard Assessment Summary will likely be the most common emergency situations that Silver Street Energy Storage faces, but there is always the potential for lesser threats and hazards or previously unidentified threat and hazards to affect the organization.
- In most serious emergency situations, local law enforcement, fire, and emergency managers will be available for assistance. However, there can be a delay in response. Therefore, staff and members will often be the first on the scene and must carry out the initial incident response activities until responders arrive.
- After a critical incident, the site may have to rely on its own resources in order to self-sustain for an extended period of time.
- Proper prevention, protection, and mitigation actions will prevent or reduce incident-related losses.
- Maintaining and providing frequently exercising the EOP amongst stakeholders can improve the outcomes of incident response.
- Immediate response is required to reduce injuries, save lives, and protect property.

## 4.2 Limitations

It is the policy of Silver Street Energy Storage that no guarantee is implied by this plan of a perfect incident management system. As personnel and resources may be overwhelmed, Silver Street Energy Storage can only endeavor to make every reasonable effort to manage the situation with the resources and information available at the time.

## 4.3 Roles and Responsibilities

This plan is based upon the concept that the incident management functions that must be performed by the organization generally parallel some of their routine day-to-day functions. To the extent possible, the same personnel and material resources used for day-to-day activities will be employed during incidents. Because personnel and equipment resources are limited, certain nonessential functions, as determined by the organization, will be suspended. The personnel, equipment, and supplies that would typically be required for those nonessential functions will be redirected to accomplish assigned incident management tasks. Operations fit within the overall National Response Framework and comply with the National Incident Management System (NIMS) and Incident Command System (ICS) standards.

Priorities for all emergency responses are as follows:

1. Life Safety
2. Incident Stabilization
3. Property Preservation

If an incident is within the authorities of the responder community (police, fire/EMS, etc.), command will be transferred upon the arrival of qualified responders. At the discretion of the new Incident Commander, the organization Incident Commander (TBD by XXXX) may be integrated into the incident response in a new role.

## 4.4 Prevention

Prevention measures seek to eliminate the impact of hazards and/or reduce susceptibility to them. The Silver Street Energy Storage uses multiple layers to prevent an incident. These layers include:

- Code Compliance
- Battery Management Systems
- Ongoing Inspection and Maintenance



## 4.5 Protection

Protection measures are actions or measures taken to cover or shield assets from exposure, injury, or destruction. Protective actions may occur before, during, or after an incident and prevent, minimize, or contain the impact of an incident. Silver Street Energy Storage once again uses many different layers to address protection measures. First, the site is secure to prevent unauthorized persons from entering the site. The site is monitored 24/7 using a sophisticated camera monitoring system. Lastly, each cabinet is designed to withstand a variety of extreme weather conditions.

## 4.6 Response

The Site Operator will be utilizing XXXXXXXX Network Operations Center that operates 24/7 monitoring the safety and health of the BESS Installation. Based on remote monitoring, when certain thresholds are reached an alarm signal will be sent to a Central Station that in turn transmits to the Fire Department Dispatch Center. As per response protocols that will be developed in conjunction with the local fire department, an alarm will be generated for response. In addition, the Site Operator will dispatch the Site Supervisor or Asset Manager to the scene within timeframes acceptable to the local fire department. The Site Supervisor or Asset Manager that responds to the scene will have the following background and duties:

- A working knowledge of the energy storage system and the safety concerns of lithium-ion batteries.
- Fire Service operational familiarity.
- Specific familiarity with the ERP, design, and fire protection as pertains to the BESS installation.
- SME will interpret this information for the IC at the site.
- Upon arrival the Site Supervisor or Asset Manager will confer with the IC and assist in the development of a tactical action plan
- The Site Supervisor or Asset Manager will remain available to advise all stakeholders on the risks posed by the system.

Once on-scene and in conjunction with first responders on the scene, the Site Supervisor or Asset Manager will assume responsibility for securing the scene, assuming the fire has been contained, or will provide guidance based on available data and expertise on how to contain the fire or event. The Site Supervisor or Asset Manager will also:

- Determine whether a hazmat mitigation effort is necessary and will coordinate with hazmat partners to perform work if necessary; and
- Will coordinate with the local fire department, if necessary, to establish a fire watch and isolate any other affected parts of the system.
- The Site Supervisor or Asset Manager will also coordinate with a licensed environmental services company to respond, monitor, and (if necessary) properly manage and dispose of water within the stormwater management

system if any runoff is generated during a thermal incident.

Upon securing the scene, the Site Supervisor or Asset Manager will coordinate with XXXXX remotely to:

- Isolate the affected system if not already accomplished.
- Assess the condition of adjacent systems.
- Return the system to operation if safe to do so and with consultation of fire department command.
- Establish a perimeter around the installation ensuring the fenced area is secure.
- Begin the process of determining how to render safe the affected system and/or return it to service.
- Alternatively, begin the process of safely decommissioning the system by making the appropriate notifications and beginning to develop a recovery plan; and
- Determine next steps for performing a fire investigation and which parties should be notified.

## 4.7 Recovery

Recovery encompasses both short-term and long-term efforts for returning the site back to normal operating conditions. During the recovery phase, restoration, investigation, and disposal may be conducted. The SME will:

- Utilize the approved Decommissioning Plan to remove any damaged batteries, battery arrays or battery cabinets.
- Hithium ESS strategy of allowing the troubled unit to consume itself serves to limit the amount of stranded energy that would need to be dissipated during the restoration phase of the event.
- Work with stakeholders to determine what degree of restoration may be performed with respect to continuity of operations, spoliation of evidence, and overall safety.
- Act as investigator for Silver Street Energy Storage or help begin and facilitate investigation process; and
- Work with hazmat and disposal partners following completion of the investigation to ensure the system is properly secured and to determine the appropriate course of action for disposing of the system.
- Utilize the approved commissioning plan to bring all units, existing and new, online.

## 4.8 Mitigation

Mitigation, with its focus on the impact of a hazard, encompasses the structural and non-structural approaches taken to eliminate or limit a hazard's presence. Mitigation can be accomplished by ensuring code compliance. Silver Street Energy Storage mitigates hazards by ensuring the batteries and other components are listed and in compliance with all applicable fire and building codes as well as in compliance with NFPA 855.

# 5 EMERGENCY OPERATIONS PLAN PROCEDURES

## 5.1 Determination to Activate EOP

| Event                   | Trigger                                                                                                                                                                                                                            |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General Emergency       | Awareness of a facility incident requiring an emergency response                                                                                                                                                                   |
| Cold Weather Event      | Forecasted temperature lower than 0°F                                                                                                                                                                                              |
| Hot Weather Event       | Forecasted temperature higher than 100°F                                                                                                                                                                                           |
| Wildfire                | Awareness from Emergency Manager, local fire department, other first responders and Local News Channels.                                                                                                                           |
| Cyber Security Event    | Threatened or actual Cyber Security event.<br>□ Refer to Annex 7 - Physical Indicators of a Potential Cyber Security or Physical Security Incident<br>□ Refer to Annex 7 - Cyber Indicators of a Potential Cyber Security Incident |
| Physical Security Event | Threatened or actual Physical Security event.<br>□ Refer Annex 7 - Physical Indicators of a Potential Cyber Security or Physical Security Incident                                                                                 |
| Tornado                 | Awareness from Local News Channels or tornado warning applications.                                                                                                                                                                |
| Drought                 | Awareness from NOAA – U.S. Drought Monitor website                                                                                                                                                                                 |
| Flooding                | Awareness from Local News Channels or flood warning applications.                                                                                                                                                                  |

## 5.2 EOP Activation Process

| Action                        | Process                                                                                                                                                                                                                              |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Determination to Activate EOP | Site Supervisor or designee makes the determination that EOP Activation is necessary.                                                                                                                                                |
| EOP Activation                | Site Supervisor or designee implements the appropriate annex for the event causing the activation of the EOP.                                                                                                                        |
| Internal Notifications        | Site Supervisor or designee notifies the following Front Range personnel of the EOP Activation: <ul style="list-style-type: none"><li>□ Field Services</li><li>□ Compliance Personnel</li><li>□ Other Operations Personnel</li></ul> |
| External Notifications        | Site or designee Supervisor notifies the following external personnel of the EOP Activation: <ul style="list-style-type: none"><li>□ Remote Operations Center</li></ul>                                                              |

## 5.3 EOP Deactivation Process

| Action                          | Process                                                                                                                                                                                                                                |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Determination to Deactivate EOP | Site Supervisor or designee makes the determination that EOP Deactivation is necessary.                                                                                                                                                |
| Internal Notifications          | Site Supervisor or designee notifies the following Front Range personnel of the EOP Deactivation: <ul style="list-style-type: none"><li>□ Field Services</li><li>□ Compliance Personnel</li><li>□ Other Operations Personnel</li></ul> |
| External Notifications          | Site Supervisor or designee notifies the following external personnel of the EOP Deactivation: <ul style="list-style-type: none"><li>□ Remote Operations Center</li></ul>                                                              |

## 6.0 Communication Plan

The purpose of the communication plan is to ensure that timely and accurate information is provided to the media, regulators and other entities, as required.

All Silver Street personnel who are designated to interact with local, state, and federal emergency management officials during emergency events should have received the latest FEMA National Incident Management System (NIMS) training. That training at a minimum shall include the following modules:

- ICS-100: Introduction to the Incident Command System
- ICS-200: ICS for Single Resources and Initial Action Incidents
- ICS-700: National Incident Management System (NIMS)
- ICS-800: National Response Framework

The Table below outlines the responsibility and process for communication with the media, regulators and other entities:

| Entity                                 | Communication Procedures                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Media                                  | All communication, from any media outlet, will be referred by Front Range personnel to the Chief Communications Officer. No other Front Range personnel will provide information or communicate directly with the media.                                                                                                                                                 |
| PSCo<br>(Public Service Company)       | Front Range will communicate with the PSCo during an emergency in the manner requested by the PSCo. The Head of Asset Management, Asset Manager, or Site Supervisor will be available by phone and by email to address any PSCo questions or concerns.                                                                                                                   |
| Local and State Governmental Entities  | Front Range will communicate with the Local and State Governmental Entities during an emergency in the manner requested by the Entities. The Chief Communications Officer, Head of Asset Management, or Operations Center will be available by phone and by email to address any Local and State Governmental Entities questions or concerns.                            |
| Local and State Governmental Officials | Front Range will communicate with the Local and State Governmental Officials during an emergency in the manner requested by the Officials. All communication will be referred by Front Range personnel to the Chief Communications Officer. No other Front Range personnel will provide information or communicate directly with Local and State Governmental Officials. |
| Local and State Governmental EOCs      | Front Range will communicate with the Local and State Governmental EOCs during an emergency in the manner requested by the EOCs. The Chief Communications Officer, Head of Asset Management, or Operations Center will be available by phone and by email to address any Local and State Governmental EOCs questions or concerns.                                        |

## 7.0 Emergency Staffing Plan

Emergency staffing is dependent upon the type and severity of the emergency. Staffing considerations for 404 Silver Street Agawam during an emergency will be determined by the Site Supervisor.

## 8.0 Identification of Weather-Related Hazards Plan

Silver Street has identified the necessity of monitoring anticipated and actual weather-related hazards.

Silver Street should monitor Local News Channels and the National Weather Service reports and advisories notices advising of extreme weather that could impact the grid.

The Field Technicians for the 404 Silver Street Agawam facility are responsible to:

- Daily Monitor real-time and forecasted weather events.
- Notify the Site Supervisor of any predicted weather-related events.
- If necessary, begin EOP procedures as directed by the Site Supervisor or Asset Manager per Section 5.0 – EOP Activation / Deactivation Procedures.

| Event              | Where Info Comes From                                                |
|--------------------|----------------------------------------------------------------------|
| Cold Weather Event | Awareness from Local News Channels, and NOAA Website.                |
| Hot Weather Event  | Awareness from Local News Channels, and NOAA Website.                |
| High Wind Event    | Awareness from Local News Channels and specific direction from NOAA. |
| Tornado            | Awareness from Local News Channels or tornado warning applications.  |
| Drought            | Awareness from NOAA – U.S. Drought Monitor website                   |
| Flooding           | Awareness from Local News Channels or flood warning applications.    |

## Annex

The Annexes listed below are used as a part of 404 Silver Street's emergency procedures.

### Annex 1 – Emergency Contact Information

#### **EMERGENCY CONTACT INFORMATION**

**IN CASE OF EMERGENCY CALL 911**

##### **LOCAL POLICE DEPARTMENT**

###### **Agawam Police Department**

**Phone:** (413) 786 - 4767 (Non-Emergency)

**Address:** 681 Springfield Street  
Feeding Hills, MA 01030

##### **LOCAL FIRE DEPARTMENT**

###### **Agawam Fire Department**

**Phone:** (413) 786 – 2662 (Non-Emergency)

**Address:** 800 Main Street  
Agawam, MA 01001

##### **HOSPITAL EMERGENCY ROOM**

###### **Baystate Medical Center**

**Phone:** (413) 794 - 0000 (Non-Emergency)

**Address:** 759 Chestnut Street  
Springfield, MA 01199

##### **LOCAL HEALTH FACILITY**

###### **AFC Urgent Care**

**Phone:** (413) 781 - 0100

**Address:** 18 Union Street  
West Springfield, MA 01089

##### **BURN CENTER**

###### **Sumner Redstone Burn Center – MA General Hospital**

**Phone:** (617) 726 – 3712 (Non-Emergency)

**Address:** 55 Fruit Street GRB 1300  
Boston, MA 02114



## Annex 2 – Evacuation Procedures

### Introduction

In the event of an emergency where the onsite evacuation of the 404 Silver Street Agawam facility is required, personnel will gather at the Primary Onsite Evacuation Point. If the Primary Onsite Evacuation Point is unavailable or unsafe, personnel will gather at the Secondary Onsite Evacuation Point.

All Evacuation Points will be used to take roll of all personnel and visitors and to organize rescue and first aid.

MAP of Evacuation Points will be provided once the final site layout is confirmed.

### Evacuation Procedure – On-Site

This Immediate Evacuation Procedure is applicable regardless of the location of personnel onsite, including the administration building, O&M trailer, field, and substation. This procedure should be used when a situation or event occurs that can cause immediate danger or harm to personnel.

In the event the Site Supervisor or Lead Field Services initiates immediate evacuations, all personnel on-site shall take the following actions:

- Locate and obtain the visitor/contractor sign-in sheet.
- Locate and obtain all immediately accessible hand-held radios.
- Locate the air horn and sound five short blasts of airhorn, wait ten seconds and sound five short blasts of the airhorn.
  - If the airhorn is not available go to any nearby vehicle and sound five short blasts of the vehicle horn, wait ten seconds, and repeat five short blasts.
- Gather at the Primary Onsite Evacuation Point, and determine the safest Evacuation point to proceed to, depending upon the known circumstances of the emergency, if it differs from the Primary Onsite Evacuation Point.
- Pass the following information over the Plant radio system or other approved means of communication:
  - The Evacuation Point the employees will be proceeding to.
  - Visitors/contractors known to be in the operating areas (as indicated by the visitor/contractor sign-in sheet).
- Once the preceding steps are completed, all personnel shall immediately proceed to the designated Evacuation Point, if it differs from the Primary Onsite Evacuation Point.
- Personnel on-site should not delay in evacuating or wait on other personnel that they anticipate may arrive.
- The group shall designate a Person-in-Charge and take a head count of all personnel who are at the Evacuation Point, including contractors and visitors.
- After a roll call of all personnel present is taken, the Person-in-Charge shall:
  - **Identify** which operating area personnel are not at the Evacuation Point.
  - **Query** by radio for personnel who are unaccounted for.
  - **Establish** radio communication or cell phone communication with the Site Supervisor or Compliance Manager (if applicable) and relay information on unaccounted for personnel.
- All personnel shall remain at the designated Evacuation Point until an “ALL CLEAR” signal is sounded, or if directed by the Emergency Coordinator (if applicable) to move to another location.
  - The “ALL CLEAR” signal will be communicated by radio or cellular telephone.

- The Person-in-Charge shall continuously monitor the communication system while at the designated Evacuation Point.

## Annex 3 – General Emergency or Wildfire

### IN THE EVENT OF AN EMERGENCY, DIAL 911.

When calling the local emergency dispatcher remain calm, speak slowly and clearly. Include the following information in your communication:

- State the facility address or coordinates.  
404 Silver Street Agawam Energy Storage  
404 Silver Street  
Agawam, MA 01001
- State the type of emergency (fire, medical, etc.).
- Stay on the telephone until the responding agency releases you, answer all questions.
- Advise the dispatcher if you need to evacuate the facility.

## Annex 4 – Weather Emergency

### Introduction

This Annex addresses the monitoring and operational plans for extreme hot and cold weather events. The Annex also provides a checklist for Operations Personnel to use for an extreme weather event emergency response.

### Monitoring Cold/Hot Weather Events

The Field Technicians are responsible for monitoring real-time and forecasted extreme weather events. The Site Supervisor is responsible for implementing the requirements of this Annex when temperatures forecasted exceed 105 degrees Fahrenheit or fall below 35 degrees Fahrenheit. Additionally, if there are extreme weather conditions that may inhibit the plant from continuous operations, Field staff shall activate this Weather Emergency Annex.

### Operational Plans for Extreme Weather Events

The Site Supervisor is responsible for implementing the following operational plan for any anticipated extreme weather events.

### Internal Notifications

The Site Supervisor will notify the following internal personnel of the anticipated extreme weather event and the actions that are being taken:

- Management
- Field Services
- Other Operations Personnel

### External Notifications

The Site Supervisor will notify external entities of the anticipated extreme weather event and the actions that are being taken:

## Additional Staffing Requirements

The Site Supervisor will assess the safety and operational circumstances, together with the Site Manager, surrounding any extreme weather event and will judge if additional field staff should be arranged to be on site for the extreme weather event.

## Additional Equipment Monitoring Requirements

The Site Supervisor will ensure applicable, additional on-site monitoring of facility equipment occurs, in accordance with either the Extreme Cold/Hot Weather Event Checklist or best practices, during extreme weather events.

## Checklists

Silver Street has developed checklists that are used during cold or hot weather event emergencies to ensure equipment safeguards, necessary supplies, and appropriate personnel are available during a weather emergency. The Site Supervisor is responsible for ensuring the Checklists are completed for each extreme weather event. Refer to the Extreme Cold Weather Event and Extreme Hot Weather Event Checklists for more information.

Check each item listed in the Extreme Cold Weather Event Checklist. Initial each item in the checklist as it is completed. Provide the completed checklist to the Site Supervisor. Blank lines available to add items as needed.

| Extreme Cold Weather Event Checklist                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Initials |
| Extreme Cold Weather Supply Inventory: <ul style="list-style-type: none"><li><input type="checkbox"/> Tarps</li><li><input type="checkbox"/> Battery-powered radio with National Oceanic and Atmospheric Administration (NOAA) weather radio with tone alert</li><li><input type="checkbox"/> Extension cords</li><li><input type="checkbox"/> Flashlights and batteries</li><li><input type="checkbox"/> Portable generator and fuel (as applicable)</li><li><input type="checkbox"/> Confirm adequate fuel reserves for backup generator (if present).</li><li><input type="checkbox"/> Potable water supply</li><li><input type="checkbox"/> Cold weather gear that is compatible with PPE (e.g., rain/snow gear). <b>Check IN-USE Dates</b></li><li><input type="checkbox"/> Fully stocked First Aid kits. <b>Check IN-USE Dates</b></li><li><input type="checkbox"/> Verify adequate inventory of spare parts for reliable operation of the facility during an extreme cold weather event.</li><li><input type="checkbox"/> Blankets</li></ul> |          |
| Place severe weather protection in service where extreme cold or severe or freezing winter weather could adversely impact Personnel, operations, or forced outage recovery.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |
| Establish communications with Personnel, including notification to Operating Personnel of potential facility outage, shutdown, or curtailment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |
| Verify appropriate cold weather PPE for Field Services.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |          |
| Monitor temperatures and take actions to limit or prevent reliability impacts to instrumentation and equipment due to extreme cold.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |
| Review outstanding preventative work orders and perform necessary and immediate work needed to protect the facility.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |
| Conduct site inspection. Check for extra precautions or outfitting of site components and/or critical equipment that may be impacted by the forecasted extreme cold weather event exposure to elements.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |          |

| Extreme Hot Weather Event Checklist                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Initials |
| <p>Extreme Hot Weather Supply Inventory:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Tarps</li> <li><input type="checkbox"/> Battery-powered radio with National Oceanic and Atmospheric Administration (NOAA) weather radio with tone alert</li> <li><input type="checkbox"/> Extension cords</li> <li><input type="checkbox"/> Flashlights and batteries</li> <li><input type="checkbox"/> Portable generator and fuel</li> <li><input type="checkbox"/> Confirm adequate fuel reserves for backup generator (if present).</li> <li><input type="checkbox"/> Potable water supply</li> <li><input type="checkbox"/> Non-potable water supply</li> <li><input type="checkbox"/> Hot weather gear that is compatible with PPE (e.g., fire-resistant clothing that breathes, cooling bandanas, sunscreen). <b>Check IN-USE Dates</b></li> <li><input type="checkbox"/> Fully stocked First Aid kits. <b>Check IN-USE Dates</b></li> <li><input type="checkbox"/> Verify adequate inventory of spare parts for reliable operation of the facility during an extreme hot weather event.</li> </ul> |          |
| Establish communications with Operating Personnel on weather event conditions and discuss appropriate restrictions on maintenance to maximize generation capability.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |          |
| Verify appropriate hot weather PPE for Field Services.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |
| Review staffing plan (including supplemental coverage) and review/update emergency callout list as needed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |
| Monitor temperatures and take actions to limit or prevent impact to instrumentation and equipment due to extreme heat.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |
| Review outstanding preventative work orders and perform necessary and immediate work needed to protect the facility (e.g. weed abatement, fire prevention activities, flood preparation).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |          |
| Confirm all critical equipment is operating and protected per the manufacturer's recommendations during extreme hot weather events. Emphasize the points at the facility where fire safety is necessary to protect critical equipment. (Can be performed remotely through data)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |
| Conduct site inspection. Check for extra precautions or outfitting of site components and/or critical equipment that may be impacted by the forecasted extreme hot weather event.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |          |

## Annex 5 – Restoration of Service

404 Silver Street Agawam interconnects with Eversource via on site utility poles to a 13.8kV transmission feeder line along Silver Street.

## Annex 6 – Pandemic and Epidemic

Silver Street is committed to a safe and healthy environment for all personnel and visitors while continuing to provide energy services. This annex considers local, state, and federal mandates, executive orders, and government agency guidelines.

The Pandemic / Epidemic Team will:

- Monitor International, National, State, and Local pandemic/epidemic outbreak reports • Activate Silver Street's Pandemic and Epidemic Plan.
- Ensure staffing and supplies are readily available throughout the activation of the Pandemic and Epidemic Plan.
- Determine essential personnel.
- Display the FEMA – Novel Pandemic Hazard Sheet at all entrances and in common areas.
- Consider modifying the typical workday shift to one with multiple shift periods to minimize worker contact.
- Assess and adjust actions within this Pandemic and Epidemic Plan based on the best available information as the pandemic/epidemic spreads.
- Keep all internal and external stakeholders informed in a timely manner. • Determine when to deactivate Silver Street's Pandemic and Epidemic Plan.

## Annex 7 – Cyber and Physical Security Incident

### Introduction

The purpose of this Annex is to provide guidance and direction to Silver Street personnel during a potential Cyber or Physical Security Incident.

### Incident Identification

Cyber and Physical Security Incidents appear in multiple ways. It is imperative that all Silver Street personnel are attentive to possible threats to the facility. In the event of a Cyber and Physical Security Incident, all Silver Street personnel should remain calm, gather as much information as possible, and appropriately report the incident.

### Threat to the Front Range Facility

In the event a threat is communicated to Silver Street, by phone or other means, complete the following actions immediately:

| Role                        | Responsibility                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Person Receiving the Threat | Gather as much information as possible.                                                                                                                                                                                                                                                                                                                                                                                                             |
|                             | Threat by written correspondence:<br><input type="checkbox"/> Place the correspondence in a location in which it will not be touched or otherwise disturbed until police can be contacted.                                                                                                                                                                                                                                                          |
|                             | Threat made verbally:<br><input type="checkbox"/> Continue to gather information from the individual making the threat for as long as possible.                                                                                                                                                                                                                                                                                                     |
|                             | Inform the Site Supervisor as soon as able.                                                                                                                                                                                                                                                                                                                                                                                                         |
| Site Supervisor             | Possible Actions:<br><input type="checkbox"/> Order an evacuation of the facility.<br><input type="checkbox"/> Call 911 for Police or Fire Assistance.<br><input type="checkbox"/> Arrange for additional security personnel for the facility.<br><input type="checkbox"/> Direct Plant personnel to commence a controlled shutdown of the facility.<br><input type="checkbox"/> Direct searches to be performed on vehicles entering the facility. |

### Physical Indicators of a Potential Cyber Security or Physical Security Incident

Physical indicators of a Potential Cyber Security or Physical Security Incident include, but are not limited to:

- Physical security alarms or obvious signs of intrusion (e.g., cut fencing, broken locks, pry marks, etc.).
- Unescorted, unauthorized visitors within a BES Cyber Systems perimeter.
- Unusual vehicles at the perimeter of or in the Silver Street Facility.
- Any suspicious packaging, unknown equipment, or unexplainable changes to wiring.
- Loosened fasteners found in patterns or in high numbers.

### Cyber Indicators of a Potential Cyber Security Incident

Cyber indicators of a Potential Cyber Security Incident include but are not limited to:

- Unexplained changes in the availability or unavailability of a service.
- Software performance, increased command latency.
- Software crashes and database corruptions.
- Changes in software behavior (such as reset commands performing an alarm test).
- Line, bus, or transformer relay actions with no indicated fault targets or unusual combinations of fault targets.
- Remote Terminal Unit (RTU) or other abnormal communications failures.
- Social engineering efforts directed at Personnel.
- Unexplained use of privileged accounts.
- Accounting discrepancies.
- Suspicious, unusual, or excessively unsuccessful login attempts.
- Unexplained new user accounts.
- Unstable systems or system crashes.
- Poor or inconsistent system response time.
- USB sticks, drives, or devices found connected to BES Cyber Systems.
- Changes in wiring.
- Physical disturbances (e.g., open panels, broken tamper tape).

## **Incident Escalation, Investigation, Mitigation, and Reporting**

### **Escalation**

Upon receipt of notification from Field Services or Operating Personnel, the Site Supervisor will coordinate the investigation and reporting of the suspected incident to the appropriate stakeholders in the reporting process.

### **Investigation and Initial Reporting**

The Site Supervisor, along with SMEs Operating Personnel, Field Services, and other support staff, will ensure that the potential event is investigated and initially reported within all required timelines (e.g. NERC, ERCOT, Federal).

### **Mitigation**

The Site Supervisor, along with SMEs, Operating Personnel, Field Services, and other support staff, will develop and implement mitigation to resolve the physical or cyber intrusion, if required.

### **Reporting**

In coordination with Operating Personnel and SMEs, the Site Supervisor and Asset Manager will determine if there is any additional reporting required for the incident.

- Personnel involved in the response to an incident will be notified by the Site Supervisor of any submittals that were made.
- Operating Personnel will notify and coordinate with Field Services until the end of the Reportable Event.
- If the event is determined not to meet the reporting threshold, Operating Personnel will coordinate the collection of all appropriate evidence with Field Services and submit it to the Asset Manager for evidence retention.
- If it is determined that a Reportable Cyber Security Incident has occurred or is ongoing, the incident must be reported to:
  - The NERC Electricity Information Sharing and Analysis Center (E-ISAC) and other entities, as required.
  - The Department of Energy and other entities, as required.



## Appendix K – Stormwater Report



westonandsampson.com

55 Walkers Brook Drive, Suite 100  
Reading, MA 01867  
tel: 978.532.1900

# REPORT

October 2024

Silver Street Energy Storage, LLC  
c/o New Leaf Energy, Inc.

Battery Energy Storage System

404 Silver Street,  
Agawam, Massachusetts 01001

**Stormwater Report**

**Applicant/Project Name:** Silver Street Energy Storage, LLC  
c/o New Leaf Energy, Inc.  
Proposed Battery Energy Storage System

**Project Location:** 404 Silver Street (Map H8, Block 3, Lot 37)  
Agawam, MA 01001

**Application Prepared by:**  
Firm: Weston & Sampson Engineers, Inc.  
Registered PE: Robert J. Bukowski, P.E.

Below is a summary of the existing site conditions, proposed site design, and an explanation describing the Provisions of the Water & Sewer Ordinance section of the Town of Agawam Code (The Ordinance) as they apply to the battery energy storage system (BESS) project located 404 Silver Street (Map H8, Block 3, Lot 37) Agawam, MA 01001:

### General

The proposed project is located at 404 Silver Street in Agawam, Massachusetts and is owned by Robert and Deborah Pelley. The site is bounded by Silver Street to the south, undeveloped woodland and residential properties to the east and west, and undeveloped woodland to the north. The site includes a residence, gravel road, undeveloped woodland, and wetlands on the northern portion of the site. A subdivision is proposed to divide the approximately 5.7-acre property into two parcels, one parcel with the existing residence and the second parcel including the remainder of the undeveloped parcel. A Locus Map is included in **Attachment A**.

The majority of the site slopes uniformly to the northeast, with a high point at the southwest corner of the site. The northern portion of the site contains a wetland, to which the northern edge of the site slopes toward. The area directly south of the wetland slopes north toward the wetland.

Weston & Sampson wetland scientists conducted field wetland delineations on August 8, 2024. Wetland resource areas were observed at the site. Wetland resource areas including three bordering vegetated wetlands (BVW), one perennial stream, one intermittent stream, and land under waterbodies and waterways (LUW) were identified on the property. These identified wetlands are located in the northern portion of the site. In accordance with the Massachusetts Department of Environmental Protection (MA DEP) 310 CMR 10.00: Wetlands Protection Act (WPA) Regulations, there is a 100 foot buffer zone associated with the onsite wetlands, and a 200 foot riverfront area associated with the onsite perennial stream.

The proposed project is for the installation a battery energy storage system (BESS) with a capacity of 5 megawatts (MW) and 20 megawatt hours (MWh). The system will consist of batteries, transformers, and inverters that will sit on concrete pads. This BESS equipment will be surrounded by a combination of a 7 foot tall chain link fence with a gate for access and 10 foot tall sound barrier wall. Pole-mounted interconnection equipment will allow interconnection to an existing power pole on Silver Street and will connect to the BESS by means of underground conduit. The total limit of work area is approximate 0.99 acres consisting of the battery storage equipment, fence, improved gravel access road, tree clearing, and overhead wire poles.

Minimal site grading is proposed for the implementation of the improved 20 foot wide gravel access road and the equipment pads. Tree clearing is proposed for the proposed power pole installation, gravel access road, and equipment pads. Outside of the areas of grading and tree clearing, the ground cover is expected to remain.

According to the United States Department of Agriculture Natural Resource Conservation Service (USDA NRCS) soil mapping data, the site is primarily comprised of hydrologic soil group (HSG) A soils, with HSG B

and B/D soils in the northern part of the site. NRCS Web Soil Survey maps and reports for hydrologic soil group, depth to water table, and depth to bedrock are included as **Attachment B**.

The site is not located within any FEMA flood hazard zones. The FEMA FIRMette map for the project site is included in **Attachment B**.

Rainfall data is referenced from NOAA Atlas 14, Volume 10, Version 3 for Agawam, Massachusetts and is included in **Attachment B**.

#### **Stormwater Analysis:**

The proposed project, as designed, will not result in an increase in peak runoff rates from pre- to post-development conditions. Existing and proposed peak design flows were assessed using the National Resources Conservation Service (NRCS) Technical Release 20 (TR-20) methodology. HydroCAD® version 10.10-3a stormwater modeling software was used to analyze and compare pre- and post- development stormwater conditions for the 2-, 10-, and 100-year 24-hour storm events. HydroCAD® is a comprehensive hydrodynamic modeling program which analyzes and designs site hydrology, surface drainage systems, and storm drains. It can manage a variety of flow situations such as overland flow, drainage swales, ponds, and piping systems.

A summary of the analysis is provided below, the full stormwater reports for pre- and post- development conditions with associated hydrologic maps are included in **Attachment C**.

#### **Existing Hydrology:**

The stormwater analysis for this project was modeled using the property line as the general limit of the drainage area boundary.

Figure 1 of **Attachment C** displays the limits of the drainage area, time of concentration flow paths, and existing ground cover. Below is a summary of the existing drainage area:

- **Drainage Area 1 (E1)** – Residential building, existing gravel road, grassed areas, wooded areas, dirt piles, and wetlands.

One point of analysis (POA) has been determined to analyze the stormwater impacts of the post-development conditions compared to the pre-development conditions.

#### **Proposed Hydrology:**

Compared to pre-development conditions, the proposed development will have an increase in impervious area due to the proposed equipment pads and an increase in gravel due to the proposed access road. The proposed stormwater design utilizes an infiltration trench surrounding the equipment pad area to maintain reduced peak flows compared to pre-development conditions. The infiltration trench will also provide pollutant removal for the added impervious area, see **Attachment D** for retention volume calculations.

Figure 2 of **Attachment C** displays the limits of the proposed drainage area, time of concentration flow paths, and proposed ground cover. Below is a summary of the proposed drainage area:

- **Drainage Area 1 (P1)** – Residential building, existing gravel road, grassed areas, wooded areas, dirt piles, wetlands, and proposed access road.
- **Drainage Area 2 (P2)** - Proposed BESS equipment, proposed equipment pads, and infiltration trench.

Provisions of the Water & Sewer Ordinance and Stormwater Management Ordinance of the Town of Agawam Code (The Ordinance) relative to the project, followed by an analysis of the project's compliance with applicable provisions (in underlined font), are listed below. The outlined regulations represent an

analysis primarily applicable to Article IV, Sanitary Sewers, Storm Drains, and Connections, Section 175-35, Stormwater Management Plan, and Article III, Stormwater Management Permit of the Ordinance.

#### Article IV. Sanitary Sewers, Storm Drains, and Connections 175-35. Stormwater Management Plan.

The stormwater management plan shall demonstrate a comprehensive plan intended to address changes in runoff characteristics due to a proposed construction project. Both short-term and long-term alterations in flow paths, runoff volume, and runoff characteristics must be addressed. The protection of regulated water resources is required. The use of natural pre-existing vegetation and/or the planting of native species to provide runoff mitigation is strongly encouraged.

Alterations in flow paths, runoff volume, and runoff characteristics are addressed in the watershed plans and HydroCAD calculations in **Attachment C**.

A. Stormwater management performance standards. The Superintendent of the Department of Public Works may alter the stormwater management performance standards at his discretion. These standards do not relieve the applicant from complying with all state and federal regulations.

Acknowledged.

B. Construction erosion and sediment controls. Temporary control measures to keep disturbed soils on the construction site, prevent erosion and control and remove sedimentation due the construction process. The Department of Public Works shall develop design guidelines for this purpose. They shall be based upon Massachusetts Department of Environmental Protection Erosion and Sediment Control Policies. The erosion and sediment control plan shall be prepared by a registered professional engineer.

Proposed construction erosion and sediment controls are shown on the Post-Development Watershed Plan (Figure 2), included in **Attachment C**. A construction period pollution and prevention and erosion and sedimentation control plan is included in **Attachment F**.

C. Permanent measures; runoff quality and quantity best management practices.

(1) New Development. New commercial, industrial, and residential sites, unless exempted in § 175-22B, must comply with the stormwater management performance standards.

Acknowledged, the BESS is a new development and complies with the stormwater management performance standards.

(a) Stormwater management measures shall be required to satisfy the control requirements and shall be implemented in the following order of preference:

[1] Flow attenuation and pollutant removal of runoff on site to existing areas with grass, trees, and similar vegetation and through the use of open vegetated swales and natural depressions with appropriate stabilization measures to ensure long-term operation.

Peak flows are decreased in post-development conditions compared to pre-development conditions, see **Attachment D** for table depicting peak flows.

[2] Stormwater detention pond for the temporary storage of runoff, which is designed so as not to create a permanent pool of water.

There are no stormwater detention ponds proposed for this project, however, there is an infiltration trench proposed for temporary storage of runoff from the equipment pad area. This infiltration trench is included on the Post-Development Watershed Plan (Figure 2) and in the post-development HydroCAD report, both included in **Attachment C**.

[3] Stormwater retention structures for the permanent storage of runoff by means of a permanent pool of water. This type of system will not be allowed for subdivisions.

Not applicable. There are no permanent retention structures proposed for this project.

[4] Retention and evaporation of stormwater on rooftops or in parking lots. This type of system will not be allowed for subdivisions.

Not applicable. There are no rooftops or parking lots proposed for this project.

(b) Peak flow rates. Peak flow rates for the post-construction conditions must not exceed the peak flow rates for the preconstruction condition for one-hundred-year twenty-four-hour design storm events. The two-year twenty-four-hour, ten-year twenty-four-hour post-construction peak flow rate must be mitigated to the maximum extent practicable.

Peak flow rates for the post-construction conditions do not exceed the peak flow rates for the pre-construction conditions. A summary of the pre- and post-development peak flow rates is included in **Attachment D**.

(c) Minimize pollutants. Best management practices shall be employed to minimize pollutants in stormwater runoff prior to discharge into a separate storm drainage system or water body. Runoff from parking lots over two acres shall be treated by oil and water separators or other controls to remove oil and sediment.

An infiltration trench is proposed to surround the equipment pad area to collect runoff, the infiltration trench is shown on the Post-Development Watershed Plan (Figure 2) included in **Attachment C**.

(d) Projects involving the storage or use of hazardous chemicals or petroleum products shall incorporate handling and storage best management practices that prevent such chemicals from contaminating runoff from the site into infiltration systems, receiving water bodies, or the MS4, and shall include a list of such chemicals in the application.

Not applicable, storage of hazardous chemicals or petroleum products is not proposed.

(e) Connection to MS4. If the destination for the outlet of a detention system is the MS4, the applicant must evaluate the existing capacity and condition of that system. If there are existing deficiencies or extra capacity is not available to accept

additional flows from the project site, the applicant will be required to design and construct improvements or reduce the outlet flow rate based on existing capacity.

Not applicable. Connection to MS4 is not proposed.

(f) Emergency overflow. All detention ponds shall be designed to provide an emergency overflow system, and incorporate measures to provide a nonerosive velocity to flow along its length and at any outfall.

Not applicable. There are no detention ponds proposed for this project.

(h) Centralized detention facilities. Certain industrial areas have centralized detention facilities. The following describes the allowed percent of impervious area before on-site detention is required.

Not applicable. Proposed project is not a centralized detention facility.

(i) Detention ponds. The Department of Public Works shall develop design guidelines for this purpose. These standards may be updated from time to time. Public safety shall be considered in the design of any stormwater facilities. Detention ponds on private sites are encouraged to utilize the DPW design guidelines; at the DPW's discretion certain design standards may not apply to private sites. Detention ponds within easements to the Town must follow all design standards as directed by the DPW Superintendent.

Not applicable. There are no detention ponds proposed for this project.

(l) Detention pond maintenance requirements. Detention ponds within easements to the Town of Agawam require minor maintenance to be performed by the property owner on a regular basis.

Not applicable. There are no detention ponds proposed for this project.

(m) Calculation submittals for review by the DPW shall include the following components.

[1] Locus map.

A locus map is included in **Attachment A**.

[2] Site plan. This plan must include all relevant information for the hydrologic modeling of the site. Information shall include preconstruction and post-construction conditions at the same scale, which is appropriate for complexity and size of the project.

Hydrologic maps for pre- and post-construction conditions are included in **Attachment C**.

[3] Existing conditions and proposed impact mitigation; description/investigation of both up-gradient conditions which release runoff to the site and down-gradient areas which are the destination of the runoff from the site in question. The extent of this investigation must be such that the project designer and the DPW reviewer can have a good understanding of existing conditions, including flow paths, flooding

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conditions, flow-limiting structures, wetlands or other water resources' ability to withstand current runoff flow rates and volumes. Proposed structures and improvements must be such that they extend far enough down stream to mitigate the proposed development and increases in impervious areas.

Minimal runoff flows to the site from areas west of the southern portion of the parcel and north of the northern portion of the parcel. Runoff from the site releases downgradient to an area east of the parcel. Runoff from upgradient areas to the west and north, runoff from the site, and runoff to the downgradient area to the east have flow paths leading to a stream, which flows through the northern portion of the parcel. An infiltration trench is proposed to surround the equipment pad area to mitigate the added impervious area.

[4] Soil survey information; copy of Hampden County Soil Survey Map with site clearly outlined at the scale of the map. Copy must be clear such that soil type and hydrologic soil group can be determined. Also, list the soil types, and relevant characteristics for the purpose of modeling the project's runoff.

A copy of the NRCS Hydrologic Soils Group map for the project area is included in **Attachment B**.

[5] Hydrologic modeling data. All areas shall be modeled utilizing the TR 55 or TR 20 method of drainage calculation as appropriate. Submittals shall include the following information. Submittals will not be reviewed until complete information is given in an easy-to-follow format. The use of tables, summaries, and accompanying back-up data is strongly encouraged.

[a] Drainage subarea designations and outline locations for pre- and post-construction condition.

Drainage subarea designations and outline locations for pre- and post-construction conditions are included in the drawings in **Attachment C**.

[b] Time of concentration path location, path length, surface grade, soil type boundary location for pre- and post-construction condition.

Time of concentration path location, path length, surface grade, and soil type boundary location for pre- and post-construction conditions are included in the drawings in **Attachment C**.

[c] Modeling method description.

National Resources Conservation Service (NRCS) Technical Release 20 (TR-20) methodology. HydroCAD® version 10.10-3a stormwater modeling software was used to analyze and compare pre- and post- development stormwater conditions for the 2-, 10-, and 100-year 24-hour storm events. HydroCAD outputs are included in **Attachment C**.

[d] Model data for pre- and post-construction conditions, including model of all proposed flow rate control structures.

Model data for pre- and post-construction conditions is included in Attachment C.

[e] Model output for pre- and post-construction conditions, including model of all proposed flow rate control structures.

Model output for pre- and post-construction conditions is included in Attachment C.

[f] Preconstruction peak flow rate and post-construction peak flow rate at all design points for the site.

Pre- and post-construction condition peak flow rates are included in Attachment D.

#### D. Operation and maintenance, Long-Term.

(1) An operation and maintenance manual shall be developed by the project designer for the owner's use once construction on the proposed system is complete. The manual will include a description of each component of the drainage system, inspections, maintenance, and the frequency of each for continued operation of the system.

An operation and maintenance manual for upkeep of the proposed infiltration trench is included in Attachment E.

(2) See § 175-30B(5) for reporting requirements.

Acknowledged.

#### E. Owner/contractor certification statement; performance; and certificate of completion.

(1) Certification. The owner or authorized representative and all contractors and subcontractors shall sign certification statements as part of the permit application and the stormwater management plan. In signing the plan, the authorized representative certifies that the information is true and assumes liability for the plan. Official signatures provide a basis for an enforcement action to be taken against the person signing the document.

(a) The owner certification statement shall read:

"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.

An authorization statement by the landowner and a certification statement by Silver Street Energy Storage, LLC, c/o New Leaf Energy, Inc. is included in Attachment G.

(b) Contractors and subcontractors certification statement.

[1] Contractors and subcontractors certification statement shall read:

"I certify under penalty of law that I understand the terms and conditions of the Storm Drain Permit that authorizes stormwater discharges associated with industrial activity from the construction site identified as part of this certification."

[2] The storm drain permit application shall list all contractors and subcontractors who will implement the measures identified in the stormwater management plan.

Not applicable. There is no storm drain permit associated with the proposed project.

### Article III. Stormwater Management Permit 176-13: Purpose

#### A. Purpose

1. The purpose of this article is to better manage land development in order to protect, maintain, and enhance the public health, safety, and general welfare of the citizens of Agawam by establishing minimum requirements and procedures to control the adverse impacts associated with stormwater runoff from new development and redevelopment.

#### Acknowledged.

2. The proper management of stormwater runoff will meet the following objectives:

a) Establish regulations for land development activities that preserve the health of water resources by reducing the adverse water quality impacts from stormwater discharges to rivers, lakes, reservoirs, and streams in order to attain federal water quality standards.

The project does not propose adverse water quality impacts to rivers, lakes, reservoirs, or streams.

b) Require that new development, redevelopment, and all land conversion activities maintain the natural hydrologic characteristics of the land and treat for water quality in order to: reduce flooding, stream bank erosion, siltation, nonpoint source pollution, property damage, and to maintain the integrity of stream channels and aquatic habitats.

The project is proposed to maintain natural hydrologic characteristics of the land to the maximum extent possible.

c) Prevent the discharge of pollutants, including hazardous chemicals, into stormwater runoff.

The project does not propose the discharge of pollutants.

d) Minimize the volume and rate of stormwater discharges to rivers, streams, reservoirs, lakes and ponds during and following development activities.

The project is proposed to decrease the volume and rate of stormwater discharges compared to pre-development conditions. Pre- and post-construction condition peak flow rates are included in Attachment D.

e) Prevent erosion and sedimentation from land development, and reduce stream channel erosion caused by increased runoff

Proposed construction erosion and sediment controls are shown on the Post-Development Watershed Plan (Figure 2), included in Attachment C. A construction period pollution and prevention and erosion and sedimentation control plan is included in Attachment F.

f) Provide for the recharge of groundwater aquifers and maintain the base flow of streams.

Not applicable. The proposed project is not located at a groundwater aquifer or stream.

g) Advance the use of Low Impact Development and Better Site Design practices such as limiting disturbance, reducing impervious surface, treating and infiltration stormwater at the source, using environmentally sensitive site design, and the preservation of open space and other natural areas.

The proposed project limits disturbance to the maximum extent possible, and preserves surrounding natural areas. An infiltration trench is proposed to surround the equipment pad area to treat the runoff from the equipment pads at the source. The infiltration trench is included in the Post-Development Watershed Plan (Figure 2) included in **Attachment C**.

h) Provide stormwater facilities that are attractive, maintain the natural integrity of the environment, and are designed to protect public safety.

The proposed stormwater facility matches the intent of the proposed project and is located within the fence limits.

i) Establish maintenance provisions to ensure that stormwater treatment practices will continue to function as designed over the long term.

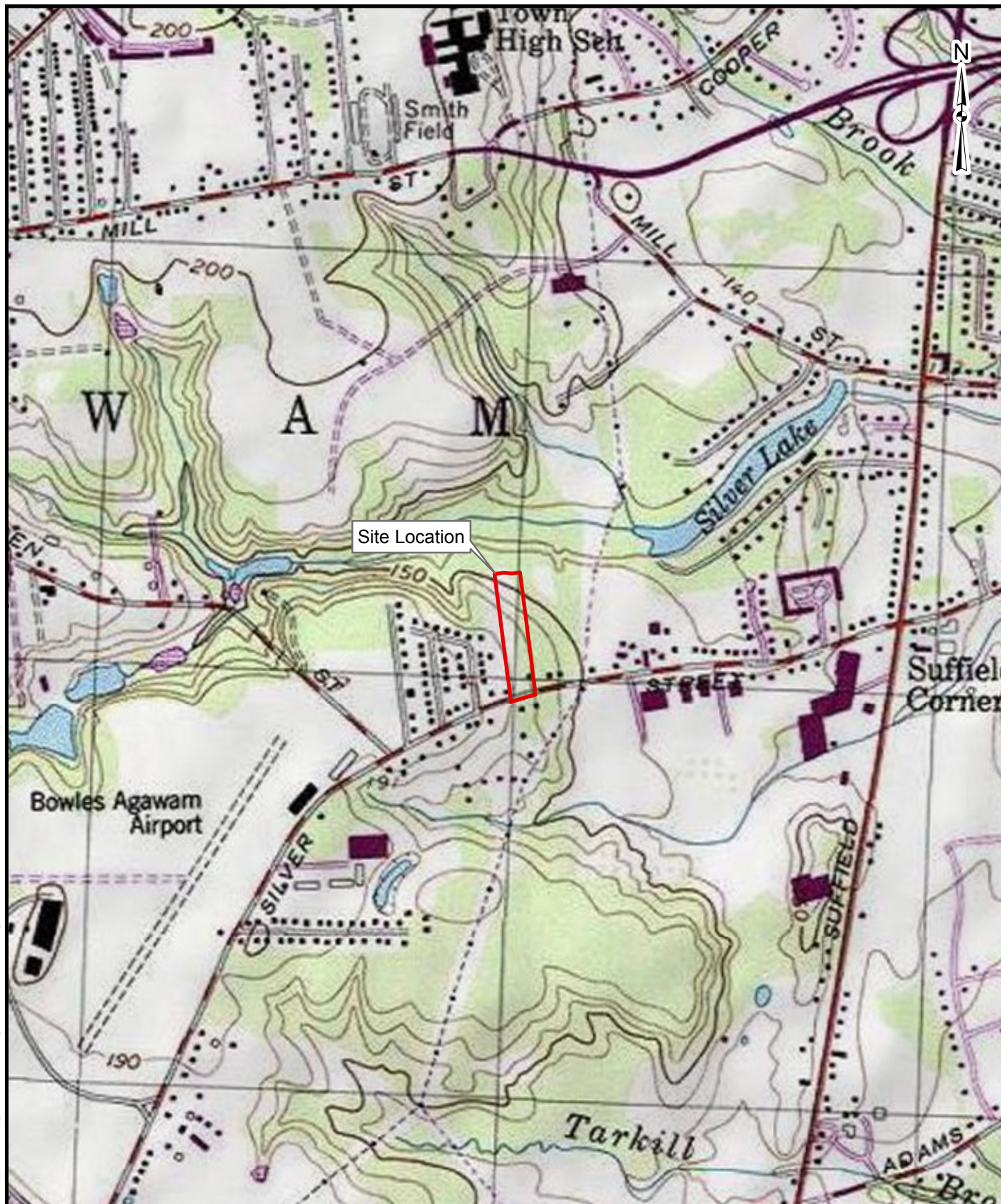
An operation and maintenance manual for upkeep of the proposed infiltration trench is included in **Attachment E**.

3. This ordinance and its associated Regulations are also intended to bring Agawam into compliance with requirements in the United States Environmental Protection Agency National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts ("Massachusetts Small MS4 General Permit")

Acknowledged. The proposed project does not tie into municipal storm sewer systems.

Attachment A - Locus Map

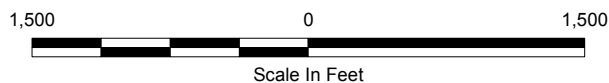




**Legend**

— Site Location

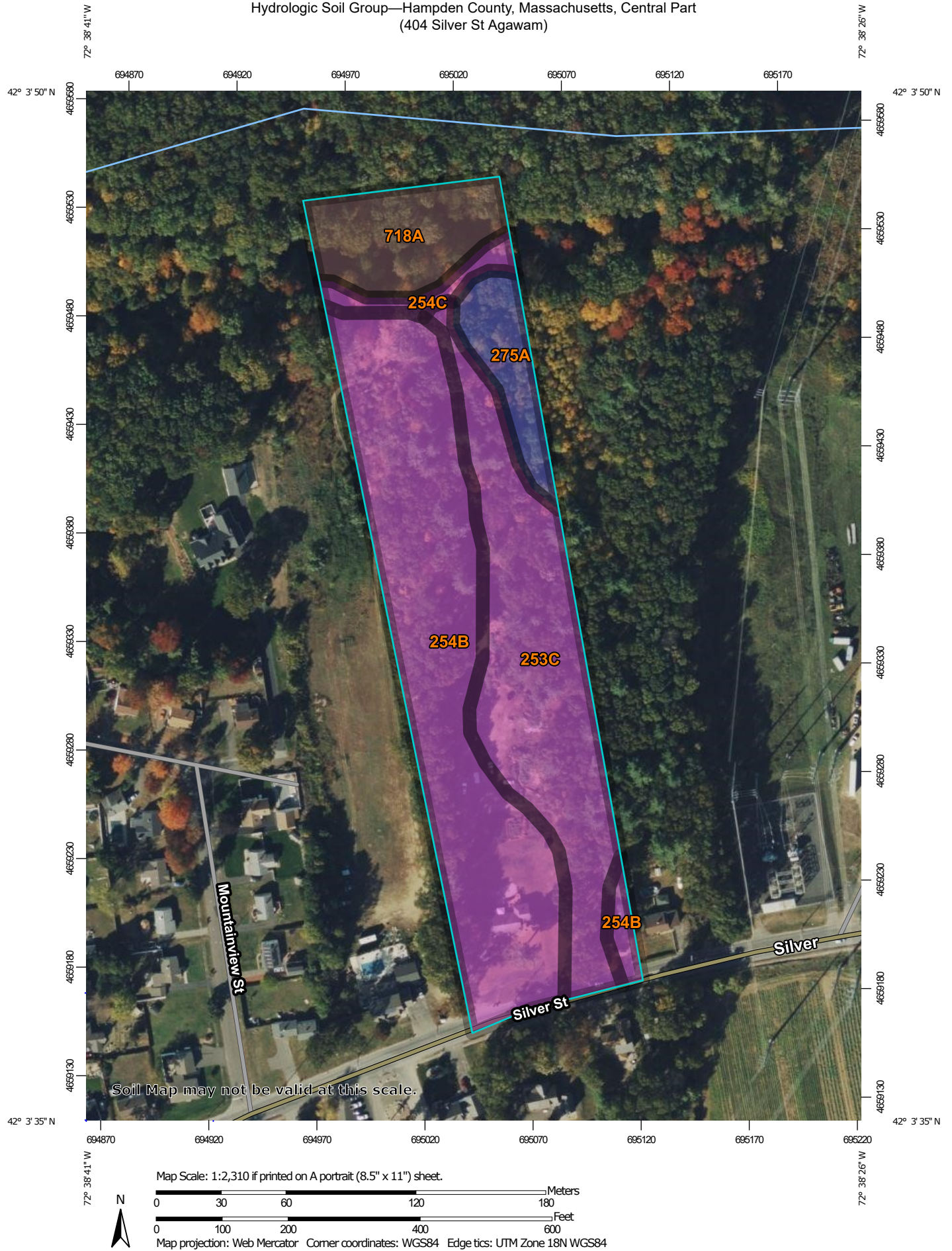
**FIGURE 1**  
**404 SILVER STREET**  
**AGAWAM, MASSACHUSETTS**  
**SILVER STREET ENERGY STORAGE, LLC**  
**LOCUS MAP**



Attachment B - NRCS Web Soil Survey Maps & Reports:  
Hydrologic Soils Group, Depth to Water Table, Depth to Bedrock,  
FEMA FIRMette,  
NOAA Atlas 14 Rainfall Data



Hydrologic Soil Group—Hampden County, Massachusetts, Central Part  
(404 Silver St Agawam)



Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

#### Soil Rating Polygons

 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Lines

 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Points

 A  
 A/D  
 B  
 B/D

 C  
 C/D  
 D  
 Not rated or not available

### 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 17, Sep 10, 2023

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.

## Hydrologic Soil Group

| Map unit symbol                    | Map unit name                                                                        | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|--------------------------------------------------------------------------------------|--------|--------------|----------------|
| 253C                               | Hinckley loamy sand, 8 to 15 percent slopes                                          | A      | 2.6          | 31.6%          |
| 254B                               | Merrimac fine sandy loam, 3 to 8 percent slopes                                      | A      | 3.9          | 47.3%          |
| 254C                               | Merrimac fine sandy loam, 8 to 15 percent slopes                                     | A      | 0.2          | 2.8%           |
| 275A                               | Agawam fine sandy loam, 0 to 3 percent slopes                                        | B      | 0.6          | 6.8%           |
| 718A                               | Saco Variant silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded | B/D    | 0.9          | 11.5%          |
| <b>Totals for Area of Interest</b> |                                                                                      |        | <b>8.2</b>   | <b>100.0%</b>  |

## Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

## Rating Options

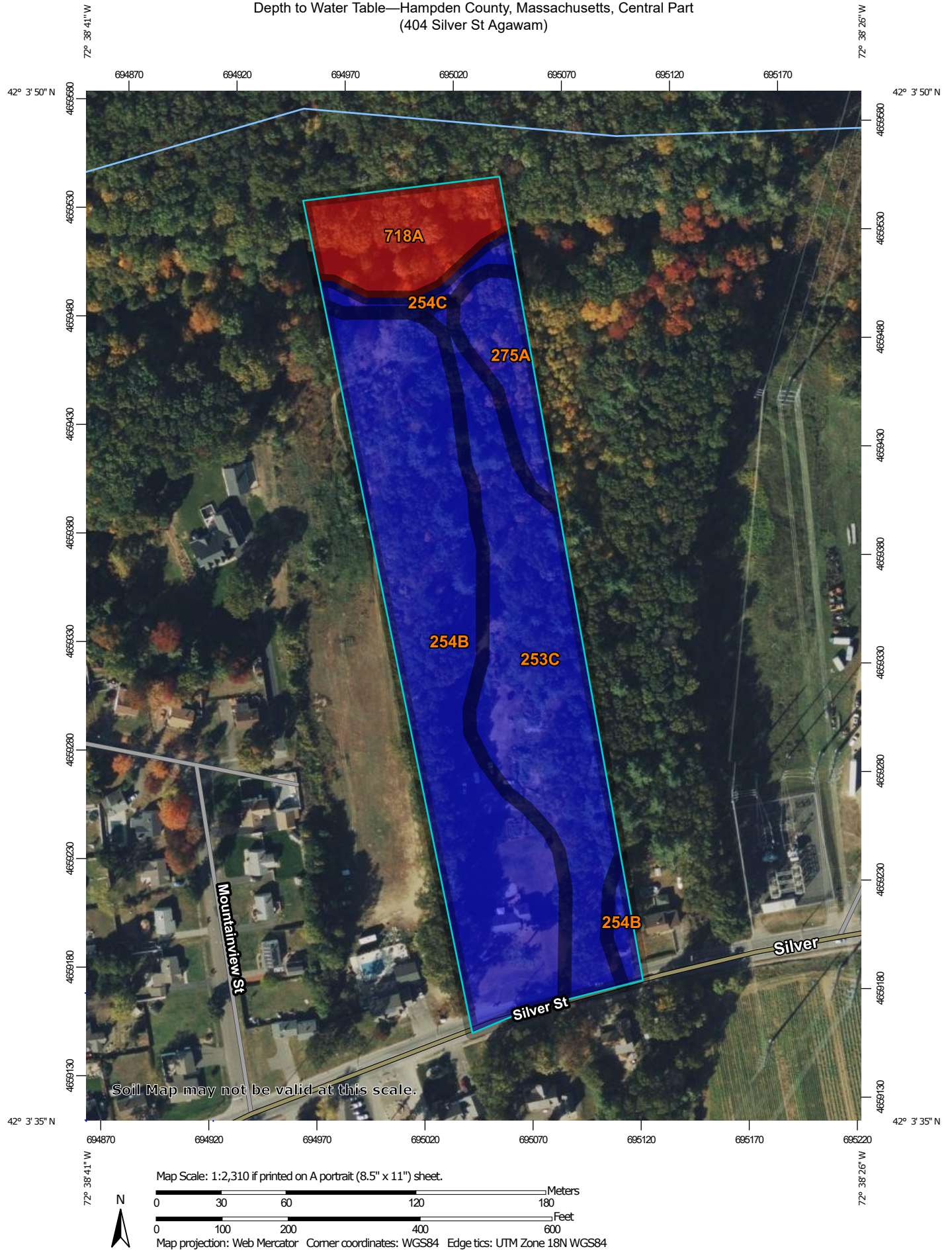
*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher



Depth to Water Table—Hampden County, Massachusetts, Central Part  
(404 Silver St Agawam)



Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

#### Soil Rating Polygons

-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200
-  Not rated or not available

#### Soil Rating Lines

-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200
-  Not rated or not available

#### Soil Rating Points

-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200

 Not rated or not available

### 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 17, Sep 10, 2023

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.

## Depth to Water Table

| Map unit symbol                    | Map unit name                                                                        | Rating (centimeters) | Acres in AOI | Percent of AOI |
|------------------------------------|--------------------------------------------------------------------------------------|----------------------|--------------|----------------|
| 253C                               | Hinckley loamy sand, 8 to 15 percent slopes                                          | >200                 | 2.6          | 31.6%          |
| 254B                               | Merrimac fine sandy loam, 3 to 8 percent slopes                                      | >200                 | 3.9          | 47.3%          |
| 254C                               | Merrimac fine sandy loam, 8 to 15 percent slopes                                     | >200                 | 0.2          | 2.8%           |
| 275A                               | Agawam fine sandy loam, 0 to 3 percent slopes                                        | >200                 | 0.6          | 6.8%           |
| 718A                               | Saco Variant silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded | 0                    | 0.9          | 11.5%          |
| <b>Totals for Area of Interest</b> |                                                                                      |                      | <b>8.2</b>   | <b>100.0%</b>  |

## Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

## Rating Options

*Units of Measure:* centimeters

*Aggregation Method:* Dominant Component

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Lower

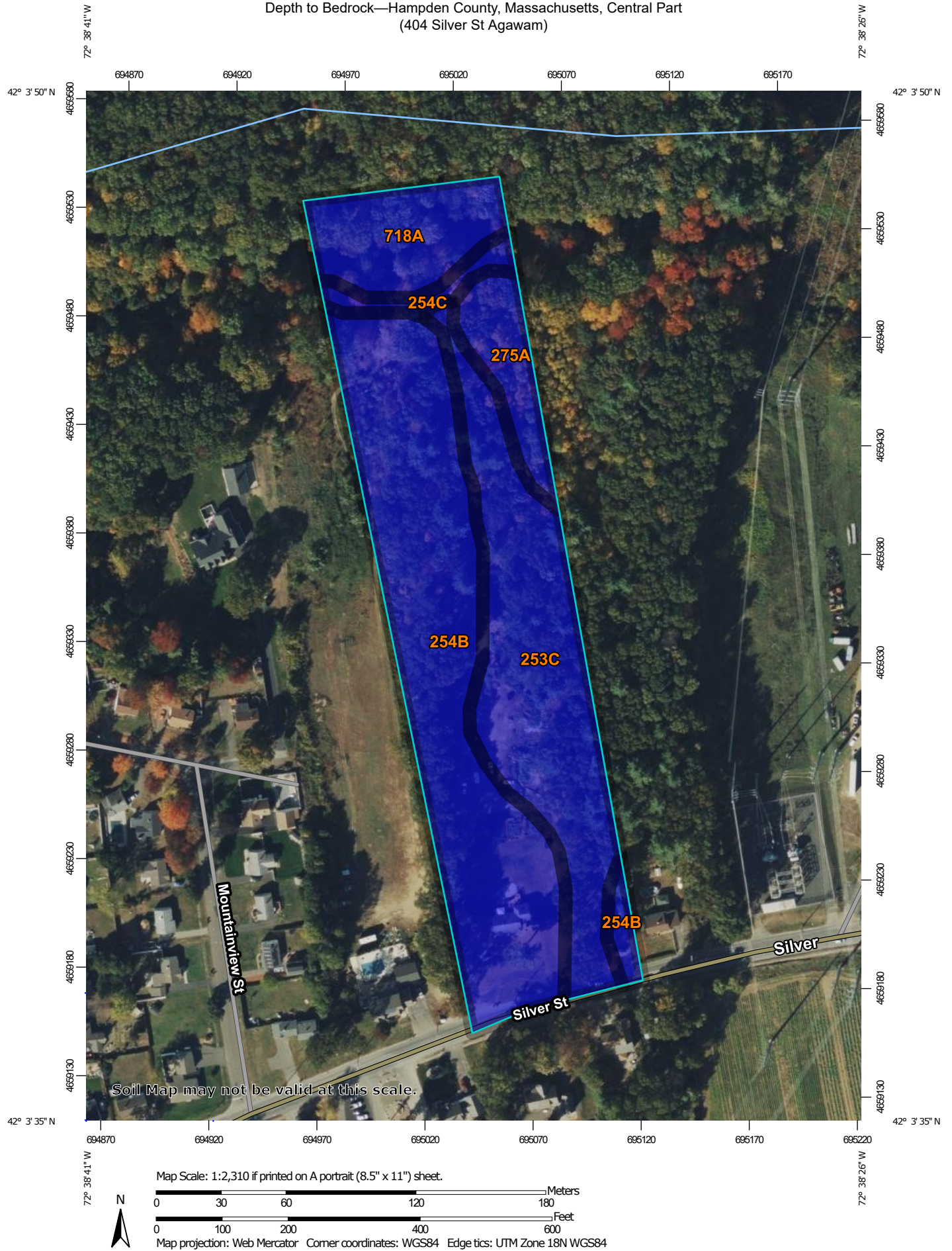
*Interpret Nulls as Zero:* No

*Beginning Month:* January

*Ending Month:* December



Depth to Bedrock—Hampden County, Massachusetts, Central Part  
(404 Silver St Agawam)



Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

#### Soil Rating Polygons

-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200
-  Not rated or not available

#### Soil Rating Lines

-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200
-  Not rated or not available

#### Soil Rating Points

-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200

 Not rated or not available

### 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 17, Sep 10, 2023

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.

## Depth to Bedrock

| Map unit symbol                    | Map unit name                                                                        | Rating (centimeters) | Acres in AOI | Percent of AOI |
|------------------------------------|--------------------------------------------------------------------------------------|----------------------|--------------|----------------|
| 253C                               | Hinckley loamy sand, 8 to 15 percent slopes                                          | >200                 | 2.6          | 31.6%          |
| 254B                               | Merrimac fine sandy loam, 3 to 8 percent slopes                                      | >200                 | 3.9          | 47.3%          |
| 254C                               | Merrimac fine sandy loam, 8 to 15 percent slopes                                     | >200                 | 0.2          | 2.8%           |
| 275A                               | Agawam fine sandy loam, 0 to 3 percent slopes                                        | >200                 | 0.6          | 6.8%           |
| 718A                               | Saco Variant silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded | >200                 | 0.9          | 11.5%          |
| <b>Totals for Area of Interest</b> |                                                                                      |                      | <b>8.2</b>   | <b>100.0%</b>  |

## Description

The term bedrock in soil survey refers to a continuous root and water restrictive layer of rock that occurs within the soil profile.

There are many types of restrictions that can occur within the soil profile but this theme only includes the three restrictions that use the term bedrock. These are:

- 1) Lithic Bedrock
- 2) Paralithic Bedrock
- 3) Densic Bedrock

Lithic bedrock and paralithic bedrock are comprised of igneous, metamorphic, and sedimentary rocks, which are coherent and consolidated into rock through pressure, heat, cementation, or fusion. Lithic bedrock represents the hardest type of bedrock, with a hardness of strongly coherent to indurated. Paralithic bedrock has a hardness of extremely weakly coherent to moderately coherent. It can occur as a thin layer of weathered bedrock above harder lithic bedrock. Paralithic bedrock can also be much thicker, extending well below the soil profile.

Densic bedrock represents a unique kind of bedrock recognized within the soil survey. It is non-coherent and consolidated, dense root restrictive material, formed by pressure, heat, and dewatering of earth materials or sediments. Densic bedrock differs from densic materials, which formed under the compaction of glaciers, mudflows, and or human-caused compaction.

If more than one type of bedrock is described for an individual soil type, the depth to the shallowest one is given. If no bedrock is described in a map unit, it is represented by the "greater than 200" depth class.

Depth to bedrock is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

## Rating Options

*Units of Measure:* centimeters

*Aggregation Method:* Dominant Component

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Lower

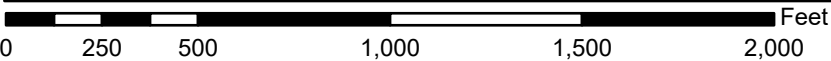
*Interpret Nulls as Zero:* No



# National Flood Hazard Layer FIRMette



72°38'52"W 42°3'52"N



1:6,000

72°38'15"W 42°3'25"N

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)<br>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 Cross Sections with 1% Annual Chance Water Surface Elevation                                                                                                 |
|                             |  | 17.5                                                                                                                                                              |
|                             |  | Coastal Transect                                                                                                                                                  |
|                             |  | Base Flood Elevation Line (BFE)                                                                                                                                   |
|                             |  | Limit of Study                                                                                                                                                    |
|                             |  | Jurisdiction Boundary                                                                                                                                             |
|                             |  | Coastal Transect Baseline                                                                                                                                         |
|                             |  | Profile Baseline                                                                                                                                                  |
| MAP PANELS                  |  | Digital Data Available                                                                                                                                            |
|                             |  | No Digital Data Available                                                                                                                                         |
|                             |  | Unmapped                                                                                                                                                          |



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 9/21/2024 at 3:06 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.



## 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 & aerals](#)

### PF tabular

| PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup> |                                     |                        |                        |                        |                       |                       |                       |                      |                      |                      |
|----------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------|------------------------|------------------------|-----------------------|-----------------------|-----------------------|----------------------|----------------------|----------------------|
| Duration                                                                                                 | Average recurrence interval (years) |                        |                        |                        |                       |                       |                       |                      |                      |                      |
|                                                                                                          | 1                                   | 2                      | 5                      | 10                     | 25                    | 50                    | 100                   | 200                  | 500                  | 1000                 |
| 5-min                                                                                                    | 0.340<br>(0.263-0.438)              | 0.409<br>(0.315-0.527) | 0.522<br>(0.401-0.673) | 0.615<br>(0.470-0.800) | 0.743<br>(0.551-1.01) | 0.840<br>(0.611-1.17) | 0.941<br>(0.665-1.36) | 1.05<br>(0.708-1.57) | 1.21<br>(0.784-1.87) | 1.34<br>(0.848-2.12) |
| 10-min                                                                                                   | 0.482<br>(0.372-0.620)              | 0.580<br>(0.447-0.746) | 0.739<br>(0.568-0.956) | 0.871<br>(0.666-1.13)  | 1.05<br>(0.780-1.44)  | 1.19<br>(0.865-1.66)  | 1.33<br>(0.942-1.93)  | 1.49<br>(1.00-2.22)  | 1.72<br>(1.11-2.65)  | 1.90<br>(1.20-3.00)  |
| 15-min                                                                                                   | 0.567<br>(0.438-0.730)              | 0.682<br>(0.526-0.878) | 0.870<br>(0.668-1.12)  | 1.02<br>(0.783-1.33)   | 1.24<br>(0.918-1.69)  | 1.40<br>(1.02-1.95)   | 1.57<br>(1.11-2.27)   | 1.76<br>(1.18-2.61)  | 2.02<br>(1.31-3.12)  | 2.23<br>(1.41-3.53)  |
| 30-min                                                                                                   | 0.766<br>(0.591-0.985)              | 0.923<br>(0.712-1.19)  | 1.18<br>(0.906-1.52)   | 1.39<br>(1.06-1.81)    | 1.68<br>(1.25-2.30)   | 1.91<br>(1.38-2.66)   | 2.14<br>(1.51-3.09)   | 2.39<br>(1.60-3.56)  | 2.75<br>(1.78-4.25)  | 3.04<br>(1.93-4.81)  |
| 60-min                                                                                                   | 0.965<br>(0.745-1.24)               | 1.16<br>(0.897-1.50)   | 1.49<br>(1.14-1.92)    | 1.76<br>(1.34-2.29)    | 2.13<br>(1.58-2.90)   | 2.41<br>(1.75-3.36)   | 2.70<br>(1.91-3.92)   | 3.03<br>(2.03-4.51)  | 3.48<br>(2.25-5.38)  | 3.85<br>(2.44-6.09)  |
| 2-hr                                                                                                     | 1.24<br>(0.960-1.58)                | 1.48<br>(1.15-1.90)    | 1.89<br>(1.46-2.43)    | 2.22<br>(1.71-2.88)    | 2.69<br>(2.01-3.65)   | 3.03<br>(2.22-4.22)   | 3.40<br>(2.43-4.94)   | 3.83<br>(2.58-5.68)  | 4.47<br>(2.90-6.88)  | 5.00<br>(3.18-7.87)  |
| 3-hr                                                                                                     | 1.42<br>(1.11-1.81)                 | 1.71<br>(1.33-2.17)    | 2.17<br>(1.69-2.78)    | 2.56<br>(1.98-3.30)    | 3.10<br>(2.32-4.20)   | 3.50<br>(2.58-4.86)   | 3.92<br>(2.82-5.71)   | 4.44<br>(3.00-6.56)  | 5.23<br>(3.40-8.02)  | 5.90<br>(3.75-9.25)  |
| 6-hr                                                                                                     | 1.78<br>(1.39-2.24)                 | 2.16<br>(1.69-2.73)    | 2.78<br>(2.17-3.53)    | 3.30<br>(2.56-4.22)    | 4.01<br>(3.03-5.42)   | 4.53<br>(3.37-6.29)   | 5.10<br>(3.71-7.44)   | 5.82<br>(3.95-8.57)  | 6.95<br>(4.54-10.6)  | 7.94<br>(5.06-12.4)  |
| 12-hr                                                                                                    | 2.17<br>(1.72-2.73)                 | 2.69<br>(2.12-3.38)    | 3.53<br>(2.78-4.46)    | 4.23<br>(3.31-5.37)    | 5.19<br>(3.95-6.99)   | 5.89<br>(4.41-8.16)   | 6.67<br>(4.89-9.72)   | 7.67<br>(5.22-11.2)  | 9.26<br>(6.06-14.1)  | 10.7<br>(6.83-16.6)  |
| 24-hr                                                                                                    | 2.55<br>(2.03-3.18)                 | 3.21<br>(2.55-4.00)    | 4.28<br>(3.39-5.37)    | 5.17<br>(4.07-6.53)    | 6.40<br>(4.91-8.59)   | 7.29<br>(5.50-10.1)   | 8.29<br>(6.13-12.1)   | 9.60<br>(6.55-14.0)  | 11.7<br>(7.69-17.7)  | 13.6<br>(8.73-21.0)  |
| 2-day                                                                                                    | 2.89<br>(2.31-3.58)                 | 3.67<br>(2.94-4.55)    | 4.95<br>(3.94-6.16)    | 6.01<br>(4.76-7.53)    | 7.46<br>(5.76-9.98)   | 8.52<br>(6.48-11.7)   | 9.71<br>(7.25-14.1)   | 11.3<br>(7.74-16.4)  | 13.9<br>(9.18-21.0)  | 16.3<br>(10.5-25.1)  |
| 3-day                                                                                                    | 3.16<br>(2.54-3.90)                 | 4.01<br>(3.22-4.96)    | 5.41<br>(4.33-6.71)    | 6.56<br>(5.22-8.20)    | 8.16<br>(6.33-10.9)   | 9.31<br>(7.10-12.8)   | 10.6<br>(7.95-15.4)   | 12.4<br>(8.49-17.9)  | 15.3<br>(10.1-23.0)  | 17.9<br>(11.6-27.5)  |
| 4-day                                                                                                    | 3.40<br>(2.74-4.18)                 | 4.31<br>(3.47-5.31)    | 5.80<br>(4.65-7.17)    | 7.03<br>(5.61-8.75)    | 8.73<br>(6.79-11.6)   | 9.96<br>(7.62-13.7)   | 11.4<br>(8.52-16.4)   | 13.2<br>(9.09-19.1)  | 16.3<br>(10.8-24.5)  | 19.1<br>(12.4-29.3)  |
| 7-day                                                                                                    | 4.07<br>(3.30-4.98)                 | 5.10<br>(4.13-6.24)    | 6.78<br>(5.46-8.33)    | 8.17<br>(6.55-10.1)    | 10.1<br>(7.87-13.3)   | 11.5<br>(8.80-15.6)   | 13.0<br>(9.80-18.7)   | 15.1<br>(10.4-21.7)  | 18.5<br>(12.3-27.7)  | 21.6<br>(14.0-32.9)  |
| 10-day                                                                                                   | 4.73<br>(3.85-5.77)                 | 5.82<br>(4.73-7.10)    | 7.60<br>(6.15-9.31)    | 9.08<br>(7.30-11.2)    | 11.1<br>(8.68-14.6)   | 12.6<br>(9.66-17.0)   | 14.2<br>(10.7-20.3)   | 16.4<br>(11.3-23.5)  | 19.9<br>(13.2-29.6)  | 23.0<br>(14.9-35.0)  |
| 20-day                                                                                                   | 6.81<br>(5.58-8.24)                 | 7.96<br>(6.51-9.64)    | 9.84<br>(8.01-12.0)    | 11.4<br>(9.22-14.0)    | 13.5<br>(10.6-17.5)   | 15.1<br>(11.6-20.1)   | 16.8<br>(12.6-23.5)   | 19.0<br>(13.2-26.9)  | 22.2<br>(14.8-32.9)  | 25.1<br>(16.3-37.9)  |
| 30-day                                                                                                   | 8.56<br>(7.04-10.3)                 | 9.73<br>(7.99-11.7)    | 11.7<br>(9.53-14.1)    | 13.2<br>(10.8-16.2)    | 15.4<br>(12.1-19.8)   | 17.1<br>(13.1-22.5)   | 18.8<br>(14.0-25.9)   | 20.8<br>(14.6-29.4)  | 23.8<br>(15.9-35.0)  | 26.2<br>(17.1-39.6)  |
| 45-day                                                                                                   | 10.7<br>(8.86-12.9)                 | 12.0<br>(9.85-14.4)    | 13.9<br>(11.4-16.8)    | 15.6<br>(12.7-19.0)    | 17.9<br>(14.0-22.7)   | 19.6<br>(15.0-25.5)   | 21.4<br>(15.8-28.9)   | 23.2<br>(16.3-32.7)  | 25.8<br>(17.3-37.8)  | 27.8<br>(18.1-41.8)  |
| 60-day                                                                                                   | 12.6<br>(10.4-15.0)                 | 13.8<br>(11.4-16.6)    | 15.9<br>(13.1-19.1)    | 17.6<br>(14.4-21.4)    | 20.0<br>(15.7-25.2)   | 21.8<br>(16.7-28.2)   | 23.6<br>(17.4-31.6)   | 25.4<br>(17.9-35.6)  | 27.6<br>(18.6-40.3)  | 29.2<br>(19.1-43.8)  |

<sup>1</sup> 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.

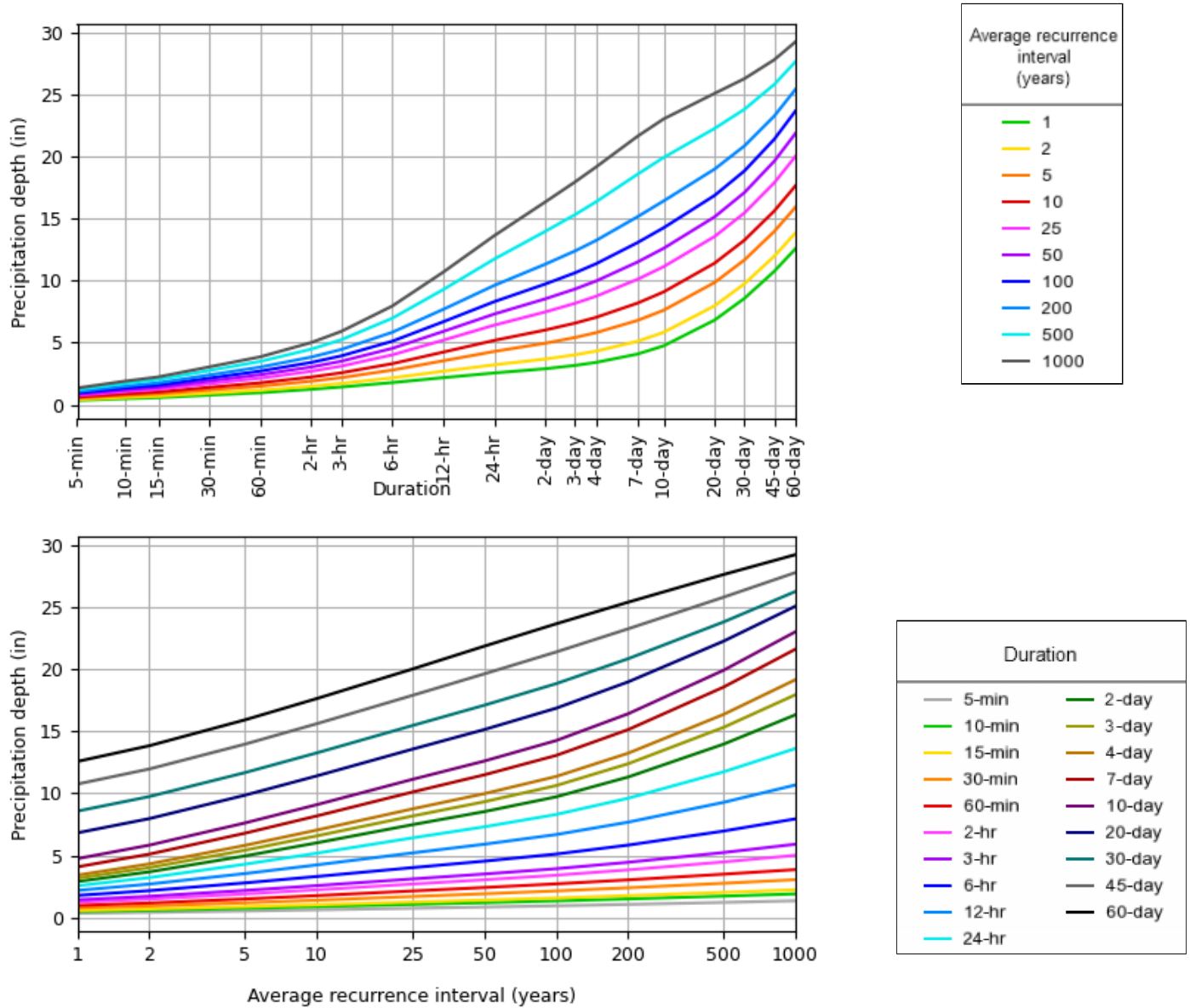
Please refer to NOAA Atlas 14 document for more information.



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## PF graphical

PDS-based depth-duration-frequency (DDF) curves  
Latitude: 42.0607°, Longitude: -72.6426°



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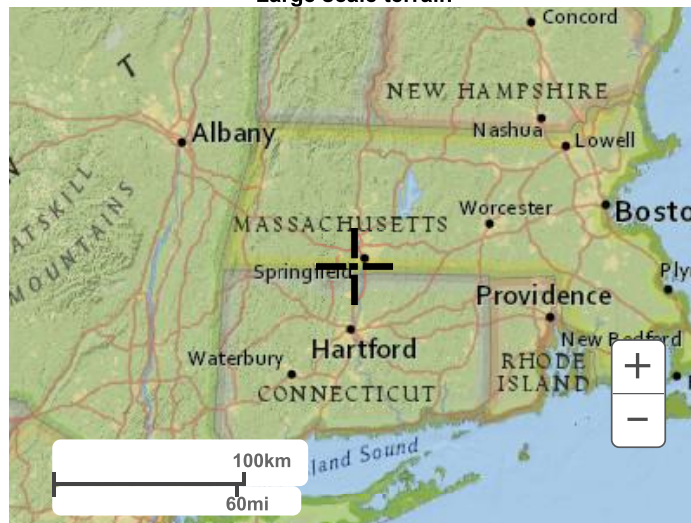
## Maps & aerials

Small scale terrain





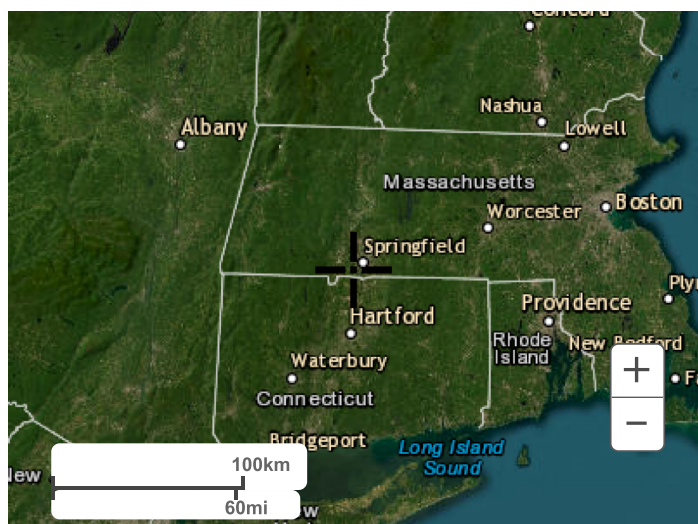
Large scale terrain



Large scale map



Large scale aerial



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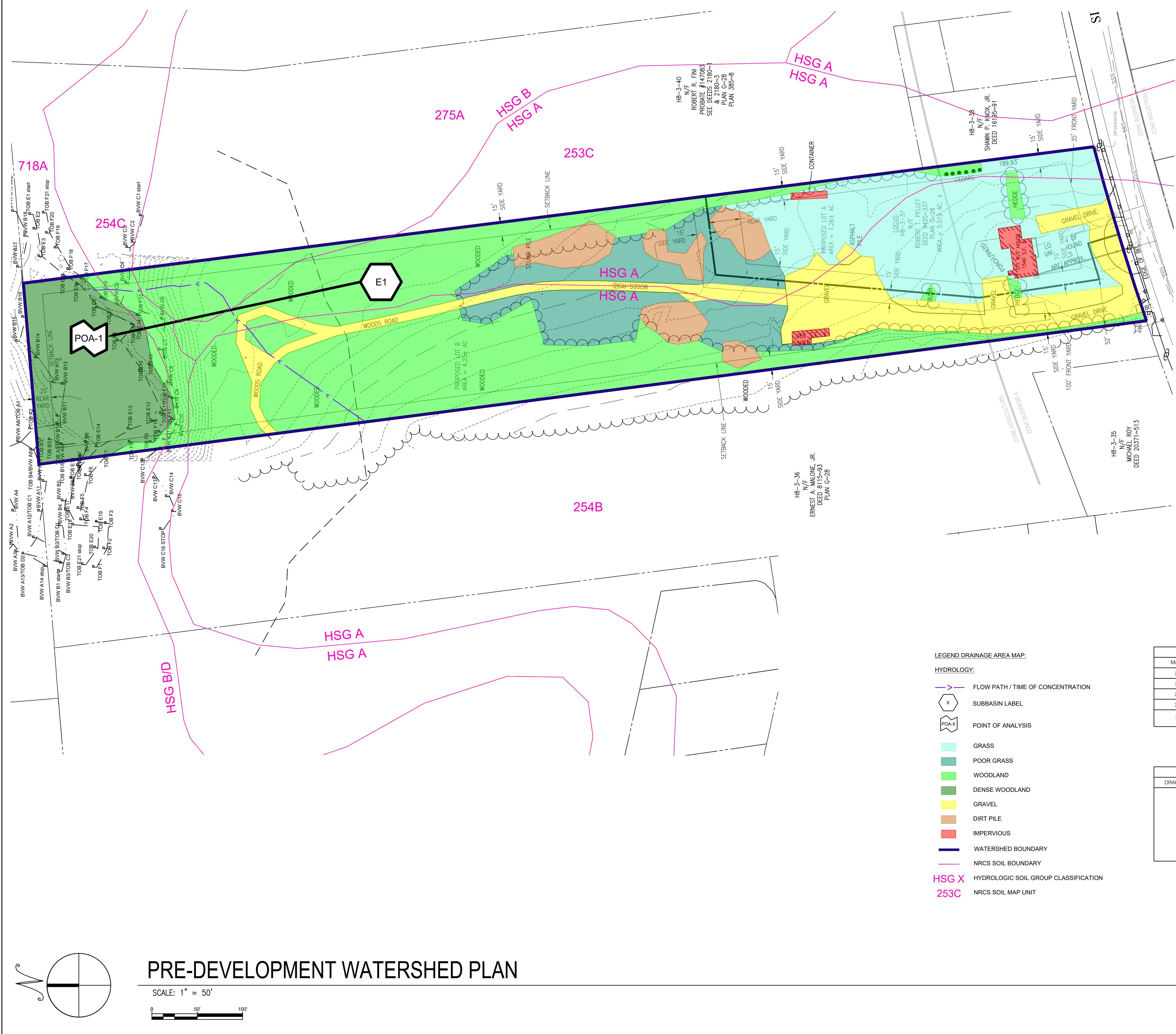
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Silver Spring, MD 20910  
Questions?: [HDSC.Questions@noaa.gov](mailto:HDSC.Questions@noaa.gov)

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Attachment C - Hydrologic Maps & HydroCAD Reports





LEGEND

ROAD (GRAVEL)

FENCE LINE

PROPERTY LINE

FLOW DIRECTION

BANK LINE/FLAG

WETLAND LINE/FLAG

(E) MAJOR CONTOUR

(E) MINOR CONTOUR

PROPOSED MAJOR CONTOUR

PROPOSED MINOR CONTOUR

WTB WETLAND BUFFER ZONE

RFA RIVERFRONT AREA

FHA 100-YEAR FLOOD HAZARD AREA

TREELINE

SF SILT FENCE

SILT SOCK

STM STORM PIPE

E ELECTRICAL TRENCH

E OVERHEAD ELECTRIC

SAN SAN SEWER LINE

W W WATER LINE

G G GAS MAIN

23-23A ASSESSORS MAP-LOT

SIGN

UTILITY POLE (WITH GUY ANCHOR)

HYDRANT

WATER VALVE

INDIVIDUAL TREE

PROPERTY MARKERS

NOTE: ITALIC FONTS INDICATE EXISTING CONDITIONS.  
STANDARD FONTS INDICATE PROPOSED CONDITIONS.

LEGEND DRAINAGE AREA MAP:

HYDROLOGY:

FLOW PATH / TIME OF CONCENTRATION

SUBBASIN LABEL

POINT OF ANALYSIS

GRASS

POOR GRASS

WOODLAND

DENSE WOODLAND

GRAVEL

DIRT PILE

IMPERVIOUS

WATERSHED BOUNDARY

NRCS SOIL BOUNDARY

HSG X HYDROLOGIC SOIL GROUP CLASSIFICATION

253C NRCS SOIL MAP UNIT

| Soil Data |                                                                                      |            |
|-----------|--------------------------------------------------------------------------------------|------------|
| Map Unit  | Map Unit Name                                                                        | HSG Rating |
| 253C      | Hinckley loamy sand, 8 to 15 percent slopes                                          | A          |
| 254B      | Merrimac fine sandy loam, 3 to 8 percent slopes                                      | A          |
| 254C      | Merrimac fine sandy loam, 8 to 15 percent slopes                                     | A          |
| 275A      | Agawam fine sandy loam, 0 to 3 percent slopes                                        | B          |
| 718A      | Saco Variant silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded | B/D        |

| PRE-DEVELOPMENT TO LIST |           |                         |             |        |
|-------------------------|-----------|-------------------------|-------------|--------|
| DRAINAGE AREA           | FLOW TYPE | GROUND COVER            | LENGTH (FT) | SLOPE  |
| E1                      | SHEET     | WOODS: LIGHT UNDERBRUSH | 50          | 9.22%  |
|                         | SCF       | WOODLAND                | 67          | 6.51%  |
|                         | SCF       | UNPAVED                 | 15          | 0.89%  |
|                         | SCF       | WOODLAND                | 37          | 4.99%  |
|                         | SCF       | UNPAVED                 | 12          | 7.76%  |
|                         | SCF       | WOODLAND                | 55          | 1.97%  |
|                         | SCF       | WOODLAND                | 125         | 16.26% |

SCALE: 1" = 50'

0

50'

100'

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SITE USE PERMIT SET  
404 SILVER ST  
AGAWAM, MA 01001

PROJECT NUMBER:  
120-0339

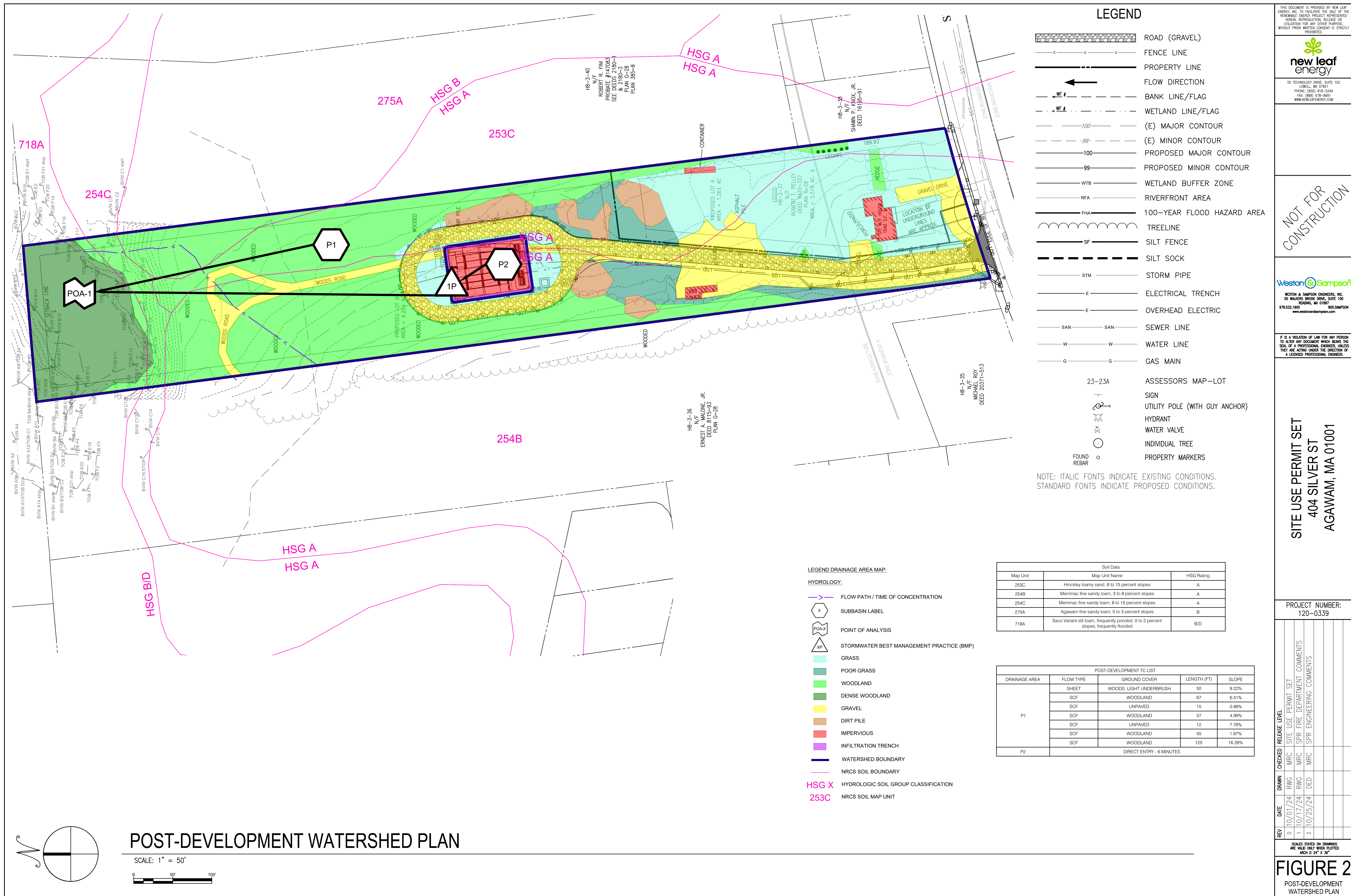
| REV | DATE     | DRAWN | CHECKED | RELEASE LEVEL | SITE USE PERMIT SET | SPR FIRE DEPARTMENT COMMENTS | SPR ENGINEERING COMMENTS |
|-----|----------|-------|---------|---------------|---------------------|------------------------------|--------------------------|
| 0   | 10/01/24 | RWG   | MRC     |               |                     |                              |                          |
| 1   | 10/17/24 | RWG   | MRC     |               |                     |                              |                          |
| 2   | 10/25/24 | DED   | MRC     |               |                     |                              |                          |

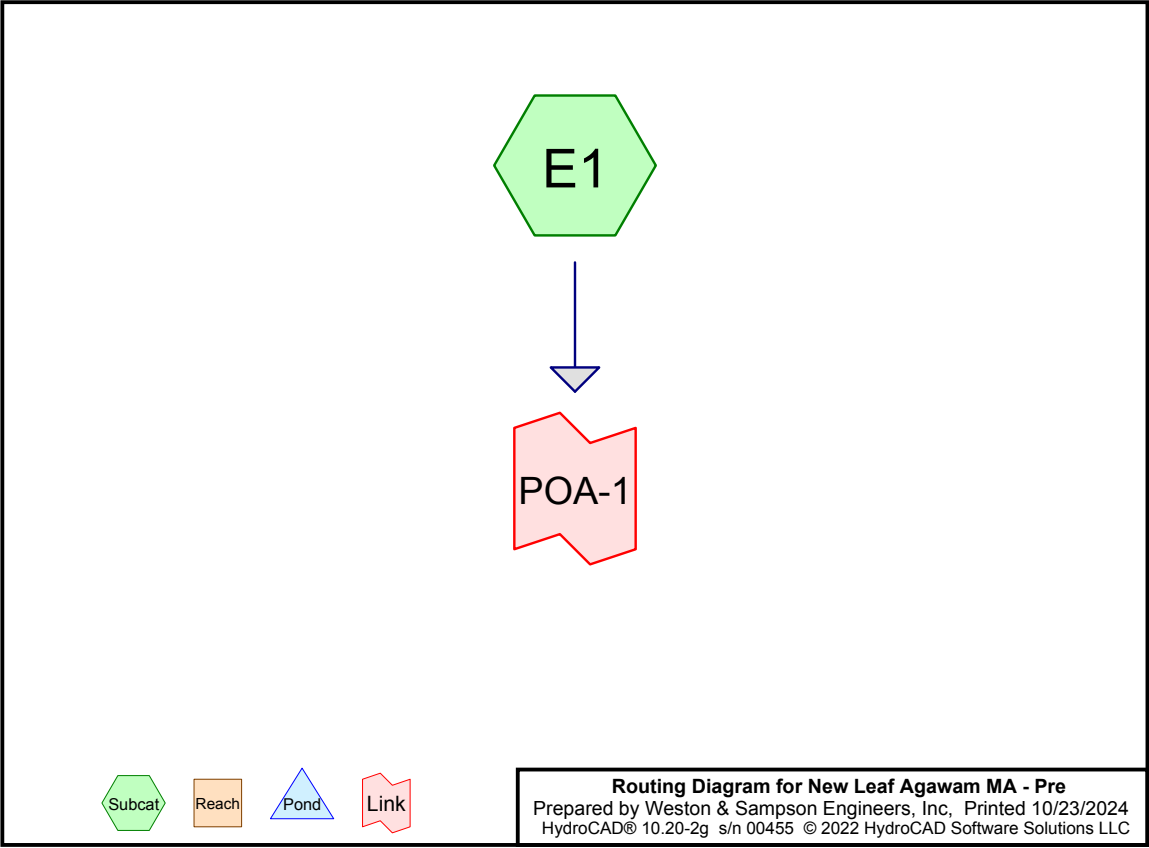
SCALES STATED ON DRAWINGS ARE VALID ONLY WHEN PLOTTED ARCH D 24" X 36"

FIGURE 1  
PRE-DEVELOPMENT WATERSHED PLAN

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**New Leaf Agawam MA - Pre**

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**Rainfall Events Listing (selected events)**

| Event# | Event Name | Storm Type     | Curve | Mode    | Duration (hours) | B/B | Depth (inches) | AMC |
|--------|------------|----------------|-------|---------|------------------|-----|----------------|-----|
| 1      | 2-yr       | Type III 24-hr |       | Default | 24.00            | 1   | 3.21           | 2   |
| 2      | 10-yr      | Type III 24-hr |       | Default | 24.00            | 1   | 5.17           | 2   |
| 3      | 100-yr     | Type III 24-hr |       | Default | 24.00            | 1   | 8.29           | 2   |

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**Area Listing (all nodes)**

| Area<br>(acres) | CN        | Description<br>(subcatchment-numbers) |
|-----------------|-----------|---------------------------------------|
| 0.960           | 49        | 50-75% Grass cover, Fair, HSG A (E1)  |
| 0.579           | 68        | <50% Grass cover, Poor, HSG A (E1)    |
| 0.263           | 77        | Fallow, bare soil, HSG A (E1)         |
| 0.758           | 76        | Gravel roads, HSG A (E1)              |
| 0.054           | 98        | Unconnected pavement, HSG A (E1)      |
| 2.087           | 36        | Woods, Fair, HSG A (E1)               |
| 0.246           | 60        | Woods, Fair, HSG B (E1)               |
| 0.008           | 30        | Woods, Good, HSG A (E1)               |
| 0.047           | 55        | Woods, Good, HSG B (E1)               |
| 0.518           | 77        | Woods, Good, HSG D (E1)               |
| <b>5.519</b>    | <b>55</b> | <b>TOTAL AREA</b>                     |

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Type III 24-hr 2-yr Rainfall=3.21"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentE1:**

Runoff Area=240,415 sf 0.97% Impervious Runoff Depth=0.25"  
Flow Length=361' Tc=10.6 min CN=55 Runoff=0.56 cfs 0.117 af

**Link POA-1:**

Inflow=0.56 cfs 0.117 af  
Primary=0.56 cfs 0.117 af

**Total Runoff Area = 5.519 ac Runoff Volume = 0.117 af Average Runoff Depth = 0.25"**  
**99.03% Pervious = 5.466 ac 0.97% Impervious = 0.054 ac**



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Type III 24-hr 2-yr Rainfall=3.21"

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**Summary for Subcatchment E1:**

Runoff = 0.56 cfs @ 12.40 hrs, Volume= 0.117 af, Depth= 0.25"  
Routed to Link POA-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-yr Rainfall=3.21"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 33,033    | 76 | Gravel roads, HSG A             |
| 11,450    | 77 | Fallow, bare soil, HSG A        |
| 41,811    | 49 | 50-75% Grass cover, Fair, HSG A |
| 25,220    | 68 | <50% Grass cover, Poor, HSG A   |
| 90,915    | 36 | Woods, Fair, HSG A              |
| 337       | 30 | Woods, Good, HSG A              |
| 2,333     | 98 | Unconnected pavement, HSG A     |
| 10,723    | 60 | Woods, Fair, HSG B              |
| 2,033     | 55 | Woods, Good, HSG B              |
| 22,560    | 77 | Woods, Good, HSG D              |
| 240,415   | 55 | Weighted Average                |
| 238,082   |    | 99.03% Pervious Area            |
| 2,333     |    | 0.97% Impervious Area           |
| 2,333     |    | 100.00% Unconnected             |

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Type III 24-hr 2-yr Rainfall=3.21"

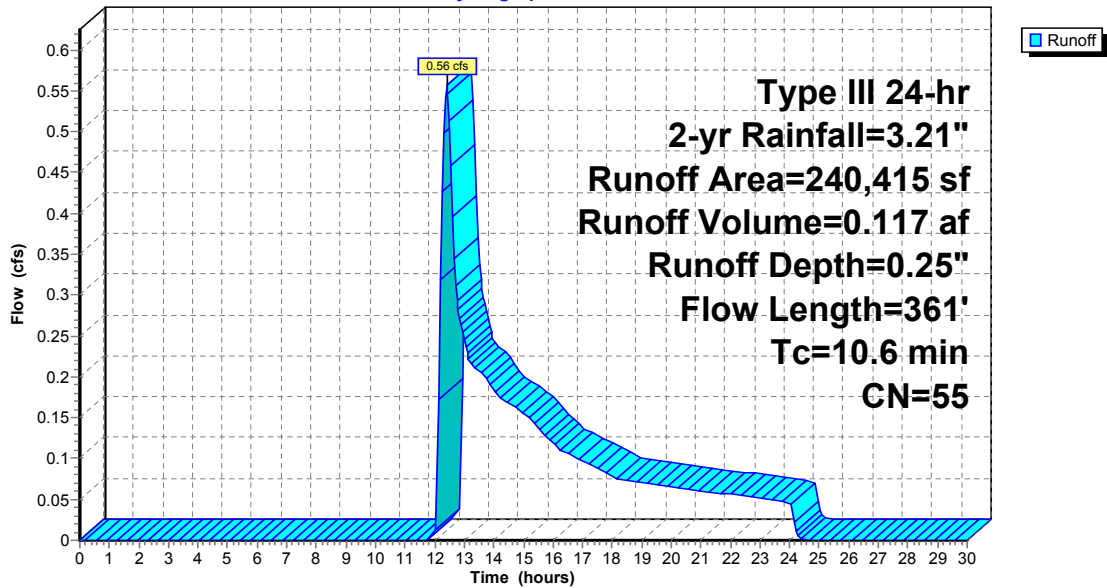
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| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                      |
|-------------|------------------|------------------|----------------------|-------------------|------------------------------------------------------------------|
| 6.7         | 50               | 0.0922           | 0.12                 |                   | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.21" |
| 0.9         | 67               | 0.0651           | 1.28                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.1         | 15               | 0.0651           | 4.11                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps        |
| 0.6         | 37               | 0.0499           | 1.12                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.0         | 12               | 0.0776           | 4.48                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps        |
| 1.3         | 55               | 0.0197           | 0.70                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 1.0         | 125              | 0.1626           | 2.02                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 10.6        | 361              | Total            |                      |                   |                                                                  |

## Subcatchment E1:

## Hydrograph



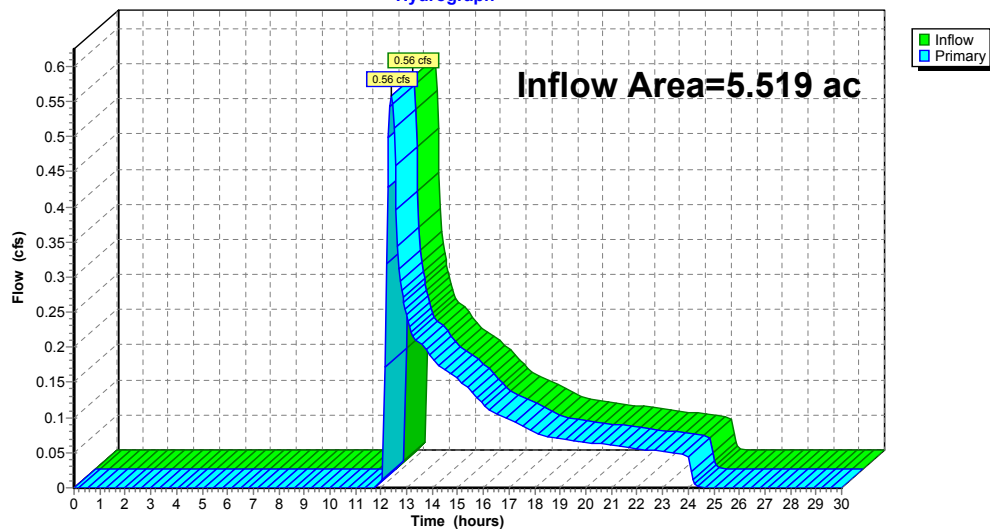
## Summary for Link POA-1:

Inflow Area = 5.519 ac, 0.97% Impervious, Inflow Depth = 0.25" for 2-yr event  
 Inflow = 0.56 cfs @ 12.40 hrs, Volume= 0.117 af  
 Primary = 0.56 cfs @ 12.40 hrs, Volume= 0.117 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

## Link POA-1:

## Hydrograph



**New Leaf Agawam MA - Pre**

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Type III 24-hr 10-yr Rainfall=5.17"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentE1:**

Runoff Area=240,415 sf 0.97% Impervious Runoff Depth=1.07"  
Flow Length=361' Tc=10.6 min CN=55 Runoff=4.70 cfs 0.490 af

**Link POA-1:**

Inflow=4.70 cfs 0.490 af  
Primary=4.70 cfs 0.490 af

**Total Runoff Area = 5.519 ac Runoff Volume = 0.490 af Average Runoff Depth = 1.07"**  
**99.03% Pervious = 5.466 ac 0.97% Impervious = 0.054 ac**

**New Leaf Agawam MA - Pre**

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Type III 24-hr 10-yr Rainfall=5.17"

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**Summary for Subcatchment E1:**

Runoff = 4.70 cfs @ 12.18 hrs, Volume= 0.490 af, Depth= 1.07"  
Routed to Link POA-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-yr Rainfall=5.17"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 33,033    | 76 | Gravel roads, HSG A             |
| 11,450    | 77 | Fallow, bare soil, HSG A        |
| 41,811    | 49 | 50-75% Grass cover, Fair, HSG A |
| 25,220    | 68 | <50% Grass cover, Poor, HSG A   |
| 90,915    | 36 | Woods, Fair, HSG A              |
| 337       | 30 | Woods, Good, HSG A              |
| 2,333     | 98 | Unconnected pavement, HSG A     |
| 10,723    | 60 | Woods, Fair, HSG B              |
| 2,033     | 55 | Woods, Good, HSG B              |
| 22,560    | 77 | Woods, Good, HSG D              |
| 240,415   | 55 | Weighted Average                |
| 238,082   |    | 99.03% Pervious Area            |
| 2,333     |    | 0.97% Impervious Area           |
| 2,333     |    | 100.00% Unconnected             |

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Type III 24-hr 10-yr Rainfall=5.17"

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| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                      |
|-------------|------------------|------------------|----------------------|-------------------|------------------------------------------------------------------|
| 6.7         | 50               | 0.0922           | 0.12                 |                   | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.21" |
| 0.9         | 67               | 0.0651           | 1.28                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.1         | 15               | 0.0651           | 4.11                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps        |
| 0.6         | 37               | 0.0499           | 1.12                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.0         | 12               | 0.0776           | 4.48                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps        |
| 1.3         | 55               | 0.0197           | 0.70                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 1.0         | 125              | 0.1626           | 2.02                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 10.6        | 361              | Total            |                      |                   |                                                                  |

**New Leaf Agawam MA - Pre**

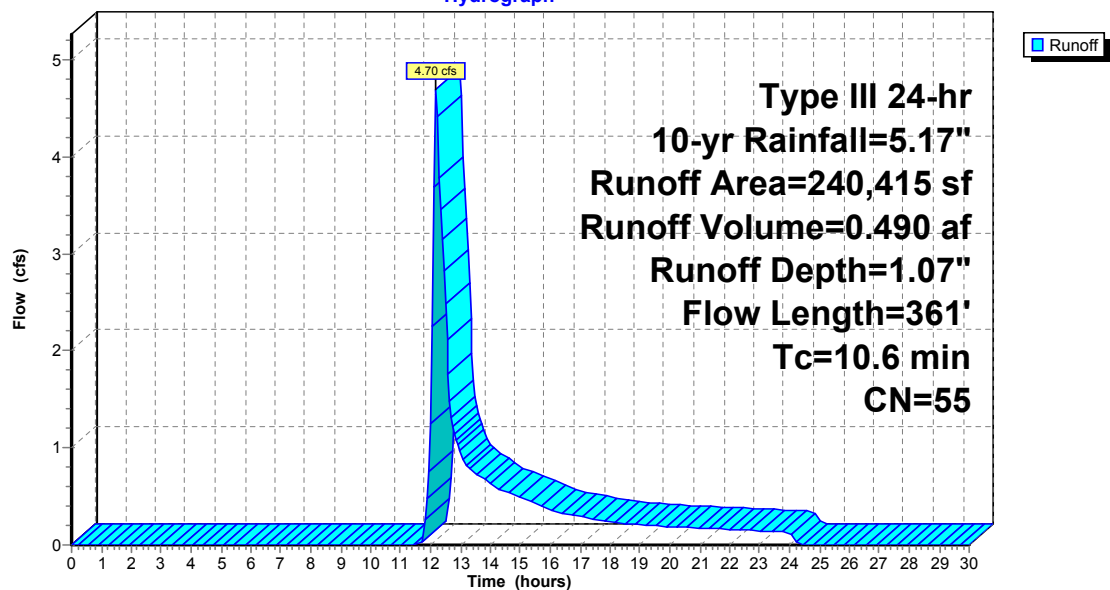
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Type III 24-hr 10-yr Rainfall=5.17"

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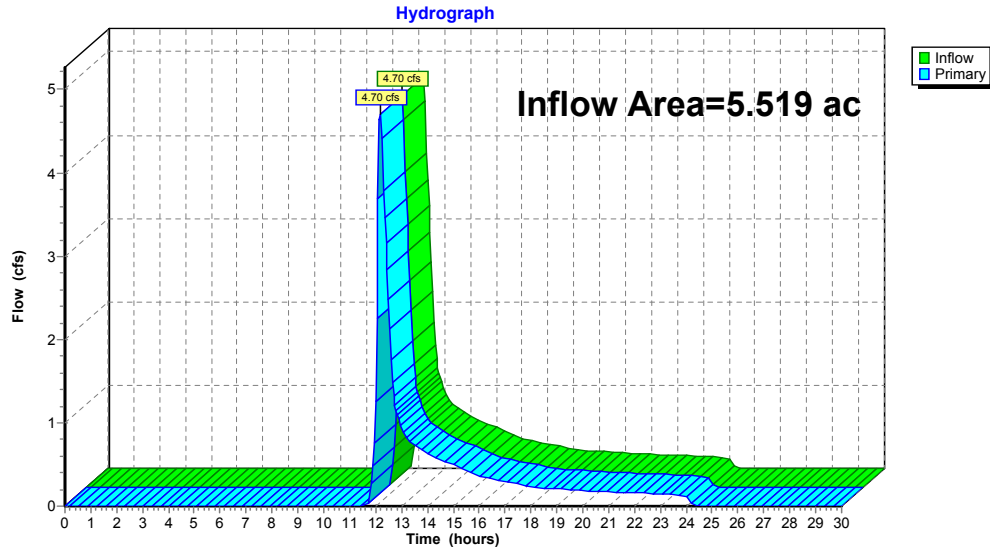
**Subcatchment E1:****Hydrograph**

### Summary for Link POA-1:

Inflow Area = 5.519 ac, 0.97% Impervious, Inflow Depth = 1.07" for 10-yr event  
Inflow = 4.70 cfs @ 12.18 hrs, Volume= 0.490 af  
Primary = 4.70 cfs @ 12.18 hrs, Volume= 0.490 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

### Link POA-1:



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

### SubcatchmentE1:

Runoff Area=240,415 sf 0.97% Impervious Runoff Depth=2.98"  
Flow Length=361' Tc=10.6 min CN=55 Runoff=15.80 cfs 1.372 af

### Link POA-1:

Inflow=15.80 cfs 1.372 af  
Primary=15.80 cfs 1.372 af

Total Runoff Area = 5.519 ac Runoff Volume = 1.372 af Average Runoff Depth = 2.98"  
99.03% Pervious = 5.466 ac 0.97% Impervious = 0.054 ac

**New Leaf Agawam MA - Pre**

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Type III 24-hr 100-yr Rainfall=8.29"

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**Summary for Subcatchment E1:**

Runoff = 15.80 cfs @ 12.16 hrs, Volume= 1.372 af, Depth= 2.98"  
Routed to Link POA-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-yr Rainfall=8.29"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 33,033    | 76 | Gravel roads, HSG A             |
| 11,450    | 77 | Fallow, bare soil, HSG A        |
| 41,811    | 49 | 50-75% Grass cover, Fair, HSG A |
| 25,220    | 68 | <50% Grass cover, Poor, HSG A   |
| 90,915    | 36 | Woods, Fair, HSG A              |
| 337       | 30 | Woods, Good, HSG A              |
| 2,333     | 98 | Unconnected pavement, HSG A     |
| 10,723    | 60 | Woods, Fair, HSG B              |
| 2,033     | 55 | Woods, Good, HSG B              |
| 22,560    | 77 | Woods, Good, HSG D              |
| 240,415   | 55 | Weighted Average                |
| 238,082   |    | 99.03% Pervious Area            |
| 2,333     |    | 0.97% Impervious Area           |
| 2,333     |    | 100.00% Unconnected             |

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Type III 24-hr 100-yr Rainfall=8.29"

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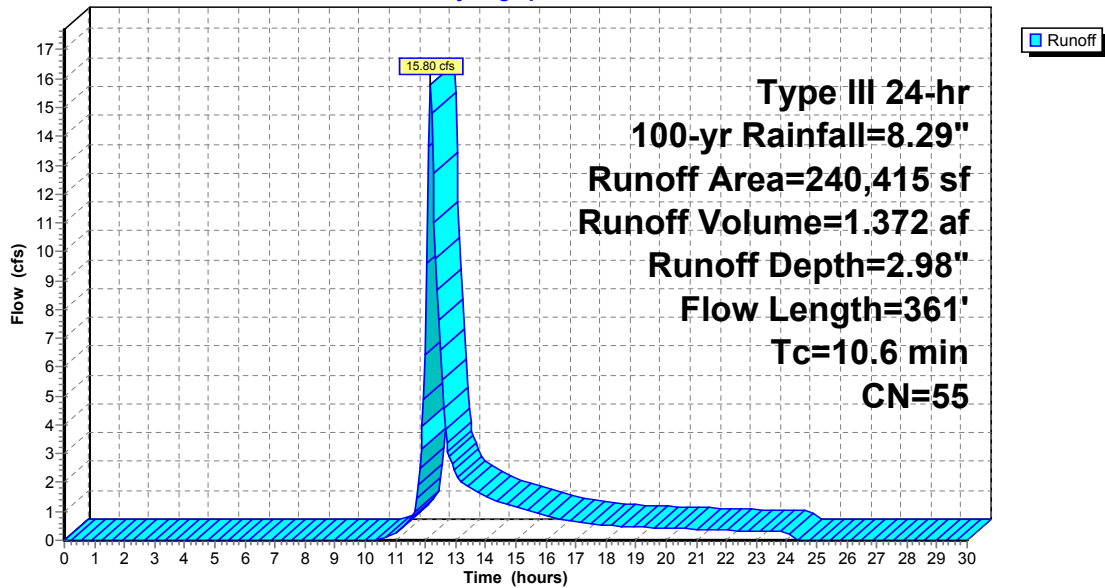
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| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                      |
|-------------|------------------|------------------|----------------------|-------------------|------------------------------------------------------------------|
| 6.7         | 50               | 0.0922           | 0.12                 |                   | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.21" |
| 0.9         | 67               | 0.0651           | 1.28                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.1         | 15               | 0.0651           | 4.11                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps        |
| 0.6         | 37               | 0.0499           | 1.12                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.0         | 12               | 0.0776           | 4.48                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps        |
| 1.3         | 55               | 0.0197           | 0.70                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 1.0         | 125              | 0.1626           | 2.02                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 10.6        | 361              | Total            |                      |                   |                                                                  |



## Subcatchment E1:

## Hydrograph



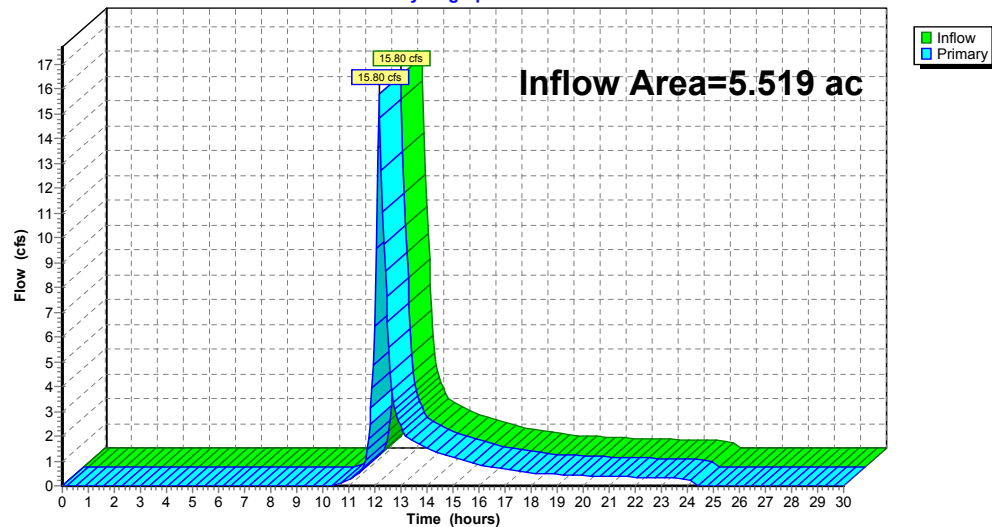
## Summary for Link POA-1:

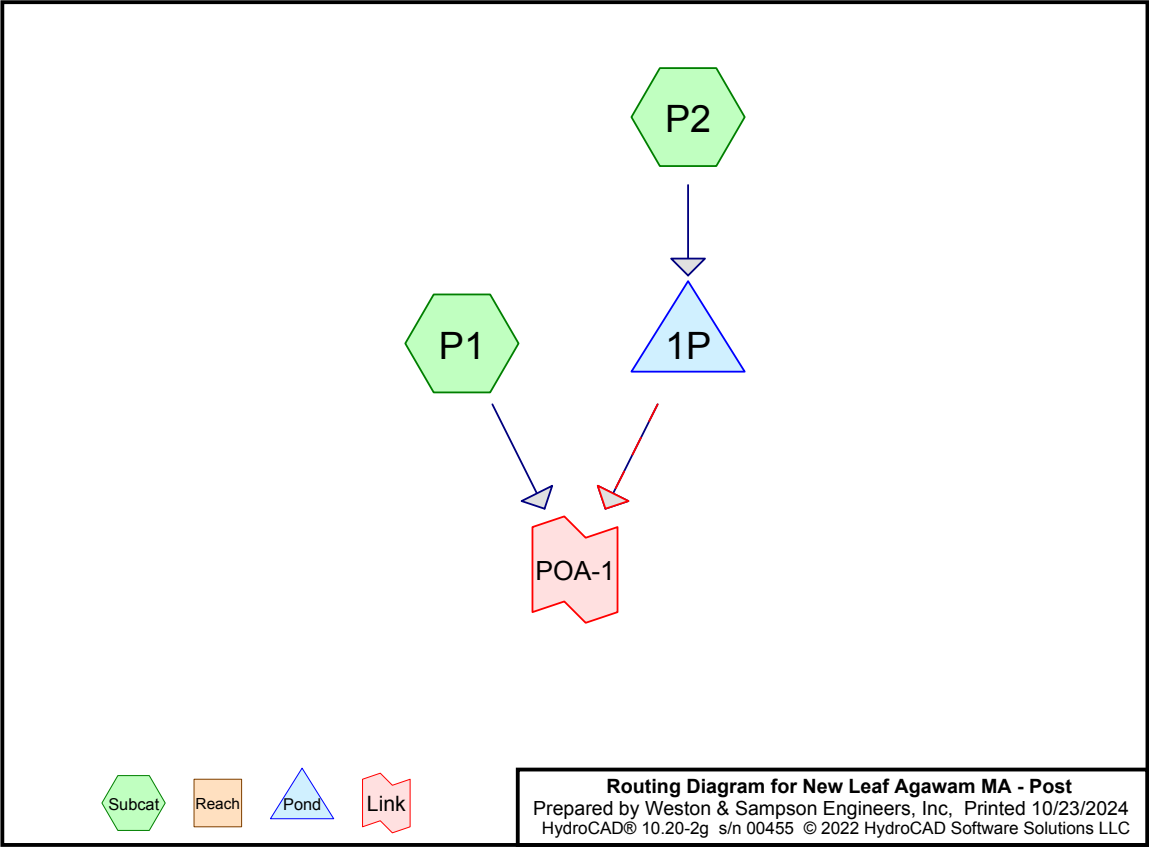
Inflow Area = 5.519 ac, 0.97% Impervious, Inflow Depth = 2.98" for 100-yr event  
 Inflow = 15.80 cfs @ 12.16 hrs, Volume= 1.372 af  
 Primary = 15.80 cfs @ 12.16 hrs, Volume= 1.372 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

## Link POA-1:

## Hydrograph





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**Rainfall Events Listing (selected events)**

| Event# | Event Name | Storm Type     | Curve | Mode    | Duration (hours) | B/B | Depth (inches) | AMC |
|--------|------------|----------------|-------|---------|------------------|-----|----------------|-----|
| 1      | 2-yr       | Type III 24-hr |       | Default | 24.00            | 1   | 3.21           | 2   |
| 2      | 10-yr      | Type III 24-hr |       | Default | 24.00            | 1   | 5.17           | 2   |
| 3      | 100-yr     | Type III 24-hr |       | Default | 24.00            | 1   | 8.29           | 2   |

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**Area Listing (all nodes)**

| Area<br>(acres) | CN        | Description<br>(subcatchment-numbers) |
|-----------------|-----------|---------------------------------------|
| 1.082           | 49        | 50-75% Grass cover, Fair, HSG A (P1)  |
| 0.308           | 68        | <50% Grass cover, Poor, HSG A (P1)    |
| 0.220           | 77        | Fallow, bare soil, HSG A (P1)         |
| 1.007           | 76        | Gravel roads, HSG A (P1)              |
| 0.031           | 76        | Infiltration Trench (P2)              |
| 0.195           | 98        | Unconnected pavement, HSG A (P1, P2)  |
| 1.859           | 36        | Woods, Fair, HSG A (P1)               |
| 0.246           | 60        | Woods, Fair, HSG B (P1)               |
| 0.008           | 30        | Woods, Good, HSG A (P1)               |
| 0.047           | 55        | Woods, Good, HSG B (P1)               |
| 0.518           | 77        | Woods, Good, HSG D (P1)               |
| <b>5.519</b>    | <b>57</b> | <b>TOTAL AREA</b>                     |

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Type III 24-hr 2-yr Rainfall=3.21"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentP1:** Runoff Area=232,938 sf 1.00% Impervious Runoff Depth=0.25"  
Flow Length=361' Tc=10.6 min UI Adjusted CN=55 Runoff=0.54 cfs 0.113 af

**SubcatchmentP2:** Runoff Area=7,477 sf 82.19% Impervious Runoff Depth=2.55"  
Tc=6.0 min CN=94 Runoff=0.48 cfs 0.037 af

**Pond 1P:** Peak Elev=160.16' Storage=619 cf Inflow=0.48 cfs 0.037 af  
Discarded=0.05 cfs 0.037 af Secondary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.037 af

**Link POA-1:** Inflow=0.54 cfs 0.113 af  
Primary=0.54 cfs 0.113 af

**Total Runoff Area = 5.519 ac Runoff Volume = 0.150 af Average Runoff Depth = 0.33"**  
**96.47% Pervious = 5.325 ac 3.53% Impervious = 0.195 ac**

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Type III 24-hr 2-yr Rainfall=3.21"

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**Summary for Subcatchment P1:**

Runoff = 0.54 cfs @ 12.40 hrs, Volume= 0.113 af, Depth= 0.25"  
Routed to Link POA-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-yr Rainfall=3.21"

| Area (sf) | CN | Adj | Description                     |
|-----------|----|-----|---------------------------------|
| 43,867    | 76 |     | Gravel roads, HSG A             |
| 9,586     | 77 |     | Fallow, bare soil, HSG A        |
| 47,120    | 49 |     | 50-75% Grass cover, Fair, HSG A |
| 13,402    | 68 |     | <50% Grass cover, Poor, HSG A   |
| 80,977    | 36 |     | Woods, Fair, HSG A              |
| 337       | 30 |     | Woods, Good, HSG A              |
| 2,333     | 98 |     | Unconnected pavement, HSG A     |
| 10,723    | 60 |     | Woods, Fair, HSG B              |
| 2,033     | 55 |     | Woods, Good, HSG B              |
| 22,560    | 77 |     | Woods, Good, HSG D              |
| 232,938   | 56 | 55  | Weighted Average, UI Adjusted   |
| 230,605   |    |     | 99.00% Pervious Area            |
| 2,333     |    |     | 1.00% Impervious Area           |
| 2,333     |    |     | 100.00% Unconnected             |

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Type III 24-hr 2-yr Rainfall=3.21"

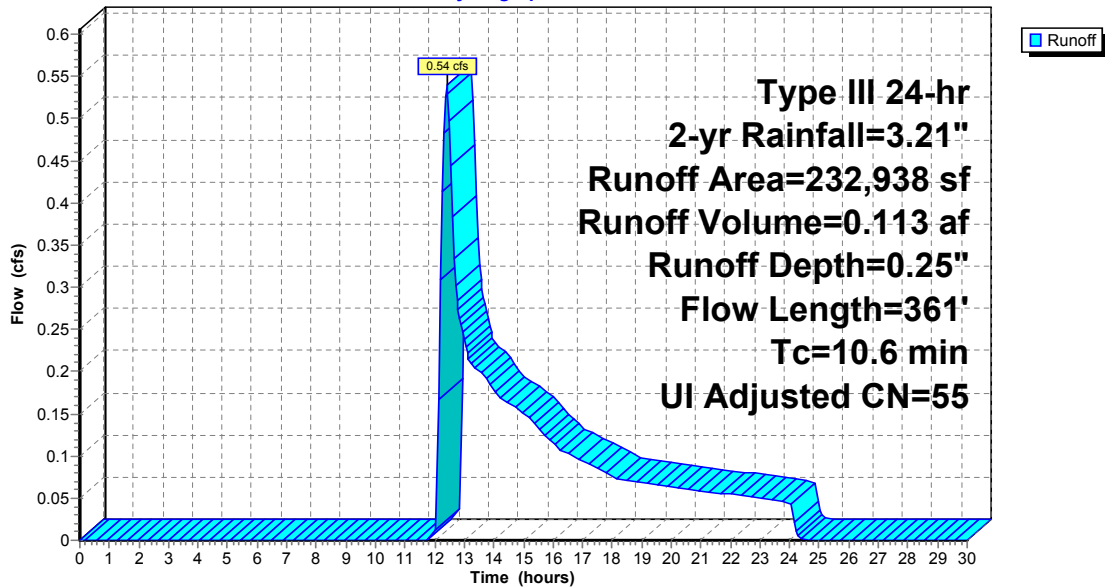
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| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                      |
|-------------|------------------|------------------|----------------------|-------------------|------------------------------------------------------------------|
| 6.7         | 50               | 0.0922           | 0.12                 |                   | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.21" |
| 0.9         | 67               | 0.0651           | 1.28                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.1         | 15               | 0.0651           | 4.11                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps        |
| 0.6         | 37               | 0.0499           | 1.12                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.0         | 12               | 0.0776           | 4.48                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps        |
| 1.3         | 55               | 0.0197           | 0.70                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 1.0         | 125              | 0.1626           | 2.02                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 10.6        | 361              | Total            |                      |                   |                                                                  |

Subcatchment P1:

Hydrograph



Summary for Subcatchment P2:

Runoff = 0.48 cfs @ 12.09 hrs, Volume= 0.037 af, Depth= 2.55"  
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-yr Rainfall=3.21"

| Area (sf) | CN | Description                 |
|-----------|----|-----------------------------|
| 6,145     | 98 | Unconnected pavement, HSG A |
| 1,332     | 76 | Infiltration Trench         |
| 7,477     | 94 | Weighted Average            |
| 1,332     |    | 17.81% Pervious Area        |
| 6,145     |    | 82.19% Impervious Area      |
| 6,145     |    | 100.00% Unconnected         |

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

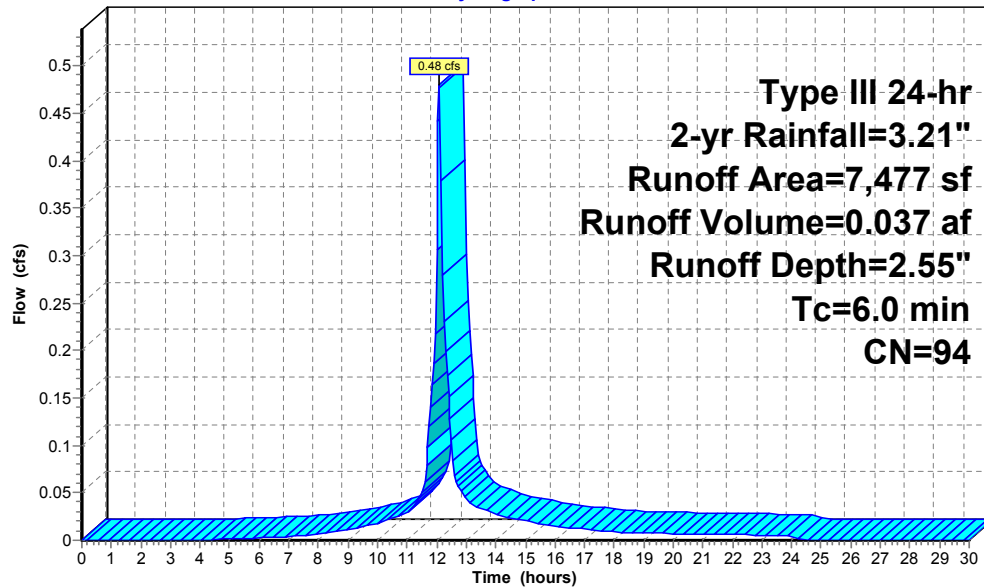
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**Subcatchment P2:****Hydrograph****New Leaf Agawam MA - Post**

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Type III 24-hr 2-yr Rainfall=3.21"

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**Summary for Pond 1P:**

Inflow Area = 0.172 ac, 82.19% Impervious, Inflow Depth = 2.55" for 2-yr event  
Inflow = 0.48 cfs @ 12.09 hrs, Volume= 0.037 af  
Outflow = 0.05 cfs @ 12.86 hrs, Volume= 0.037 af, Atten= 90%, Lag= 46.5 min  
Discarded = 0.05 cfs @ 12.86 hrs, Volume= 0.037 af  
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routed to Link POA-1 :

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
Peak Elev= 160.16' @ 12.86 hrs Surf.Area= 1,332 sf Storage= 619 cf

Plug-Flow detention time= 109.6 min calculated for 0.036 af (100% of inflow)  
Center-of-Mass det. time= 109.4 min ( 896.4 - 787.0 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                          |
|--------|---------|---------------|----------------------------------------------------------------------------------------------|
| #1     | 159.00' | 1,598 cf      | <b>Custom Stage Data (Prismatic)</b> listed below (Recalc)<br>3,996 cf Overall x 40.0% Voids |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|------------------|-------------------|------------------------|------------------------|
| 159.00           | 1,332             | 0                      | 0                      |
| 160.00           | 1,332             | 1,332                  | 1,332                  |
| 161.00           | 1,332             | 1,332                  | 2,664                  |
| 162.00           | 1,332             | 1,332                  | 3,996                  |

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                           |
|--------|-----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Discarded | 159.00' | <b>1.020 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = 157.00'                                                                                                                        |
| #2     | Secondary | 161.90' | <b>4.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b><br>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<br>Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32 |



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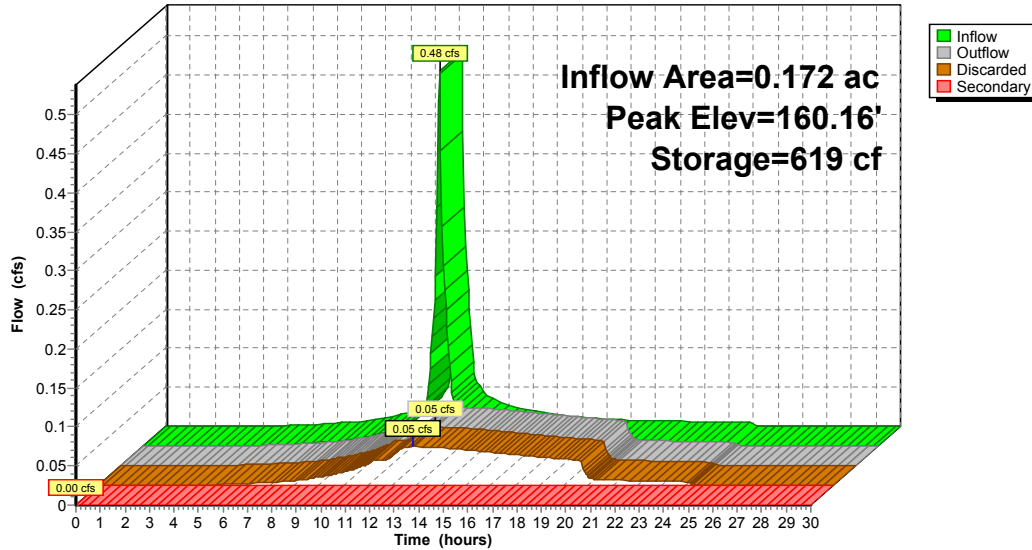
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Discarded OutFlow Max=0.05 cfs @ 12.86 hrs HW=160.16' (Free Discharge)

1=Exfiltration ( Controls 0.05 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=159.00' (Free Discharge)

2=Broad-Crested Rectangular Weir( Controls 0.00 cfs)

**Pond 1P:****Hydrograph****New Leaf Agawam MA - Post**

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**Stage-Area-Storage for Pond 1P:**

| Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) | Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-------------------------|---------------------|--------------------|-------------------------|
| 159.00              | 1,332              | 0                       | 160.80              | 1,332              | 959                     |
| 159.05              | 1,332              | 27                      | 160.85              | 1,332              | 986                     |
| 159.10              | 1,332              | 53                      | 160.90              | 1,332              | 1,012                   |
| 159.15              | 1,332              | 80                      | 160.95              | 1,332              | 1,039                   |
| 159.20              | 1,332              | 107                     | 161.00              | 1,332              | 1,066                   |
| 159.25              | 1,332              | 133                     | 161.05              | 1,332              | 1,092                   |
| 159.30              | 1,332              | 160                     | 161.10              | 1,332              | 1,119                   |
| 159.35              | 1,332              | 186                     | 161.15              | 1,332              | 1,146                   |
| 159.40              | 1,332              | 213                     | 161.20              | 1,332              | 1,172                   |
| 159.45              | 1,332              | 240                     | 161.25              | 1,332              | 1,199                   |
| 159.50              | 1,332              | 266                     | 161.30              | 1,332              | 1,225                   |
| 159.55              | 1,332              | 293                     | 161.35              | 1,332              | 1,252                   |
| 159.60              | 1,332              | 320                     | 161.40              | 1,332              | 1,279                   |
| 159.65              | 1,332              | 346                     | 161.45              | 1,332              | 1,305                   |
| 159.70              | 1,332              | 373                     | 161.50              | 1,332              | 1,332                   |
| 159.75              | 1,332              | 400                     | 161.55              | 1,332              | 1,359                   |
| 159.80              | 1,332              | 426                     | 161.60              | 1,332              | 1,385                   |
| 159.85              | 1,332              | 453                     | 161.65              | 1,332              | 1,412                   |
| 159.90              | 1,332              | 480                     | 161.70              | 1,332              | 1,439                   |
| 159.95              | 1,332              | 506                     | 161.75              | 1,332              | 1,465                   |
| 160.00              | 1,332              | 533                     | 161.80              | 1,332              | 1,492                   |
| 160.05              | 1,332              | 559                     | 161.85              | 1,332              | 1,518                   |
| 160.10              | 1,332              | 586                     | 161.90              | 1,332              | 1,545                   |
| 160.15              | 1,332              | 613                     | 161.95              | 1,332              | 1,572                   |
| 160.20              | 1,332              | 639                     | 162.00              | 1,332              | 1,598                   |
| 160.25              | 1,332              | 666                     |                     |                    |                         |
| 160.30              | 1,332              | 693                     |                     |                    |                         |
| 160.35              | 1,332              | 719                     |                     |                    |                         |
| 160.40              | 1,332              | 746                     |                     |                    |                         |
| 160.45              | 1,332              | 773                     |                     |                    |                         |
| 160.50              | 1,332              | 799                     |                     |                    |                         |
| 160.55              | 1,332              | 826                     |                     |                    |                         |
| 160.60              | 1,332              | 852                     |                     |                    |                         |
| 160.65              | 1,332              | 879                     |                     |                    |                         |
| 160.70              | 1,332              | 906                     |                     |                    |                         |
| 160.75              | 1,332              | 932                     |                     |                    |                         |

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Type III 24-hr 2-yr Rainfall=3.21"

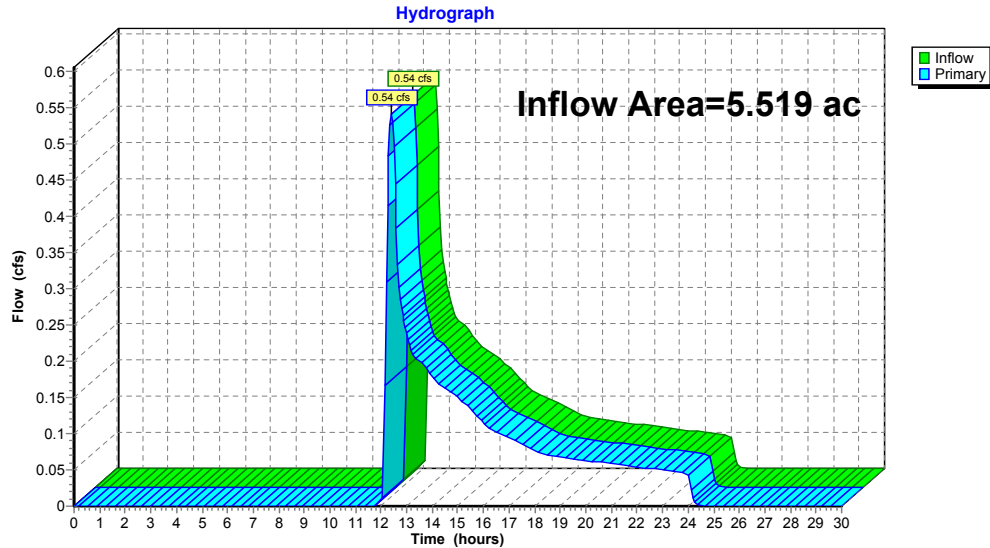
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**Summary for Link POA-1:**

Inflow Area = 5.519 ac, 3.53% Impervious, Inflow Depth = 0.25" for 2-yr event  
Inflow = 0.54 cfs @ 12.40 hrs, Volume= 0.113 af  
Primary = 0.54 cfs @ 12.40 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

**Link POA-1:****New Leaf Agawam MA - Post**

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Type III 24-hr 10-yr Rainfall=5.17"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentP1:** Runoff Area=232,938 sf 1.00% Impervious Runoff Depth=1.07"  
Flow Length=361' Tc=10.6 min UI Adjusted CN=55 Runoff=4.55 cfs 0.475 af

**SubcatchmentP2:** Runoff Area=7,477 sf 82.19% Impervious Runoff Depth=4.48"  
Tc=6.0 min CN=94 Runoff=0.82 cfs 0.064 af

**Pond 1P:** Peak Elev=161.30' Storage=1,227 cf Inflow=0.82 cfs 0.064 af  
Discarded=0.07 cfs 0.064 af Secondary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.064 af

**Link POA-1:** Inflow=4.55 cfs 0.475 af  
Primary=4.55 cfs 0.475 af

**Total Runoff Area = 5.519 ac Runoff Volume = 0.539 af Average Runoff Depth = 1.17"**  
**96.47% Pervious = 5.325 ac 3.53% Impervious = 0.195 ac**

**New Leaf Agawam MA - Post**

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Type III 24-hr 10-yr Rainfall=5.17"

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**Summary for Subcatchment P1:**

Runoff = 4.55 cfs @ 12.18 hrs, Volume= 0.475 af, Depth= 1.07"  
Routed to Link POA-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-yr Rainfall=5.17"

| Area (sf) | CN | Adj | Description                     |
|-----------|----|-----|---------------------------------|
| 43,867    | 76 |     | Gravel roads, HSG A             |
| 9,586     | 77 |     | Fallow, bare soil, HSG A        |
| 47,120    | 49 |     | 50-75% Grass cover, Fair, HSG A |
| 13,402    | 68 |     | <50% Grass cover, Poor, HSG A   |
| 80,977    | 36 |     | Woods, Fair, HSG A              |
| 337       | 30 |     | Woods, Good, HSG A              |
| 2,333     | 98 |     | Unconnected pavement, HSG A     |
| 10,723    | 60 |     | Woods, Fair, HSG B              |
| 2,033     | 55 |     | Woods, Good, HSG B              |
| 22,560    | 77 |     | Woods, Good, HSG D              |
| 232,938   | 56 | 55  | Weighted Average, UI Adjusted   |
| 230,605   |    |     | 99.00% Pervious Area            |
| 2,333     |    |     | 1.00% Impervious Area           |
| 2,333     |    |     | 100.00% Unconnected             |

**New Leaf Agawam MA - Post**

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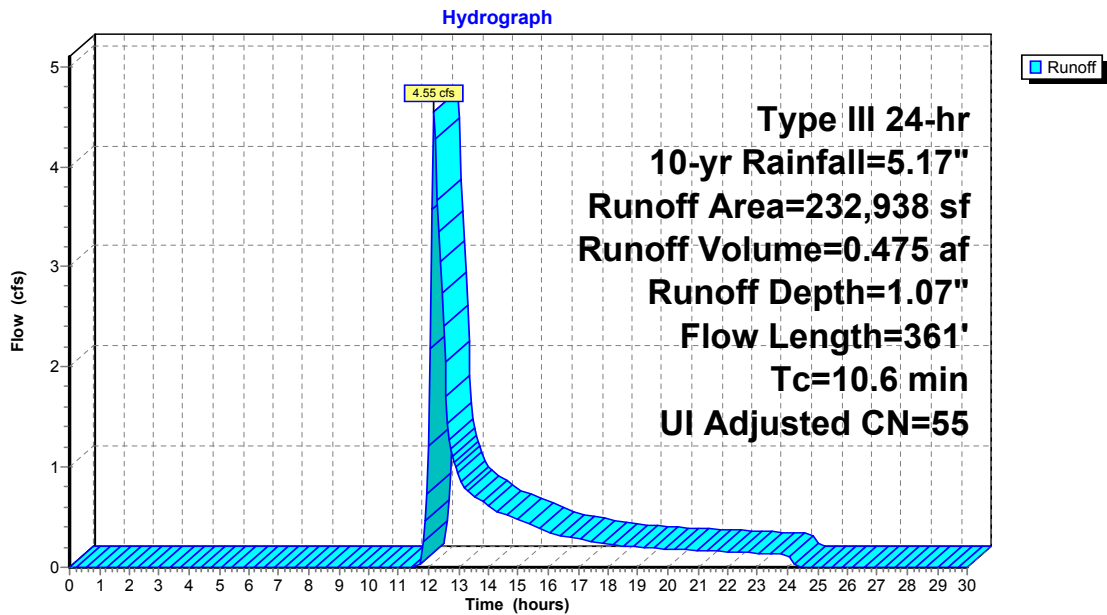
Type III 24-hr 10-yr Rainfall=5.17"

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| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                      |
|-------------|------------------|------------------|----------------------|-------------------|------------------------------------------------------------------|
| 6.7         | 50               | 0.0922           | 0.12                 |                   | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.21" |
| 0.9         | 67               | 0.0651           | 1.28                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.1         | 15               | 0.0651           | 4.11                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps        |
| 0.6         | 37               | 0.0499           | 1.12                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.0         | 12               | 0.0776           | 4.48                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps        |
| 1.3         | 55               | 0.0197           | 0.70                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 1.0         | 125              | 0.1626           | 2.02                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 10.6        | 361              | Total            |                      |                   |                                                                  |

Subcatchment P1:



Summary for Subcatchment P2:

Runoff = 0.82 cfs @ 12.09 hrs, Volume= 0.064 af, Depth= 4.48"  
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-yr Rainfall=5.17"

| Area (sf) | CN | Description                 |
|-----------|----|-----------------------------|
| 6,145     | 98 | Unconnected pavement, HSG A |
| 1,332     | 76 | Infiltration Trench         |
| 7,477     | 94 | Weighted Average            |
| 1,332     |    | 17.81% Pervious Area        |
| 6,145     |    | 82.19% Impervious Area      |
| 6,145     |    | 100.00% Unconnected         |

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

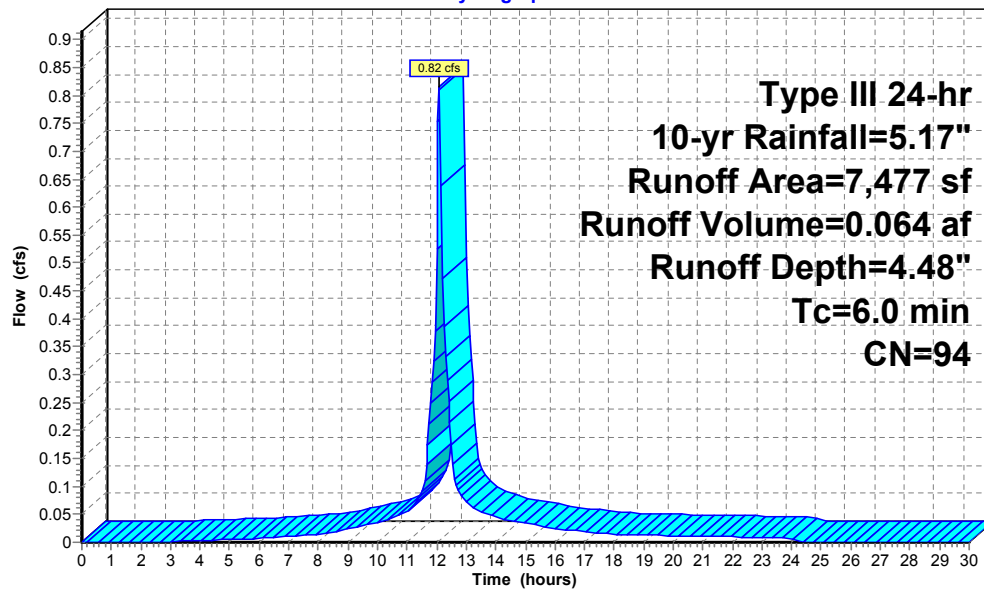
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Type III 24-hr 10-yr Rainfall=5.17"

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**Subcatchment P2:****Hydrograph****New Leaf Agawam MA - Post**

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Type III 24-hr 10-yr Rainfall=5.17"

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**Summary for Pond 1P:**

Inflow Area = 0.172 ac, 82.19% Impervious, Inflow Depth = 4.48" for 10-yr event  
Inflow = 0.82 cfs @ 12.09 hrs, Volume= 0.064 af  
Outflow = 0.07 cfs @ 13.05 hrs, Volume= 0.064 af, Atten= 92%, Lag= 57.9 min  
Discarded = 0.07 cfs @ 13.05 hrs, Volume= 0.064 af  
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
Routed to Link POA-1 :

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
Peak Elev= 161.30' @ 13.05 hrs Surf.Area= 1,332 sf Storage= 1,227 cf

Plug-Flow detention time= 181.9 min calculated for 0.064 af (100% of inflow)  
Center-of-Mass det. time= 181.7 min ( 954.2 - 772.5 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                          |
|--------|---------|---------------|----------------------------------------------------------------------------------------------|
| #1     | 159.00' | 1,598 cf      | <b>Custom Stage Data (Prismatic)</b> listed below (Recalc)<br>3,996 cf Overall x 40.0% Voids |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|------------------|-------------------|------------------------|------------------------|
| 159.00           | 1,332             | 0                      | 0                      |
| 160.00           | 1,332             | 1,332                  | 1,332                  |
| 161.00           | 1,332             | 1,332                  | 2,664                  |
| 162.00           | 1,332             | 1,332                  | 3,996                  |

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                           |
|--------|-----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Discarded | 159.00' | <b>1.020 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = 157.00'                                                                                                                        |
| #2     | Secondary | 161.90' | <b>4.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b><br>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<br>Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32 |

**New Leaf Agawam MA - Post**

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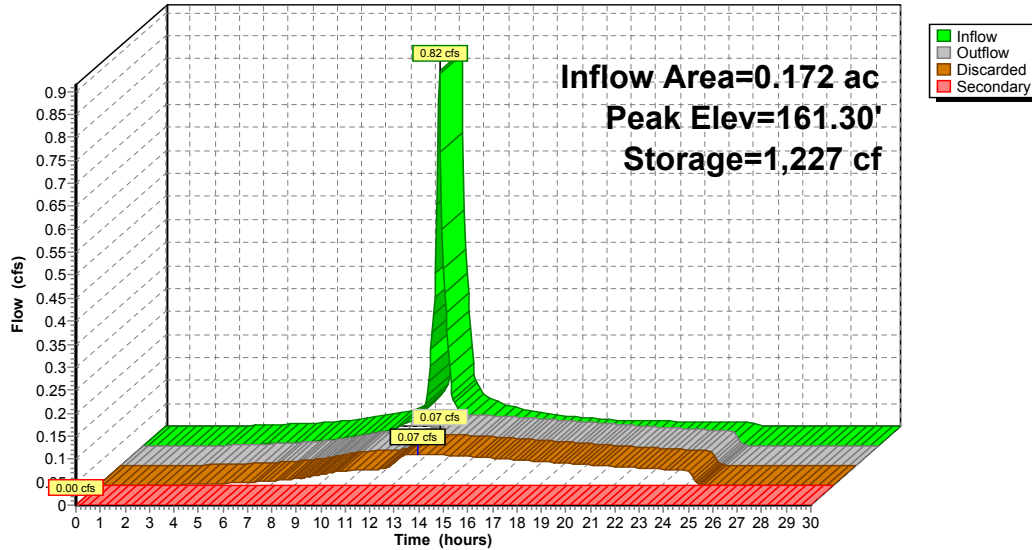
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Discarded OutFlow Max=0.07 cfs @ 13.05 hrs HW=161.30' (Free Discharge)

1=Exfiltration ( Controls 0.07 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=159.00' (Free Discharge)

2=Broad-Crested Rectangular Weir( Controls 0.00 cfs)

**Pond 1P:****Hydrograph****New Leaf Agawam MA - Post**

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Type III 24-hr 10-yr Rainfall=5.17"

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**Stage-Area-Storage for Pond 1P:**

| Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) | Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-------------------------|---------------------|--------------------|-------------------------|
| 159.00              | 1,332              | 0                       | 160.80              | 1,332              | 959                     |
| 159.05              | 1,332              | 27                      | 160.85              | 1,332              | 986                     |
| 159.10              | 1,332              | 53                      | 160.90              | 1,332              | 1,012                   |
| 159.15              | 1,332              | 80                      | 160.95              | 1,332              | 1,039                   |
| 159.20              | 1,332              | 107                     | 161.00              | 1,332              | 1,066                   |
| 159.25              | 1,332              | 133                     | 161.05              | 1,332              | 1,092                   |
| 159.30              | 1,332              | 160                     | 161.10              | 1,332              | 1,119                   |
| 159.35              | 1,332              | 186                     | 161.15              | 1,332              | 1,146                   |
| 159.40              | 1,332              | 213                     | 161.20              | 1,332              | 1,172                   |
| 159.45              | 1,332              | 240                     | 161.25              | 1,332              | 1,199                   |
| 159.50              | 1,332              | 266                     | 161.30              | 1,332              | 1,225                   |
| 159.55              | 1,332              | 293                     | 161.35              | 1,332              | 1,252                   |
| 159.60              | 1,332              | 320                     | 161.40              | 1,332              | 1,279                   |
| 159.65              | 1,332              | 346                     | 161.45              | 1,332              | 1,305                   |
| 159.70              | 1,332              | 373                     | 161.50              | 1,332              | 1,332                   |
| 159.75              | 1,332              | 400                     | 161.55              | 1,332              | 1,359                   |
| 159.80              | 1,332              | 426                     | 161.60              | 1,332              | 1,385                   |
| 159.85              | 1,332              | 453                     | 161.65              | 1,332              | 1,412                   |
| 159.90              | 1,332              | 480                     | 161.70              | 1,332              | 1,439                   |
| 159.95              | 1,332              | 506                     | 161.75              | 1,332              | 1,465                   |
| 160.00              | 1,332              | 533                     | 161.80              | 1,332              | 1,492                   |
| 160.05              | 1,332              | 559                     | 161.85              | 1,332              | 1,518                   |
| 160.10              | 1,332              | 586                     | 161.90              | 1,332              | 1,545                   |
| 160.15              | 1,332              | 613                     | 161.95              | 1,332              | 1,572                   |
| 160.20              | 1,332              | 639                     | 162.00              | 1,332              | 1,598                   |
| 160.25              | 1,332              | 666                     |                     |                    |                         |
| 160.30              | 1,332              | 693                     |                     |                    |                         |
| 160.35              | 1,332              | 719                     |                     |                    |                         |
| 160.40              | 1,332              | 746                     |                     |                    |                         |
| 160.45              | 1,332              | 773                     |                     |                    |                         |
| 160.50              | 1,332              | 799                     |                     |                    |                         |
| 160.55              | 1,332              | 826                     |                     |                    |                         |
| 160.60              | 1,332              | 852                     |                     |                    |                         |
| 160.65              | 1,332              | 879                     |                     |                    |                         |
| 160.70              | 1,332              | 906                     |                     |                    |                         |
| 160.75              | 1,332              | 932                     |                     |                    |                         |

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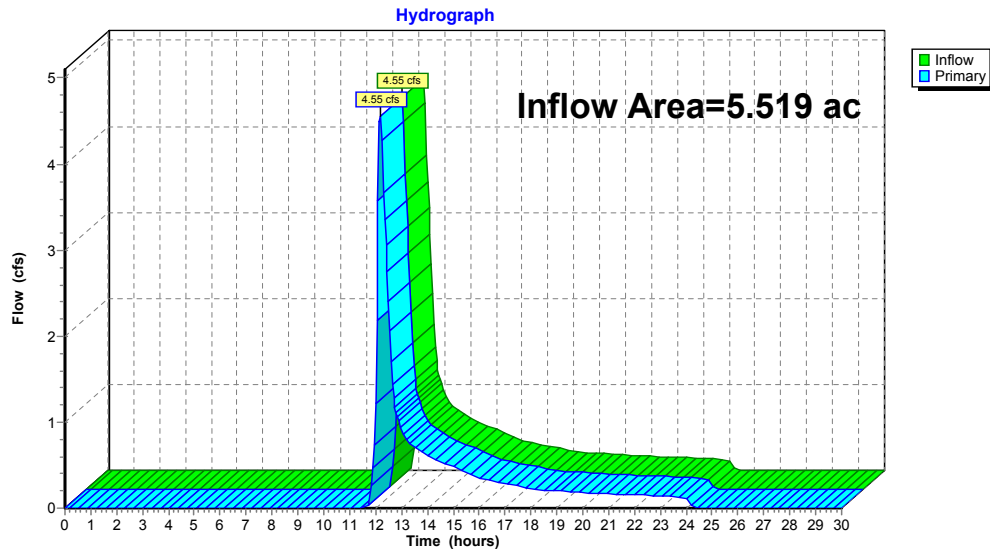
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**Summary for Link POA-1:**

Inflow Area = 5.519 ac, 3.53% Impervious, Inflow Depth = 1.03" for 10-yr event  
Inflow = 4.55 cfs @ 12.18 hrs, Volume= 0.475 af  
Primary = 4.55 cfs @ 12.18 hrs, Volume= 0.475 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

**Link POA-1:****New Leaf Agawam MA - Post**

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentP1:** Runoff Area=232,938 sf 1.00% Impervious Runoff Depth=2.98"  
Flow Length=361' Tc=10.6 min UI Adjusted CN=55 Runoff=15.31 cfs 1.330 af

**SubcatchmentP2:** Runoff Area=7,477 sf 82.19% Impervious Runoff Depth=7.57"  
Tc=6.0 min CN=94 Runoff=1.34 cfs 0.108 af

**Pond 1P:** Peak Elev=162.00' Storage=1,597 cf Inflow=1.34 cfs 0.108 af  
Discarded=0.08 cfs 0.089 af Secondary=0.33 cfs 0.015 af Outflow=0.41 cfs 0.104 af

**Link POA-1:** Inflow=15.54 cfs 1.345 af  
Primary=15.54 cfs 1.345 af

**Total Runoff Area = 5.519 ac Runoff Volume = 1.438 af Average Runoff Depth = 3.13"**  
**96.47% Pervious = 5.325 ac 3.53% Impervious = 0.195 ac**



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Type III 24-hr 100-yr Rainfall=8.29"

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**Summary for Subcatchment P1:**

Runoff = 15.31 cfs @ 12.16 hrs, Volume= 1.330 af, Depth= 2.98"  
Routed to Link POA-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-yr Rainfall=8.29"

| Area (sf) | CN | Adj | Description                     |
|-----------|----|-----|---------------------------------|
| 43,867    | 76 |     | Gravel roads, HSG A             |
| 9,586     | 77 |     | Fallow, bare soil, HSG A        |
| 47,120    | 49 |     | 50-75% Grass cover, Fair, HSG A |
| 13,402    | 68 |     | <50% Grass cover, Poor, HSG A   |
| 80,977    | 36 |     | Woods, Fair, HSG A              |
| 337       | 30 |     | Woods, Good, HSG A              |
| 2,333     | 98 |     | Unconnected pavement, HSG A     |
| 10,723    | 60 |     | Woods, Fair, HSG B              |
| 2,033     | 55 |     | Woods, Good, HSG B              |
| 22,560    | 77 |     | Woods, Good, HSG D              |
| 232,938   | 56 | 55  | Weighted Average, UI Adjusted   |
| 230,605   |    |     | 99.00% Pervious Area            |
| 2,333     |    |     | 1.00% Impervious Area           |
| 2,333     |    |     | 100.00% Unconnected             |

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Type III 24-hr 100-yr Rainfall=8.29"

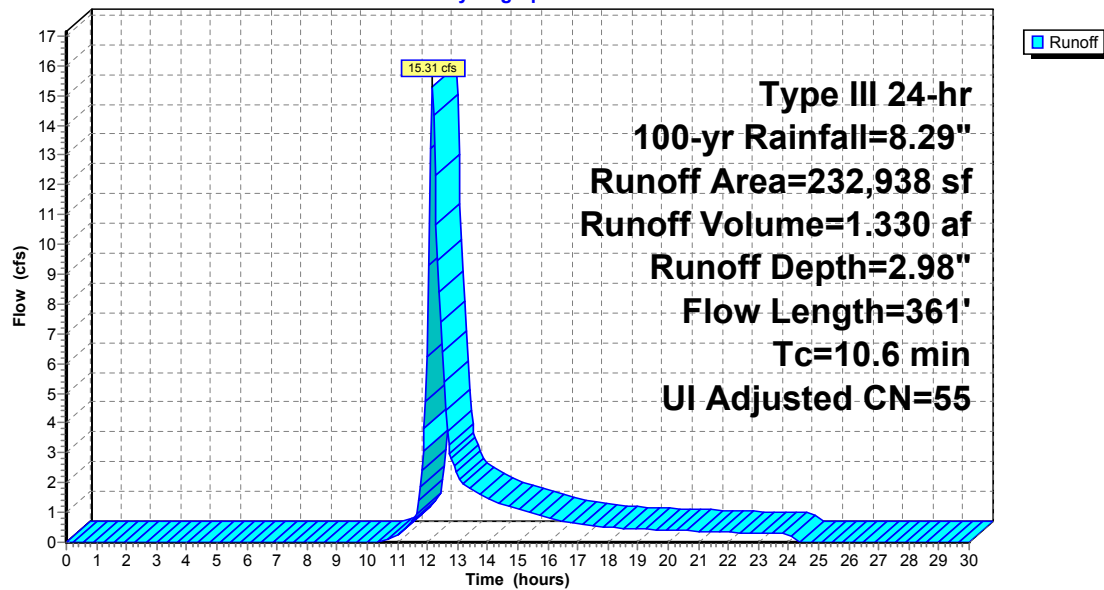
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| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                      |
|-------------|------------------|------------------|----------------------|-------------------|------------------------------------------------------------------|
| 6.7         | 50               | 0.0922           | 0.12                 |                   | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.21" |
| 0.9         | 67               | 0.0651           | 1.28                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.1         | 15               | 0.0651           | 4.11                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps        |
| 0.6         | 37               | 0.0499           | 1.12                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.0         | 12               | 0.0776           | 4.48                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps        |
| 1.3         | 55               | 0.0197           | 0.70                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 1.0         | 125              | 0.1626           | 2.02                 |                   | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 10.6        | 361              | Total            |                      |                   |                                                                  |

## Subcatchment P1:

## Hydrograph



## Summary for Subcatchment P2:

Runoff = 1.34 cfs @ 12.09 hrs, Volume= 0.108 af, Depth= 7.57"  
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-yr Rainfall=8.29"

| Area (sf) | CN | Description                 |
|-----------|----|-----------------------------|
| 6,145     | 98 | Unconnected pavement, HSG A |
| 1,332     | 76 | Infiltration Trench         |
| 7,477     | 94 | Weighted Average            |
| 1,332     |    | 17.81% Pervious Area        |
| 6,145     |    | 82.19% Impervious Area      |
| 6,145     |    | 100.00% Unconnected         |

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

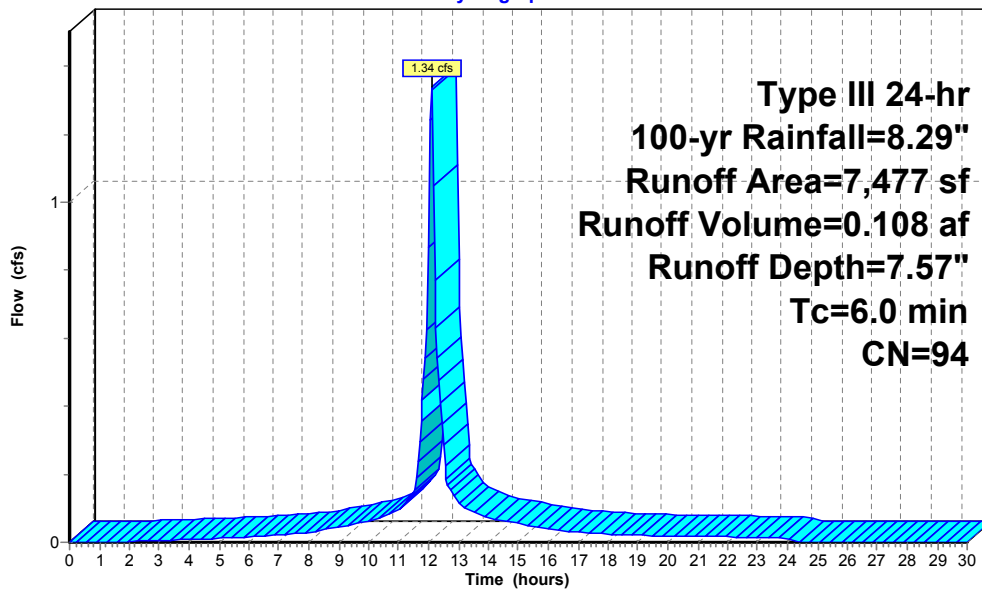
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**Subcatchment P2:****Hydrograph****New Leaf Agawam MA - Post**

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Type III 24-hr 100-yr Rainfall=8.29"

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**Summary for Pond 1P:**

Inflow Area = 0.172 ac, 82.19% Impervious, Inflow Depth = 7.57" for 100-yr event  
Inflow = 1.34 cfs @ 12.09 hrs, Volume= 0.108 af  
Outflow = 0.41 cfs @ 12.32 hrs, Volume= 0.104 af, Atten= 69%, Lag= 13.7 min  
Discarded = 0.08 cfs @ 12.32 hrs, Volume= 0.089 af  
Secondary = 0.33 cfs @ 12.32 hrs, Volume= 0.015 af

Routed to Link POA-1 :

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
Peak Elev= 162.00' @ 12.32 hrs Surf.Area= 1,332 sf Storage= 1,597 cf

Plug-Flow detention time= 212.7 min calculated for 0.104 af (96% of inflow)  
Center-of-Mass det. time= 188.7 min ( 949.2 - 760.5 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                          |
|--------|---------|---------------|----------------------------------------------------------------------------------------------|
| #1     | 159.00' | 1,598 cf      | <b>Custom Stage Data (Prismatic)</b> listed below (Recalc)<br>3,996 cf Overall x 40.0% Voids |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|------------------|-------------------|------------------------|------------------------|
| 159.00           | 1,332             | 0                      | 0                      |
| 160.00           | 1,332             | 1,332                  | 1,332                  |
| 161.00           | 1,332             | 1,332                  | 2,664                  |
| 162.00           | 1,332             | 1,332                  | 3,996                  |

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                           |
|--------|-----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Discarded | 159.00' | <b>1.020 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = 157.00'                                                                                                                        |
| #2     | Secondary | 161.90' | <b>4.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b><br>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<br>Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32 |

**New Leaf Agawam MA - Post**

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Type III 24-hr 100-yr Rainfall=8.29"

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Discarded OutFlow Max=0.08 cfs @ 12.32 hrs HW=162.00' (Free Discharge)

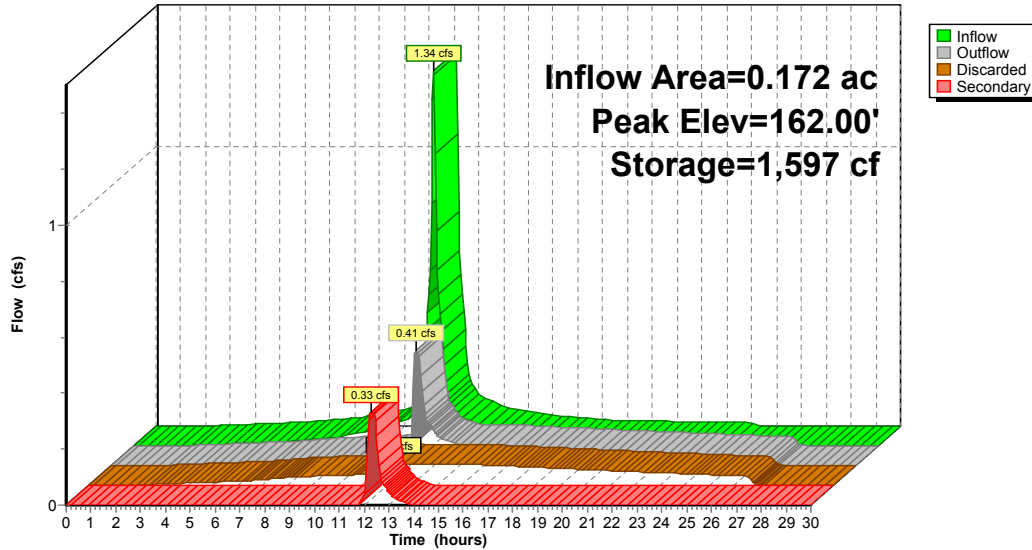
1=Exfiltration ( Controls 0.08 cfs)

Secondary OutFlow Max=0.33 cfs @ 12.32 hrs HW=162.00' (Free Discharge)

2=Broad-Crested Rectangular Weir(Weir Controls 0.33 cfs @ 0.84 fps)

**Pond 1P:**

Hydrograph

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**Stage-Area-Storage for Pond 1P:**

| Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) | Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-------------------------|---------------------|--------------------|-------------------------|
| 159.00              | 1,332              | 0                       | 160.80              | 1,332              | 959                     |
| 159.05              | 1,332              | 27                      | 160.85              | 1,332              | 986                     |
| 159.10              | 1,332              | 53                      | 160.90              | 1,332              | 1,012                   |
| 159.15              | 1,332              | 80                      | 160.95              | 1,332              | 1,039                   |
| 159.20              | 1,332              | 107                     | 161.00              | 1,332              | 1,066                   |
| 159.25              | 1,332              | 133                     | 161.05              | 1,332              | 1,092                   |
| 159.30              | 1,332              | 160                     | 161.10              | 1,332              | 1,119                   |
| 159.35              | 1,332              | 186                     | 161.15              | 1,332              | 1,146                   |
| 159.40              | 1,332              | 213                     | 161.20              | 1,332              | 1,172                   |
| 159.45              | 1,332              | 240                     | 161.25              | 1,332              | 1,199                   |
| 159.50              | 1,332              | 266                     | 161.30              | 1,332              | 1,225                   |
| 159.55              | 1,332              | 293                     | 161.35              | 1,332              | 1,252                   |
| 159.60              | 1,332              | 320                     | 161.40              | 1,332              | 1,279                   |
| 159.65              | 1,332              | 346                     | 161.45              | 1,332              | 1,305                   |
| 159.70              | 1,332              | 373                     | 161.50              | 1,332              | 1,332                   |
| 159.75              | 1,332              | 400                     | 161.55              | 1,332              | 1,359                   |
| 159.80              | 1,332              | 426                     | 161.60              | 1,332              | 1,385                   |
| 159.85              | 1,332              | 453                     | 161.65              | 1,332              | 1,412                   |
| 159.90              | 1,332              | 480                     | 161.70              | 1,332              | 1,439                   |
| 159.95              | 1,332              | 506                     | 161.75              | 1,332              | 1,465                   |
| 160.00              | 1,332              | 533                     | 161.80              | 1,332              | 1,492                   |
| 160.05              | 1,332              | 559                     | 161.85              | 1,332              | 1,518                   |
| 160.10              | 1,332              | 586                     | 161.90              | 1,332              | 1,545                   |
| 160.15              | 1,332              | 613                     | 161.95              | 1,332              | 1,572                   |
| 160.20              | 1,332              | 639                     | 162.00              | 1,332              | 1,598                   |
| 160.25              | 1,332              | 666                     | 162.05              | 1,332              | 1,598                   |
| 160.30              | 1,332              | 693                     | 162.10              | 1,332              | 1,598                   |
| 160.35              | 1,332              | 719                     | 162.15              | 1,332              | 1,598                   |
| 160.40              | 1,332              | 746                     |                     |                    |                         |
| 160.45              | 1,332              | 773                     |                     |                    |                         |
| 160.50              | 1,332              | 799                     |                     |                    |                         |
| 160.55              | 1,332              | 826                     |                     |                    |                         |
| 160.60              | 1,332              | 852                     |                     |                    |                         |
| 160.65              | 1,332              | 879                     |                     |                    |                         |
| 160.70              | 1,332              | 906                     |                     |                    |                         |
| 160.75              | 1,332              | 932                     |                     |                    |                         |

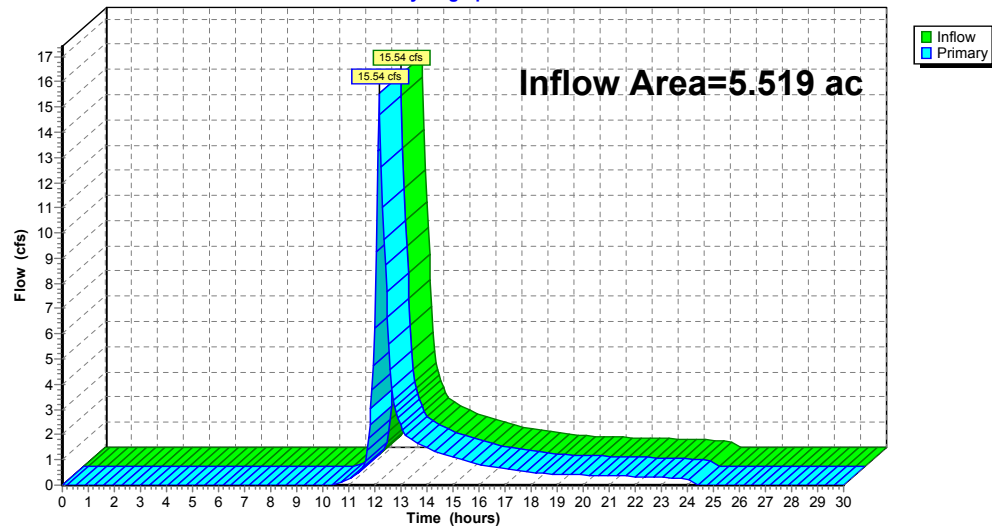
### Summary for Link POA-1:

Inflow Area = 5.519 ac, 3.53% Impervious, Inflow Depth = 2.92" for 100-yr event  
 Inflow = 15.54 cfs @ 12.16 hrs, Volume= 1.345 af  
 Primary = 15.54 cfs @ 12.16 hrs, Volume= 1.345 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

### Link POA-1:

Hydrograph



Attachment D - Supporting Calculations





Silver Street Energy Storage, LLC  
c/o New Leaf Energy, Inc.  
Agawam, MA

Peak Rate Attenuation

| OFF-SITE SUMMARY  |                     | FLOW                       |                            |                                 | VOLUME                         |                                |                           |
|-------------------|---------------------|----------------------------|----------------------------|---------------------------------|--------------------------------|--------------------------------|---------------------------|
| Point of Analysis | 24-hour Storm Event | Existing Peak Runoff (cfs) | Proposed Peak Runoff (cfs) | Difference in Peak Runoff (cfs) | Existing Discharge Volume (af) | Proposed Discharge Volume (af) | Difference in Volume (af) |
| POA - 1           | 2                   | 0.6                        | 0.5                        | 0.0                             |                                |                                |                           |
|                   | 10                  | 4.7                        | 4.6                        | -0.2                            |                                |                                |                           |
|                   | 100                 | 15.8                       | 15.5                       | -0.3                            | 1.4                            | 1.3                            | 0.0                       |

Silver Street Energy Storage, LLC  
c/o New Leaf Energy, Inc.  
Agawam, MA

Town of Agawam Regulations for Stormwater Mangement Permit  
Section 6.C Performance Standards for New Development  
Average Annual Pollutant Removal

Required Retention Volume

Retention Volume = 1 in x 1 ft / 12 in x Impervious Area (sqft)

| Drainage Area | Proposed Impervious Area<br>(sqft) | Required Retention Volume<br>(cf) | Provided Retention Volume<br>(cf) |
|---------------|------------------------------------|-----------------------------------|-----------------------------------|
| POA-1         | 18,311                             | 1,526                             | 1,545                             |

Notes:

1. Provided retention volume is calculated in the HydroCAD model based on the total storage volume available in the infiltration trench.

Attachment E - Stormwater Operation & Maintenance Plan



# STORMWATER OPERATIONS AND MAINTENANCE PLAN

## 1.0 Introduction

The following document has been written to comply with the stormwater guidelines set forth by the Massachusetts Department of Environmental Protection (MassDEP) and the Water & Sewer Ordinance section of the Town of Agawam Code. The intent of these guidelines is to encourage Low Impact Development techniques to improve the quality of the stormwater runoff. These techniques, also known as Best Management Practices (BMPs) collect, store, and treat the runoff before discharging to adjacent environmental resources.

## 2.0 Purpose

This Stormwater Operation and Maintenance Plan (O&M Plan) is intended to provide a mechanism for the consistent inspection and maintenance of the BMP installed on the project site. Included in this O&M Plan is a description and an inspection form for the BMP type.

Silver Street Energy Storage, LLC, c/o New Leaf Energy, Inc. is the owner and operator of the system and are responsible for its upkeep and maintenance. This work will be funded on an annual basis through the owner's operating budget.

**Owner/Operator:**

Silver Street Energy Storage, LLC  
c/o New Leaf Energy, Inc.  
55 Technology Drive #102  
Lowell, MA 01851  
(978) 995-3054  
wperegoy@newleafenergy.com

## 3.0 BMP Descriptions and Locations

### 3.1 Infiltration Trench

There is a proposed infiltration trench surrounding the equipment pad area that will collect stormwater runoff from the equipment pads.

## 4.0 Inspection, Maintenance Checklist and Schedule

All inspection and maintenance of the stormwater BMP should be in accordance with Volume 2 Chapter 2: Structural BMP Specifications for the Massachusetts Stormwater Handbook.

### 4.1 Infiltration Trench

Infiltration trench is to be inspected after the first several rainfall events, and then every 6 months and after every major storm event greater than 3.21 inches (the 2-year 24-hour storm). Inspect for and remove any debris, sediment, grass clippings, or leaves.

# STORMWATER OPERATIONS AND MAINTENANCE PLAN

## INSPECTION CHECKLIST SHEET

### ☐ Infiltration Trench

Frequency: Inspect infiltration trench after the first several rainfall events, and then once every 6 months and after ever major storm event greater than 3.21 inches.

Structure No: \_\_\_\_\_

Inspected By: \_\_\_\_\_ Date: \_\_\_\_\_

Observations: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Actions Taken: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Instructions: Inspect for and remove any debris, sediment, grass clippings, or leaves.

Attachment F - Construction Period Pollution and Erosion and Sedimentation Plan





# CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

## **SECTION 1: Introduction**

The project applicant proposes construction of a battery energy storage system (BESS) with associated site improvements located at 404 Silver Street in Agawam, Massachusetts.

As part of this project, this "Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan" has been created to minimize erosion and sedimentation during the implementation of the project.

## **SECTION 2: Construction Period Pollution Prevention Measures**

Best Management Practices (BMPs) will be utilized as Construction Period Pollution Prevention Measures to reduce potential pollutants and prevent any off-site discharge. The objectives of the BMPs for construction activity are to minimize the disturbed areas, stabilize any disturbed areas, control the site perimeter, and retain sediment. Non-stormwater best management measures will be used to minimize site disturbance and ensure compliance with the performance standards of the Wetlands Protection Act and Stormwater Standards. Measures will be taken to minimize the area disturbed by construction activities to reduce the potential for soil erosion and stormwater pollution problems. In addition, good housekeeping measures will be followed for the day-to-day operation of the construction site under the control of the contractor to minimize the impact of construction. This section describes the control practices that will be in place during construction activities. Recommended control practices will comply with the standards set in the MA DEP Stormwater Policy Handbook.

### **2.1 Minimize Disturbed Area and Protect Natural Features and Soil**

To minimize disturbed areas, work will be completed within well-defined work limits. These work limits are shown on the construction plans. The Contractor will not disturb native vegetation in the undisturbed wetland areas. The Contractor will be responsible to make sure that their workers and any subcontractors know the proper work limits and do not extend their work into the undisturbed areas. The protective measures are described in more detail in the following sections.

### **2.2 Control Stormwater Flowing onto and through the Project**

Construction areas adjacent to wetland resources will be lined with silt fence sediment barriers. The barriers will be inspected at least once every 7 calendar days, or every 14 calendar days and within 24 hours of a storm event of 0.25 inches or greater, and accumulated silt will be removed as needed.

### **2.3 Stabilize Soils**

The Contractor should limit the area of land which is exposed and unvegetated during construction. The Contractor should follow the seeding requirements outlined on the plans and will be responsible for maintaining the seeded areas until final acceptance is received. Final acceptance after 90 days following construction, or until the site reaches 70% stabilization, whichever is longer.

# CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

## 2.4 Proper Storage and Cover of Any Stockpiles

The location of the Contractor's storage areas for equipment and/or materials should be upon cleared portions of the job site or areas to be cleared as a part of this project, outside of wetlands and wetland buffer areas.

Adequate measures for erosion and sediment control such as the placement of straw wattle sediment barriers around the downstream perimeter of stockpiles will be employed to protect any downstream areas from siltation.

There will be no storage of equipment or materials in areas designated as wetlands.

## 2.5 Perimeter Controls and Sediment Barriers

Silt fence (as detailed in the site plans) will be utilized to ensure that sedimentation does not occur outside the perimeter of the work area. Straw wattle (as detailed in the site plans) will be utilized to ensure that sediment does not disperse from stockpile areas.

## 2.6 Storm Drain Inlet Protection

There are no storm drains in the work area.

## 2.7 Retain Sediment On-Site

The Contractor will be responsible for monitoring erosion control measures. Whenever necessary, the Contractor will clear sediment from the silt fence sediment barriers that have been silted up during construction. Inspections must be documented using the attached Monitoring Form.

## 2.8 Material Handling and Waste Management

Materials stored on-site will be stored in a neat, orderly manner in appropriate containers. Materials will be kept in their original containers with the original manufacturer's label. Substances will not be mixed with one another unless recommended by the manufacturer.

Waste materials will be collected and stored in a securely lidded metal container from a licensed management company. The waste and any construction debris from the site will be hauled off-site and disposed of properly. The contractor will be responsible for waste removal. Manufacturer's recommendations for proper use and disposal will be followed for materials. If portable sanitary waste facilities will be used on-site, sanitary waste will be collected from the units a minimum of once a week, by a licensed sanitary waste management contractor.

## 2.9 Designated Washout Areas

The Contractor shall only perform equipment washout in the designated area shown on the plans.

## 2.10 Proper Equipment/Vehicle Fueling and Maintenance Practices

On-site vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the risk of leakage. To ensure that leaks from stored equipment do not contaminate the site, oil-absorbing mats will be placed under oil-containing equipment during storage. Regular fueling and service of the equipment may be performed using approved methods and with care taken to minimize chance of spills. Repair of equipment or machinery within the 100' water resources area is not allowed. Any petroleum products will be stored in tightly sealed containers that are clearly labeled with spill control pads/socks placed under/around their perimeters.

## 2.11 Equipment/Vehicle Washing

The Contractor will be responsible to ensure that no equipment is washed on-site.

# CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

## **SECTION 3: Spill Prevention and Control Plan**

The Contractor will be responsible for preventing spills in accordance with the project drawings and applicable federal, state, and local regulations. The Contractor will identify a properly trained site employee, involved with the day-to-day site operations to be the spill prevention and cleanup coordinator. The name(s) of the responsible spill personnel will be posted on-site. Each employee will be instructed that all spills are to be reported to the spill prevention and cleanup coordinator.

### **3.1 Spill Control Equipment**

Spill control/containment equipment will be kept in the work area. Materials and equipment necessary for spill cleanup will be kept either in the work area or in an otherwise accessible on-site location. Equipment and materials will include, but not be limited to, absorbent booms/mats, brooms, dust pans, mops, rags, gloves, sand, plastic and metal containers specifically for this purpose. It is the responsibility of the Contractor to ensure the inventory will be readily accessible and maintained.

### **3.2 Notification**

Workers will be directed to inform the on-site supervisor of a spill event. The supervisor will assess the incident and initiate proper containment and response procedures immediately upon notification. Workers should avoid direct contact with spilled materials during the containment procedures. Primary notification of a spill should be made to the local Fire Department and Police Departments. Secondary Notification will be to the certified cleanup contractor if deemed necessary by Fire and/or Police personnel. The third level of notification (within 1 hour), if required, is to the DEP or municipality's Licensed Site Professional (LSP) if the spill exceeds the reportable quantity for the material spilled. The specific cleanup contractor to be used will be identified by the Contractor prior to commencement of construction activities.

### **3.3 Spill Containment and Clean-Up Measures**

Spills will be contained with granular sorbent material, sand, sorbent pads, booms or all of the above to prevent spreading. Certified cleanup contractors should complete spill cleanup. The material manufacturer's recommended methods for spill cleanup will be clearly posted and on-site personnel will be made aware of the procedures and the location of the information and cleanup supplies.

### **3.4 Hazardous Materials Spill Report**

The Contractor will report and record any spill. The spill report will present a description of the release, including the quantity and type of material, date of the spill, circumstances leading to the release, location of spill, response actions and personnel, documentation of notifications and corrective measures implemented to prevent reoccurrence.

*This document does not relieve the Contractor of the Federal reporting requirements of 40 CFR Part 110, 40 CFR Part 117, 40 CFR Part 302 and the State requirements specified under the Massachusetts Contingency Plan (M.C.P) relating to spills or other releases of oils or hazardous substances. Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117 or 40 CFR Part 302, occurs during a twenty-four (24) hour period, the Contractor is required to comply with the response requirements of the above mentioned regulations. Spills of oil or hazardous material in excess of the reportable quantity will be reported to the National Response Center (NRC).*

# CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

## **SECTION 4: Contact Information/Responsible Parties**

### **Owner/Operator:**

Silver Street Energy Storage, LLC  
c/o New Leaf Energy, Inc.  
55 Technology Drive, Suite 102  
Lowell, MA 01851  
978-995-3054  
[wperegoy@newleafenergy.com](mailto:wperegoy@newleafenergy.com)

### **Engineer:**

Rob Bukowski, PE  
Weston & Sampson Engineers, Inc.  
55 Walkers Brook Drive, Suite 100  
Reading, MA 01867  
978-532-1900  
[Bukowski.rob@wseinc.com](mailto:Bukowski.rob@wseinc.com)

### **Site Inspector:**

TBD

### **Contractor:**

TBD

## **SECTION 5: Erosion and Sedimentation Control**

Erosion and Sedimentation Control features can be found in the attached project plans which include specifications for installation and monitoring control devices.

## **SECTION 6: Site Development Plan**

The proposed site development plan is included in the attached plans.

## **SECTION 7: Operation and Maintenance of Erosion Control**

The erosion control measures will be installed as detailed in project plans. If there is a failure of the controls, the Contractor is required to stop work until the failure is repaired.

Periodically throughout the work, the sediment that has been deposited against the controls will be removed to ensure that the controls are working properly.

## **SECTION 8: Inspection Schedule**

During construction, the erosion and sedimentation controls will be inspected at least once every 7 calendar days, or once every 14 calendar days and within 24 hours of the end of a storm event of 0.25 inches or greater. Once the Contractor is selected, an on-site inspector will be identified to ensure that erosion and sedimentation controls are in place and working properly. A Monitoring Form is included for use by the on-site inspector.

# CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

## Monitoring Form

Inspected By: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

| YES | NO | DOES NOT APPLY | ITEM                                                                                                                                         |
|-----|----|----------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|     |    |                | Do any erosion/siltation control measures require repair or clean out to maintain adequate function?                                         |
|     |    |                | Is there any evidence that sediment is leaving the site and entering the wetlands?                                                           |
|     |    |                | Are any temporary soil stockpiles or construction materials located in non-approved areas?                                                   |
|     |    |                | Are on-site construction traffic routes, parking, and storage of equipment and supplies located in areas not specifically designed for them? |
|     |    |                | Are storage of fuels located outside of resource areas and associated buffer zones? Are fuels stored in proper storage containers?           |

Specific location, current weather conditions, and action to be taken:

---

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---

---

Other Comments:

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Pending the actions noted above I certify that the erosion and sedimentation controls at the site are in compliance with the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

.....

Attachment G - Owner Certification Statement



## OWNER CERTIFICATION STATEMENT

"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."

Name: William Peregoy

Signature: 

Date: Sep 24, 2024

boxSIGN 1787Q534-4P7KPY53

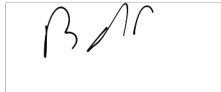
**EXHIBIT F**

Date: Aug 10, 2024

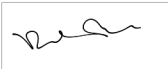
To Whom It May Concern

New Leaf Energy, Inc. and its employees and affiliates are hereby authorized to act as our agent for submission of applications and related plans and documents, and to appear before boards and other officials, with respect to obtaining approvals for solar installations and/or energy storage systems to be constructed on my property located at 404 Silver Street – Agawam, MA.

Sincerely,



box SIGN 402JZQ2V-1XG2ZKP6  
Robert T. Pelley



box SIGN 402JZQ2V-1XG2ZKP6

Deborah A. Pelley



Kevin Duquette  
*Inspector of Buildings*  
inspections@agawam.ma.us

**Town of Agawam**  
***Inspection Services Department***  
1000 Suffield Street, Agawam, Massachusetts 01001  
Telephone - (413) 821-0632

May 28, 2025

To: Office of Planning and Community Development:

Re: Site Plan Review Comments- 404 Silver Street Agawam, MA 01001:

Inspection Services has no zoning issues or concerns at this time for the proposed project for the above referenced address.

The following would need to be addressed for site plan review criteria;

- A Form-A (ANR) would be required to split the parcels for the proposed project.

Respectfully,

*Kevin Duquette*

---

Kevin Duquette  
Inspector of Buildings  
Town of Agawam



# 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: May 27, 2025  
Subject: SP 667 – Proposed Battery Energy Storage System – #404 Silver Street

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Per your request, we have reviewed the revised Site Plan Approval application for the Proposed Battery Energy Storage System to be located at #404 Silver Street; Prepared by Weston & Sampson; Dated: May 16, 2025. Based on our review, Engineering has the following comments:

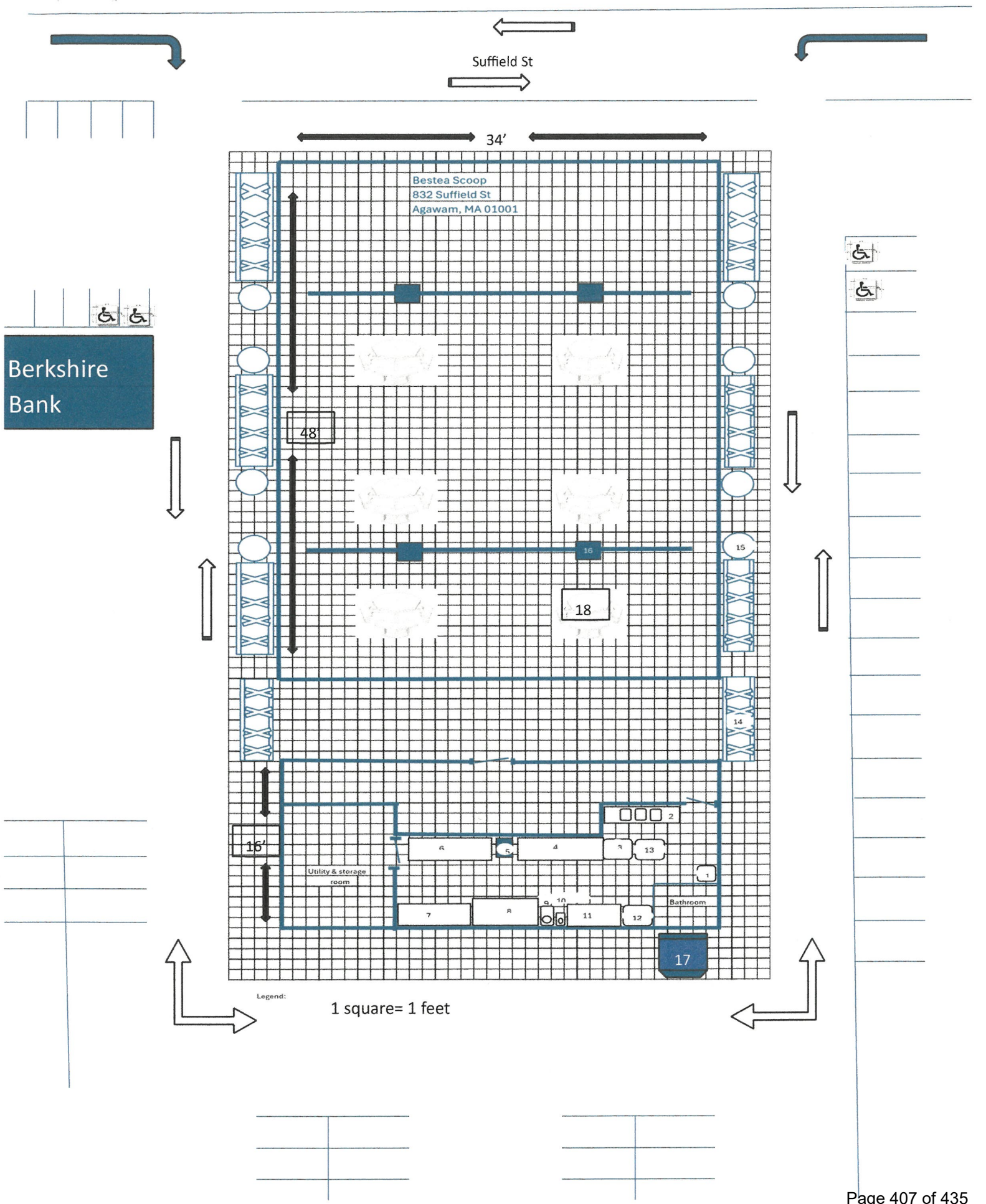
1. As noted on Sheet C-3.0, the area of disturbance for the project has increased to 1.04 acres. In accordance with Chapter 175-22B(1) of the Agawam Town Code and Agawam Stormwater Regulations, a Stormwater Management Permit must be completed and submitted to the Town if a project will disturb one (1) acre or more of land.
2. Engineering is concerned that the proposed grading on the northeastern side of the gravel access driveway loop will be too steep for vehicles to travel. Also, there appears to be a 2:1 slope proposed for the north and east sides of the infiltration trench. This is likely to cause stormwater runoff to bypass the trench in these areas.
3. Engineering recommends the proposed sound barrier wall be extended along the southern side of the electrical equipment area to provide a buffer for the residence remaining at #404 Silver Street.

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.

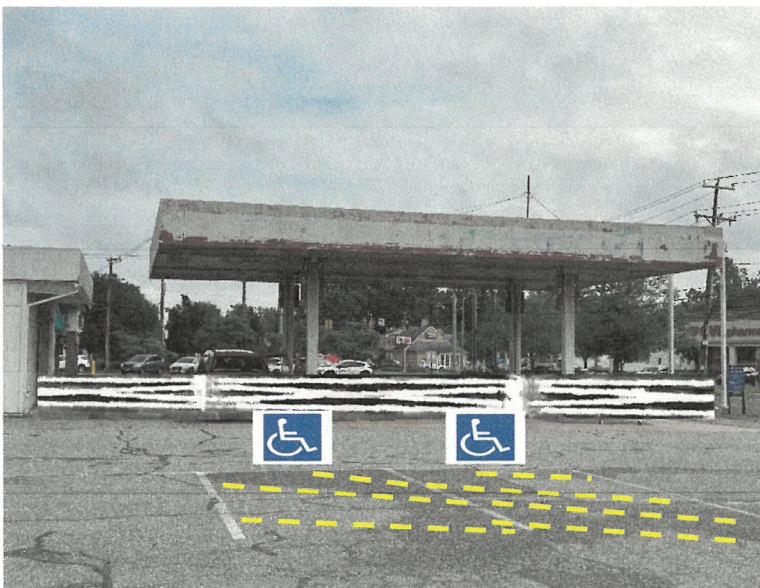
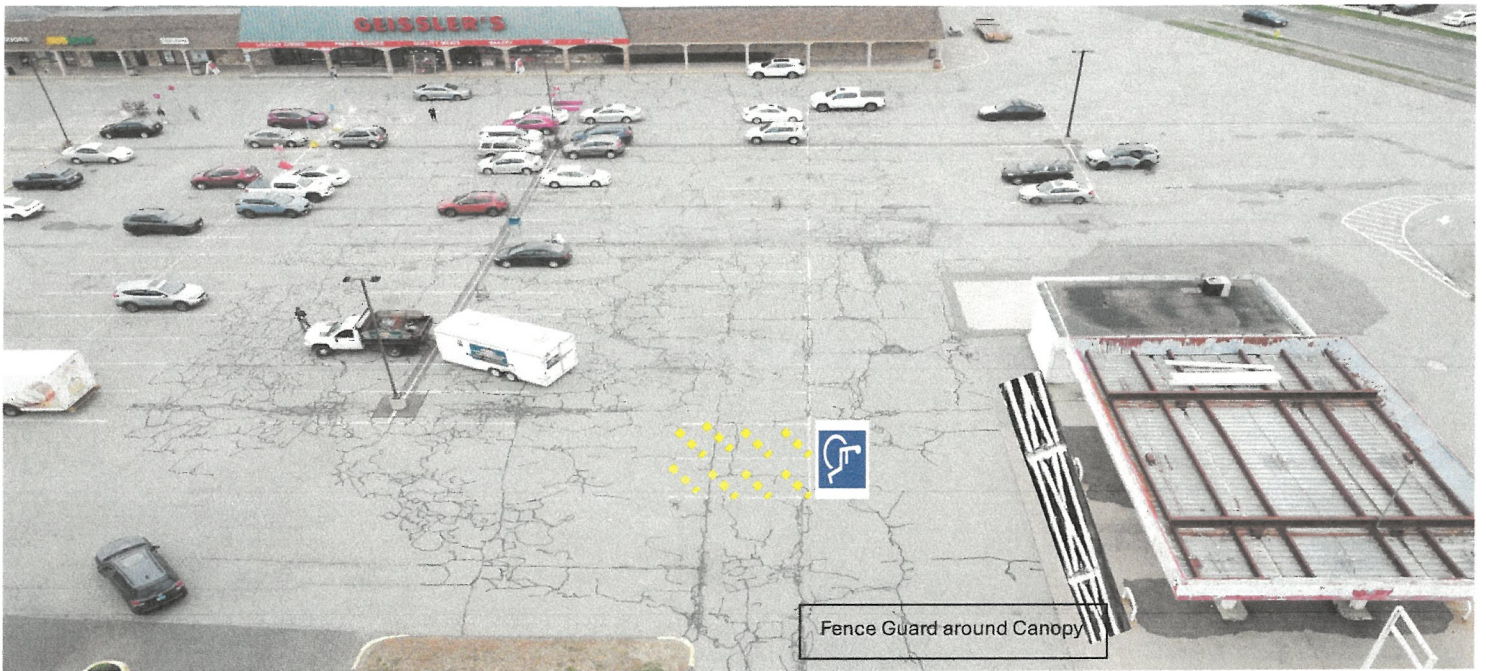
Sincerely,

  
Michelle C. Chase, P.E.  
Town Engineer

  
Michael F. Albro, P.E.  
Assistant Town Engineer









- 1- Mop sink
- 2- 3 bay sink
- 3- SoftServe machine
- 4- Ice cream dipping cabinet
- 5- Cash register
- 6- Ice cream dipping cabinet
- 7- Worktop refrigerator
- 8- Prep refrigerator
- 9- Blender station

- 10- Hand sink
- 11- Worktop refrigerator
- 12- Reach-in Freezer
- 13- Ice Maker
- 14- Fence guards
- 15- Flower pot with bend sitting
- 16- Canopy column
- 17- Trash can/dumpster
- 18- Metal picnic tables

Avantco A-19F-HC 29" Solid Door Reach-In Freezer

Avantco SS-WT-60R-HC 60" Two Door Worktop Refrigerator with 3 1/2" Backsplash

Avantco SS-WT-48R-HC 48" Two Door Worktop Refrigerator with 3 1/2" Backsplash

Avantco APT-60M-HC 60" 2 Door Mega Top Refrigerated Sandwich Prep Table

Avantco CPSS-68-HC 67 3/4" 12 Tub Stainless Steel Deluxe Ice Cream Dipping

Avantco Ice KMC-F-322-A 22" Air Cooled Modular Full Cube Ice Machine with 275 lb.

Vitamix 068255 T&G Advance Blending Station 2.3 hp Blender with Cover and 32 oz.

Regency 18" x 23" Stainless Steel Blender Station with Dump Sink and Faucet

Regency 9" x 9" x 5" Wall-Mounted Hand Sink with 4" Centers, Side Splash, and Strainer

Regency 70" 16 Gauge Stainless Steel Three Compartment Sink with Galvanized Steel Legs and Two Drainboards - 14" x 16" x 12" Bowls

Steelton 16" x 20" x 6" 16 Gauge 304 Stainless Steel One Compartment Floor Mop Sink

Regency 7" Ice Cream Dipper Well and Faucet Set



# TOWN OF AGAWAM, MASSACHUSETTS

## FORM D

### Application for Site Plan Approval

Please complete the following form and electronically submit with site plans and Storm water Management Report to [siteplan@agawam.ma.us](mailto: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 to:

Agawam Inspection Services

1000 Suffield Street

Agawam, MA 01001

RECEIVED  
2025 MAY 29 12:57  
CLERK'S OFFICE  
TOWN OF AGAWAM

05/29 2025

1. Name of Business Bestea Scoop  
Address 832 Suffield, Agawam, MA  
Phone # \_\_\_\_\_ Fax # \_\_\_\_\_ email \_\_\_\_\_  
CKT Partnership LLC
2. Name of Applicant/Owner Khoa Nguyen - CK  
Address 24 Daytona St, Springfield, MA 01108  
Phone # 413-204-3091 Fax # \_\_\_\_\_ email homeuse413@gmail.com
3. Name of Engineer/Architect \_\_\_\_\_  
Address \_\_\_\_\_  
Phone # \_\_\_\_\_ Fax # \_\_\_\_\_ email \_\_\_\_\_
4. Please give a brief description of the proposed project:  
change of use for ice cream shop.



The Commonwealth of Massachusetts  
**Town of Agawam**  
**Inspection Services - Building Department**  
1000 Suffield Street, Agawam MA 01001 – (413) 821-0632



**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.

|                                                                                              |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------|--|--|
| <b>1) PROPERTY INFORMATION</b> (824)                                                         |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
| a. Street Address                                                                            |                                                                                                                                                 |          |        |                                                                                     | b. Zoning District                                                                                              |                                               |                          |  |  |
| c. Assessor's Map                                                                            |                                                                                                                                                 |          |        |                                                                                     | d. Lot(s)                                                                                                       |                                               |                          |  |  |
| e. Registry of Deeds Book                                                                    |                                                                                                                                                 |          |        |                                                                                     | f. Page                                                                                                         |                                               |                          |  |  |
| g. Overlay Districts                                                                         |                                                                                                                                                 |          |        |                                                                                     | <input type="checkbox"/> Historic Preservation <input type="checkbox"/> Mixed-Use Business C                    |                                               |                          |  |  |
| h. Previous Special Permits, Site Plan Approvals, Findings or Variances Issued for this Site |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
|                                                                                              |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
| <b>2) APPLICANT &amp; OWNER INFORMATION</b>                                                  |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
| a. Applicant Name                                                                            |                                                                                                                                                 |          |        |                                                                                     | b. Applicant Phone                                                                                              |                                               |                          |  |  |
| c. Applicant Email                                                                           |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
| d. Applicant Mailing Address                                                                 |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
| e. Applicant Relationship to Property                                                        |                                                                                                                                                 |          |        |                                                                                     | <input type="checkbox"/> Owner <input type="checkbox"/> Agent <input checked="" type="checkbox"/> Other: Tenant |                                               |                          |  |  |
| f. Representative Name (if any)                                                              |                                                                                                                                                 |          |        |                                                                                     | g. Rep. Phone                                                                                                   |                                               |                          |  |  |
| h. Rep. Email                                                                                |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
| i. Owner Mailing Address                                                                     |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
| j. Owner Name (if different)                                                                 |                                                                                                                                                 |          |        |                                                                                     | k. Owner Phone                                                                                                  |                                               |                          |  |  |
| l. Owner Email                                                                               |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
| m. Owner Mailing Address                                                                     |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
| <b>3) PROJECT &amp; SITE DETAILS</b>                                                         |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
| NOTE: Any omission of requested information may result in an INCOMPLETE determination        |                                                                                                                                                 |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
|                                                                                              |                                                                                                                                                 | Existing |        | <input checked="" type="checkbox"/> Proposed<br>No changes to building, site or lot |                                                                                                                 | -FOR BUILDING DEPT. REVIEW-<br>REQUIRED / NCU |                          |  |  |
| a. Lot Size                                                                                  | SF                                                                                                                                              |          | SF     |                                                                                     | LOT SIZE                                                                                                        |                                               | <input type="checkbox"/> |  |  |
| b. Frontage                                                                                  | FT                                                                                                                                              |          | FT     |                                                                                     | FRONTAGE                                                                                                        |                                               | <input type="checkbox"/> |  |  |
| c. Front Lot Line                                                                            | FT                                                                                                                                              |          | FT     |                                                                                     | FRONT SB                                                                                                        |                                               | <input type="checkbox"/> |  |  |
| d. Side Lot Line (Left/Right)                                                                | L: FT                                                                                                                                           | R: FT    | L: FT  | R: FT                                                                               | SIDE SB                                                                                                         |                                               | <input type="checkbox"/> |  |  |
| e. Rear Lot Line                                                                             | FT                                                                                                                                              |          | FT     |                                                                                     | REAR SB                                                                                                         |                                               | <input type="checkbox"/> |  |  |
| f. Building Height                                                                           | FT                                                                                                                                              |          | FT     |                                                                                     | BLDG HT                                                                                                         |                                               | <input type="checkbox"/> |  |  |
| g. Total BLDG/Res Area                                                                       | SF                                                                                                                                              | SF       | SF     | SF                                                                                  | AREA LIM                                                                                                        |                                               | <input type="checkbox"/> |  |  |
| h. BLDG Coverage (Footprint)                                                                 | SF                                                                                                                                              | % of lot | SF     | % of lot                                                                            | LOT COVER                                                                                                       |                                               | <input type="checkbox"/> |  |  |
| i. Impervious Coverage                                                                       | SF                                                                                                                                              | % of lot | SF     | % of lot                                                                            | IMPERVIOUS                                                                                                      |                                               | <input type="checkbox"/> |  |  |
| j. Parking/Loading Spaces                                                                    | P:                                                                                                                                              | L:       | P:     | L:                                                                                  | PARKING                                                                                                         |                                               | <input type="checkbox"/> |  |  |
| k. Bicycle/EV Charge Spaces                                                                  | B:                                                                                                                                              | EV:      | B:     | EV:                                                                                 | BIKE/EV                                                                                                         |                                               | <input type="checkbox"/> |  |  |
| l. Signs (Size & Type)                                                                       | x                                                                                                                                               | T:       | x      | T:                                                                                  | SIGNS                                                                                                           |                                               | <input type="checkbox"/> |  |  |
| m. Fence (Size & Type)                                                                       | LIN FT                                                                                                                                          | T:       | LIN FT | T:                                                                                  |                                                                                                                 |                                               |                          |  |  |
| n. Wetland Area                                                                              | SF                                                                                                                                              |          | SF     |                                                                                     |                                                                                                                 |                                               |                          |  |  |
| o. Utility Services                                                                          | <input type="checkbox"/> Town Water <input type="checkbox"/> Town Sewer <input type="checkbox"/> Town Water <input type="checkbox"/> Town Sewer |          |        |                                                                                     |                                                                                                                 |                                               |                          |  |  |
|                                                                                              |                                                                                                                                                 |          |        |                                                                                     | NON-CONFORMING USE <input type="checkbox"/>                                                                     |                                               |                          |  |  |



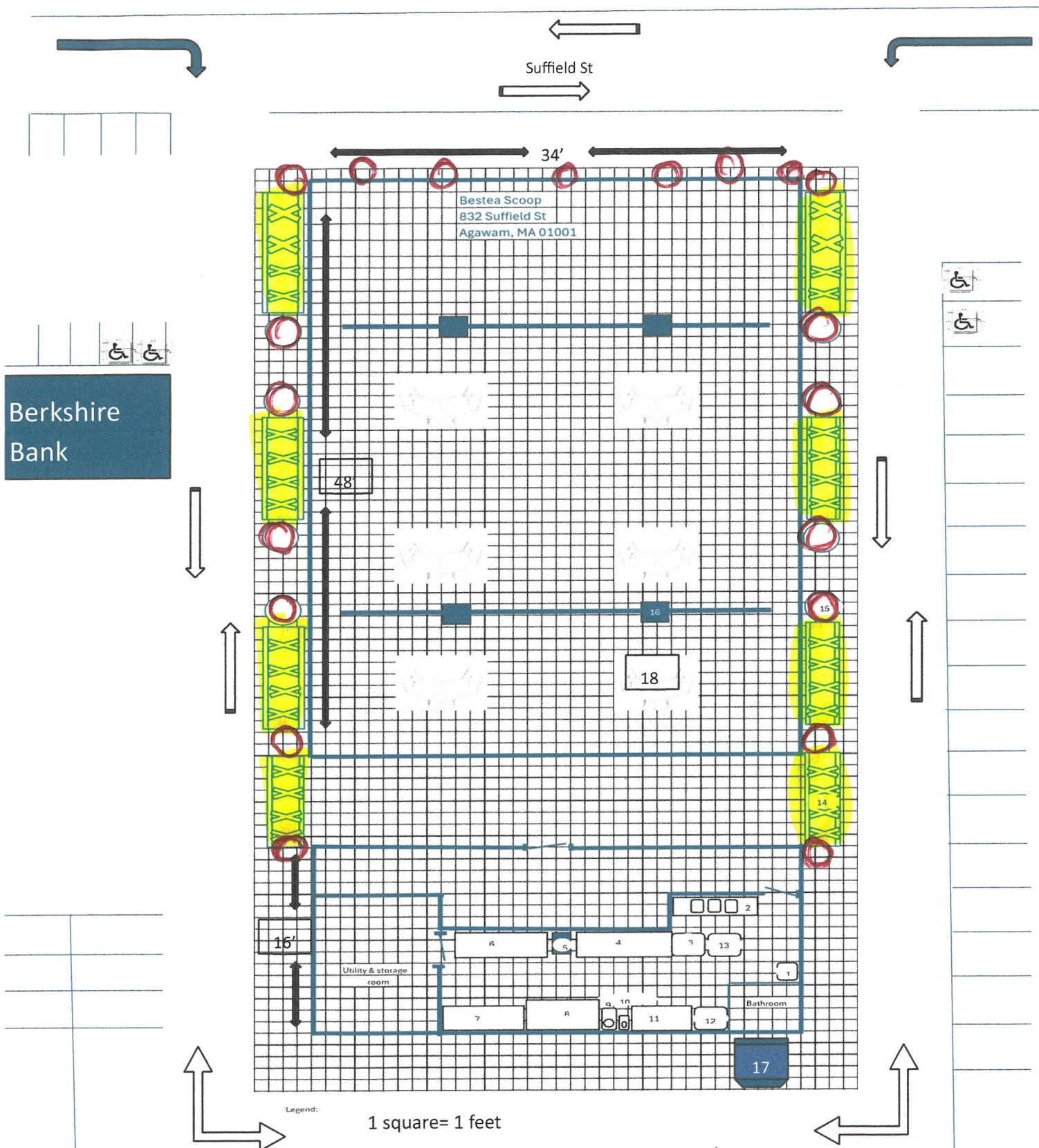
|                                                                                                                                                                                                                                                                                                                                           |                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| p. Current Use of Property                                                                                                                                                                                                                                                                                                                | VACANT - Former Pride Gas station                                                                   |
| q. Proposed Use of Property                                                                                                                                                                                                                                                                                                               | Ice Cream, Boba Tea Shop                                                                            |
| r. Project Description                                                                                                                                                                                                                                                                                                                    |                                                                                                     |
| Change of use. Create outdoor seating areas.                                                                                                                                                                                                                                                                                              |                                                                                                     |
| s. I have attached additional narrative, plans or supporting materials<br>(any oversize plans should also be included in an 8.5 x 11" format)                                                                                                                                                                                             | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 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.<br>If so, <u>CONSERVATION COMMISSION</u> review is required.                                                                                                                                     | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unsure |
| u. The following projects shall be required to comply with the requirements of a <u>STORM DRAIN PERMIT</u> :<br>[1] Any alteration to sites on parcels of one acre or greater.<br>[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. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unsure |
| v. The project will affect at least one of the following; additional gross floor area by 2,000 square feet, <u>any change of use</u> , changes to parking and/ or curb cuts.                                                                                                                                                              | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No                                 |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>4) CERTIFICATION</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |
| <p>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.</p> |               |
| Signature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Date 05-29-25 |
| <input type="checkbox"/> Applicant <input type="checkbox"/> Applicant's Representative                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |               |

| ZONING DETERMINATION - OFFICE USE ONLY                                                                                                                                                                                                                          |                                                                                                                                                 |                                                                                                                                         |                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Approved <input type="checkbox"/> Denied: <input type="checkbox"/> The proposed use is not permitted in the subject zoning district<br><input type="checkbox"/> Only permissible with variance relief from the Zoning Board of Appeals |                                                                                                                                                 |                                                                                                                                         |                                                                                                                                          |
| <input checked="" type="checkbox"/> Approved <b>Pending additional approval:</b>                                                                                                                                                                                |                                                                                                                                                 |                                                                                                                                         |                                                                                                                                          |
| Per Zoning Ordinance Section(s)                                                                                                                                                                                                                                 | Required Permit(s)                                                                                                                              | Approval Required                                                                                                                       | Permitting Authority                                                                                                                     |
| 180-13-B                                                                                                                                                                                                                                                        | <input type="checkbox"/> Building Permit(s)<br><input type="checkbox"/> Electrical Permit(s)<br><input type="checkbox"/> Plumbing/Gas Permit(s) | <input type="checkbox"/> Special Permit(s)<br><input checked="" type="checkbox"/> Site Plan Review<br><input type="checkbox"/> Variance | <input checked="" type="checkbox"/> Planning Board<br><input type="checkbox"/> Board of Appeals<br><input type="checkbox"/> City Council |
| Town Building Official                                                                                                                                                                                                                                          | Issue Date                                                                                                                                      |                                                                                                                                         | 5/29/2025                                                                                                                                |

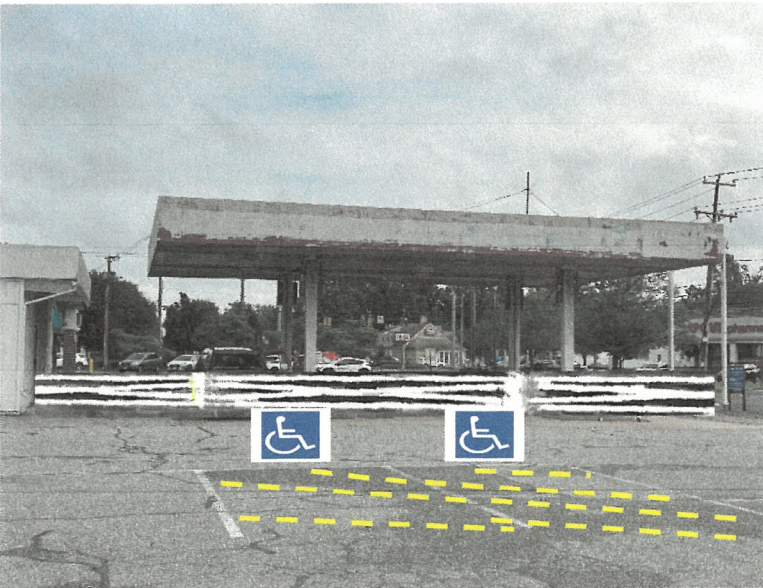
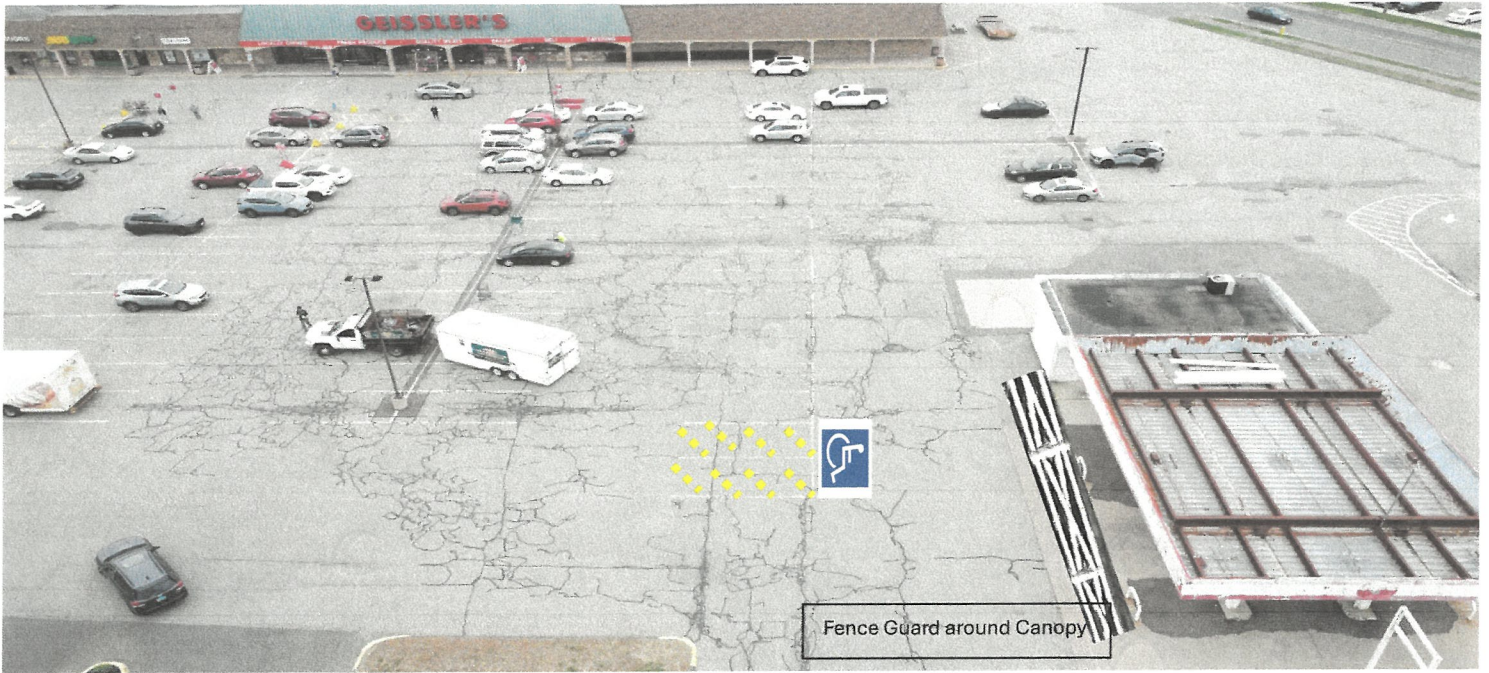
This determination may be appealable to the Zoning Board of Appeals under the provisions of MGL Ch. 40A Sec. 8.  
Revised 09/08/2022





42" wooden guard barrier every foot with concrete ballards every six feet.







- 1- Mop sink
- 2- 3 bay sink
- 3- SoftServe machine
- 4- Ice cream dipping cabinet
- 5- Cash register
- 6- Ice cream dipping cabinet
- 7- Worktop refrigerator
- 8- Prep refrigerator
- 9- Blender station

- 10- Hand sink
- 11- Worktop refrigerator
- 12- Reach-in Freezer
- 13- Ice Maker
- 14- Fence guards
- 15- Flower pot with bend sitting
- 16- Canopy column
- 17- Trash can/dumpster
- 18- Metal picnic tables

Avantco A-19F-HC 29" Solid Door Reach-In Freezer

Avantco SS-WT-60R-HC 60" Two Door Worktop Refrigerator with 3 1/2" Backsplash

Avantco SS-WT-48R-HC 48" Two Door Worktop Refrigerator with 3 1/2" Backsplash

Avantco APT-60M-HC 60" 2 Door Mega Top Refrigerated Sandwich Prep Table

Avantco CPSS-68-HC 67 3/4" 12 Tub Stainless Steel Deluxe Ice Cream Dipping

Avantco Ice KMC-F-322-A 22" Air Cooled Modular Full Cube Ice Machine with 275 lb.

Vitamix 068255 T&G Advance Blending Station 2.3 hp Blender with Cover and 32 oz.

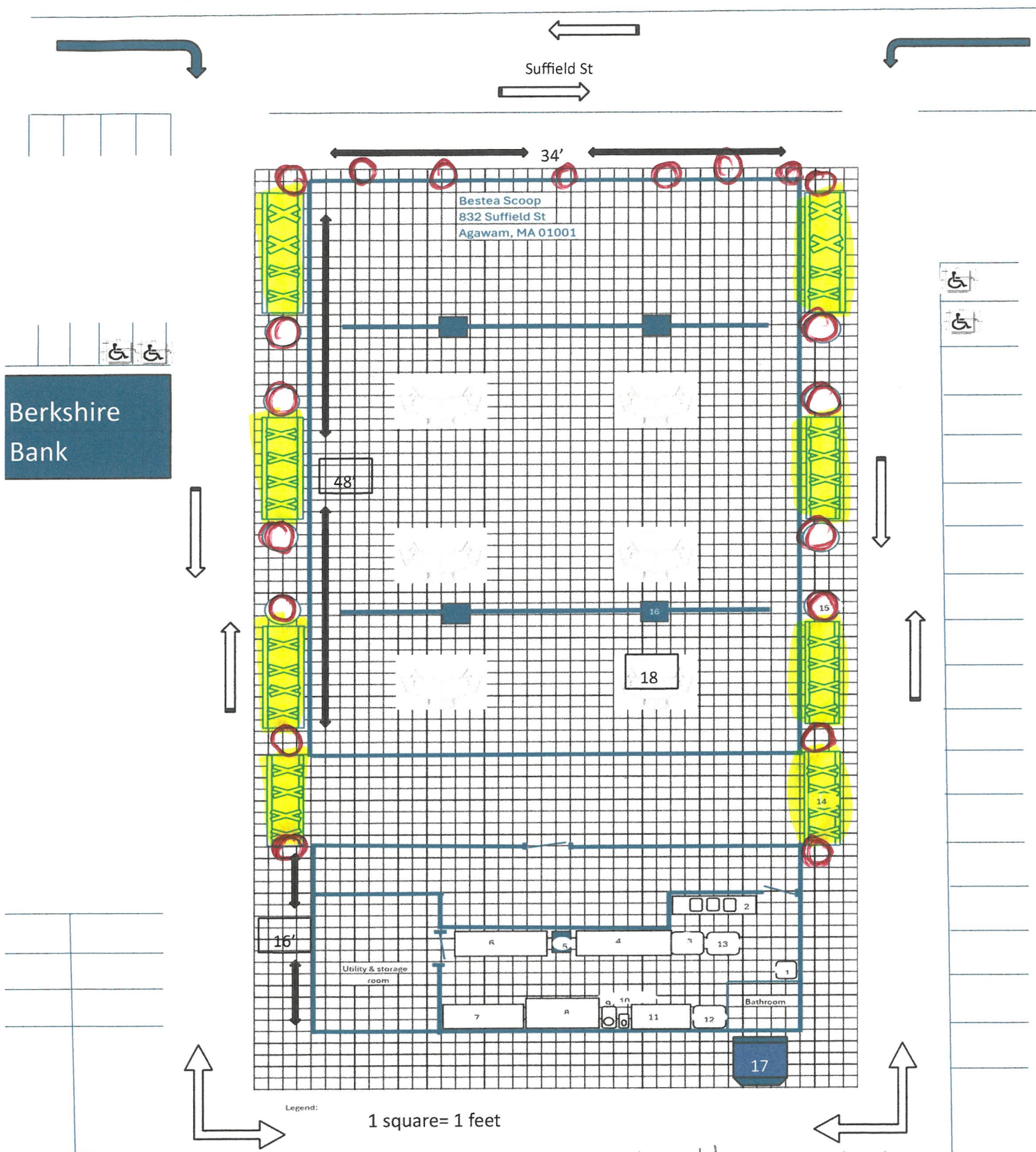
Regency 18" x 23" Stainless Steel Blender Station with Dump Sink and Faucet

Regency 9" x 9" x 5" Wall-Mounted Hand Sink with 4" Centers, Side Splash, and Strainer

Regency 70" 16 Gauge Stainless Steel Three Compartment Sink with Galvanized Steel Legs and Two Drainboards - 14" x 16" x 12" Bowls

Steelton 16" x 20" x 6" 16 Gauge 304 Stainless Steel One Compartment Floor Mop Sink

Regency 7" Ice Cream Dipper Well and Faucet Set



42" - wooden quard barrier every feet with concrete ballards every six feet.



# TOWN OF AGAWAM, MASSACHUSETTS

## FORM A

### Application for Endorsement of Plan Not Believed to Require Approval

FILE ONE COMPLETED FORM WITH THE PLANNING BOARD AND ONE COPY WITH THE TOWN CLERK IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 11-B

MAY 6 2025

TO THE PLANNING BOARD:

The undersigned, believing that the accompanying plan of his property in the Town of Agawam does not constitute a subdivision within the meaning of the Subdivision Control Law, herewith submits said plan for a determination and endorsement that Planning Board approval under the Subdivision Control Law is not required.

1. Name of Applicant MR. JEROME RICHARD  
Address 643 MILL ST., AGAWAM, MA 01030  
Phone # 413-564-5537 Fax # \_\_\_\_\_ email jerry251dex@gmail.com
2. Name of Surveyor MARCE SHUTE, P.L.S. - R LEVESQUE ASSOCIATES  
Address 40 SCHOOL ST, WESTFIELD, MA 01085  
Phone # 413-568-0985 Fax # \_\_\_\_\_ email joel@rl2land.com
3. Deed of Property Recorded in HAMPDEN COUNTY REGISTRY OF DEEDS  
Book 25685 Page 64
4. Location of Property PROPERTY IS LOCATED ON THE SOUTHERLY SIDE OF MILL ST.,
5. Describe the proposal in this submission: ACROSS FROM THE INTERSECTION OF  
MILL ST AND KENSINGTON ST.

THIS ANR PLAN HAS BEEN PREPARED TO CREATE 2 PARCELS OF LAND (LOTS A+B) AT THE NORTHEASTERLY CORNER OF PARCEL 2 IN DEED BOOK 25685 PAGE 64.

**ATTACHMENTS - Two originals and three copies of plan by certified land surveyor. Filing Fee - \$50.00 plus \$20.00 per lot.**

Signature of Owner

Jerome Richard

Address

643 mill street  
Freezing Hills, MA 01030



**Town of Agawam**  
***Inspection Services Department***  
1000 Suffield Street, Agawam, Massachusetts 01001  
Telephone - (413) 821-0632

Kevin Duquette  
Inspector of Buildings  
inspections@agawam.ma.us

May 28, 2025

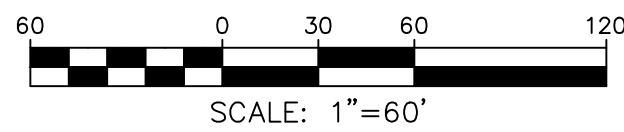
To: Office of Planning and Community Development:

Re: Form-A Review Comments for 643 Mill Street Feeding Hills, MA 01030;

Inspection Services has no zoning issues or concerns for the proposed Form A- ANR revised plan dated 5/15/2025 for the above referenced address.

Respectfully,

Kevin Duquette  
Kevin Duquette  
Inspector of Buildings  
Town of Agawam



Professional Land Surveyor



This Planning Board Endorsement does not imply compliance with the Massachusetts Wetlands Protection Act or Zoning By-law.

Date: \_\_\_\_\_

1. THE RECORD OWNER OF THE SUBJECT PARCEL IS JEROME RICHARD. SEE HAMPDEN COUNTY REGISTRY OF DEEDS BOOK 25685 PAGE 64.
2. SEE ALSO, HAMPDEN COUNTY REGISTRY OF DEEDS:  
PLAN BOOK 28 PAGES 64-69  
PLAN BOOK 35 PAGE 50  
PLAN BOOK 337 PAGE 32  
PLAN BOOK 373 PAGE 56  
PLAN BOOK 374 PAGE 58  
PLAN BOOK 374 PAGE 94  
PLAN BOOK 382 PAGE 75  
PLAN BOOK 403 PAGE 8
3. THE EXISTING CONDITIONS INFORMATION SHOWN IS BASED UPON A SURVEY PERFORMED BY R LEVESQUE ASSOCIATES, INC. BETWEEN 11-11-2024 AND 11-13-2024.
4. THE UNDERGROUND UTILITIES SHOWN HEREON HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION, AVAILABLE RECORD DATA, AND THE TOWN OF AGAWAM WEB GIS. 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 THE EXACT LOCATION INDICATED, ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM AVAILABLE INFORMATION.
5. 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.

Agawam Planning Board

May 6, 2025 Scale: 1"=60'  
Rev: May 15, 2025

Prepared By

**RLA**  
**R LEVESQUE ASSOCIATES, INC**  
**40 School Street**  
**P.O. Box 640**  
**Westfield, MA 01086**

SYMBOL & LINE LEGEND

- STONE BOUND FOUND  
 ○ IRON PIN FOUND  
 ● IRON PIN TO BE SET  
 ① EXISTING DRAIN MANHOLE  
 — SD — SD — EXISTING STORM DRAIN

RLA Job No. 2409II

Calabrese Construction, LLC  
7 Brewster Rd.  
West Springfield, MA 01089  
413 478-0761

May 29, 2025

To: The Agawam Planning Board

I, Charles Calabrese am asking for an extension on the bond I have on Samuel St. in town for four months.

Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read "Charles Calabrese", with a stylized flourish at the end.

Charles Calabrese  
Calabrese Construction LLC



Site Plans

# Proposed Contractor Buildings

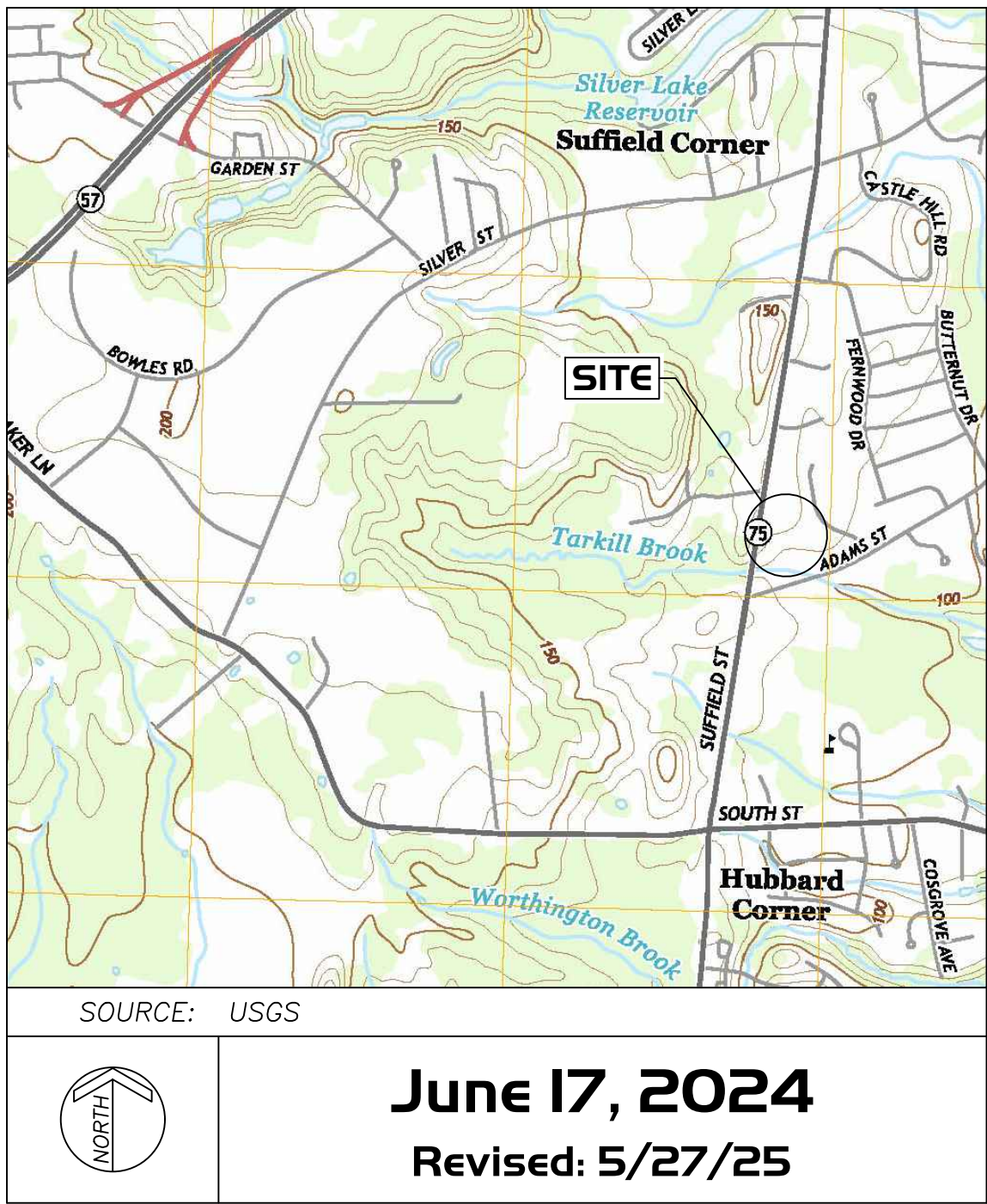
6 Ace Precision Way (Lot 3 / Assessor's Parcel: 16-2-27)  
& 24 Ace Precision Way (Lot 2 / Assessor's Parcel: 16-2-14)  
Agawam, MA 01001

AS PREPARED FOR  
TGE Realty LLC  
c/o Mr. Sadiq Elias  
53 Cecile Street  
Agawam, MA 01001

| ZONING REVIEW - Business B (BB) |                       |                  |                  |
|---------------------------------|-----------------------|------------------|------------------|
| TYPE (MINIMUM)                  | REQUIRED              | PROPOSED (LOT 2) | PROPOSED (LOT 3) |
| LOT AREA                        | 10,000 SQ FT          | 72,080 SQ FT     | 79,170 SQ FT     |
| FRONTAGE                        | 100 FT                | 100 FT           | 275 FT           |
| FRONT YARD                      | 35 FT                 | 126 FT           | 69 FT            |
| SIDE YARD                       | 10 FT <sup>1</sup>    | 33 FT            | 18 FT            |
| REAR YARD                       | 35 FT                 | 84 FT            | 161 FT           |
| BUILDING HEIGHT (MAX)           | 45 FT                 | 21 FT            | 21 FT            |
| BUILDING STORIES (MAX)          | 3                     | 1                | 1                |
| BUILDING COVERAGE (MAX)         | 50%                   | 13.3%            | 9.1%             |
| PARKING <sup>2</sup>            | LOT 2: 24 / LOT 3: 18 | 24 SPACES        | 33 SPACES        |

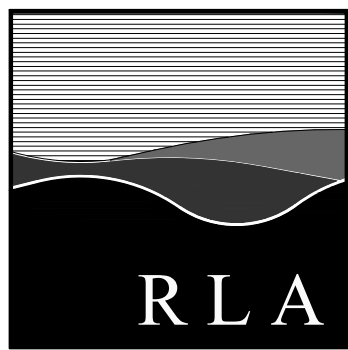
<sup>1</sup> SIDE YARD REQUIREMENTS SHALL BE A MINIMUM OF 10 FEET, EXCEPT ADJACENT TO RESIDENTIAL OR AGRICULTURAL ZONES, AT WHICH TIME IT WOULD BE 15 FEET

<sup>2</sup> REQUIRED PARKING BASED ON TOWN OF AGAWAM PARKING GUIDELINES:  
SERVICE INDUSTRIAL BUILDING: ONE (1) PARKING SPACE FOR EACH FIVE HUNDRED (500) SQUARE FEET OF GROSS FLOOR AREA



| DRAWING INDEX |                                                |            |               |
|---------------|------------------------------------------------|------------|---------------|
| SHEET NO.     | SHEET NAME                                     | ISSUE DATE | REVISION DATE |
| T-1           | TITLE SHEET                                    | 6/17/24    | 5/27/25       |
| EX-1          | EXISTING CONDITIONS PLAN                       | 6/17/24    | 7/3/24        |
| C-1           | NOTES, SYMBOL & LINE LEGEND, AND ABBREVIATIONS | 6/17/24    |               |
| C-2           | CONSTRUCTION NOTES                             | 6/17/24    |               |
| C-3           | DEMOLITION AND REMOVALS PLAN                   | 6/17/24    |               |
| C-4           | LAYOUT AND MATERIALS PLAN                      | 6/17/24    | 7/3/24        |
| C-5           | GRADING, EROSION & SEDIMENTATION CONTROL PLAN  | 6/17/24    | 7/3/24        |
| C-6           | DRAINAGE AND UTILITIES PLAN                    | 6/17/24    | 7/3/24        |
| C-7           | LANDSCAPING PLAN                               | 6/17/24    | 5/27/25       |
| L-1B          | PHOTOMETRIC PLAN                               | 6/17/24    |               |
| D-1           | DETAILS                                        | 6/17/24    |               |
| D-2           | DETAILS                                        | 6/17/24    |               |
| D-3           | DETAILS                                        | 6/17/24    |               |

BY

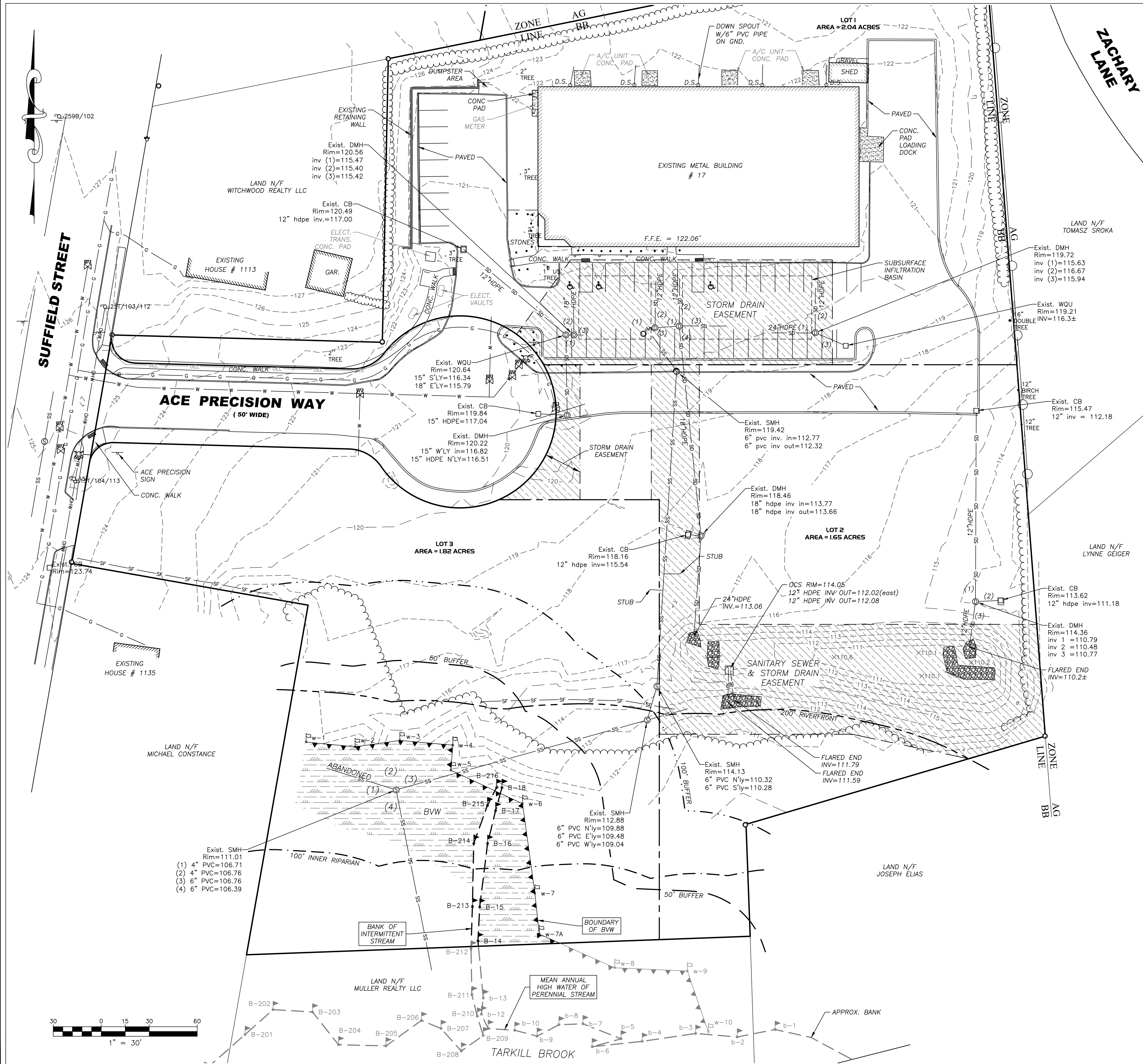


R LEVESQUE ASSOCIATES INC

A LAND PLANNING SERVICES COMPANY

40 School Street · Westfield, MA · 01085  
ph 413.568.0985 · fax 413.568.0986  
www.rlaland.com



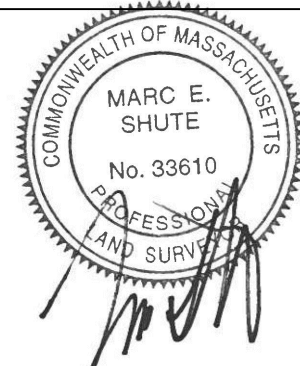


#### NOTES

- THE RECORD OWNER OF THE SUBJECT PARCEL IS TGE REALTY LLC. SEE HAMPDEN COUNTY REGISTRY OF DEEDS BOOK 15732 PAGE 189.
- THE PROPERTY LINES SHOWN HEREON ARE BASED UPON A PLAN TITLED, "DEFINITIVE SUBDIVISION PLAN" PREPARED BY R.LEVESQUE ASSOCIATES ASSOCIATES INC, DATED FEB. 2018. SEE HAMPDEN COUNTY REGISTRY OF DEEDS BOOK OF PLANS 385 PAGE 127.
- 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.
- THIS PLAN HAS BEEN PREPARED FOR SITE PLANNING PURPOSES AND SHALL NOT BE USED FOR THE CONVEYANCE OF LAND OR FOR ANY OTHER USE.
- SUBJECT LOT AREAS LOT 1 2.04 ACRES, LOT 2 1.65 ACRES AND LOT 3 1.82 ACRES
- 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.
- WETLANDS AND M.A.H.W. DELINEATED BY R. LEVESQUE ASSOCIATES INC. IN MAY 2017.
- THE EXISTING CONDITIONS INFORMATION SHOWN IS BASED UPON A TOPOGRAPHIC SURVEY PERFORMED BY R LEVESQUE ASSOCIATES, INC. IN JUNE 2024.
- THE UNDERGROUND UTILITIES SHOWN HEREON HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION, AVAILABLE RECORD DATA, TOWN OF AGAWAM GIS. R. LEVESQUE ASSOCIATES 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.
- ADJACENT PROPERTY LINES AND ABUTTERS SHOWN HEREON ARE REFERENCED FROM THE TOWN OF AGAWAM GIS MAPPING.
- SUBJECT PARCEL IS ZONED BB ACCORDING TO THE TOWN OF AGAWAM GIS ZONING MAP.
- THE SUBJECT PARCEL IS NOT LOCATED WITHIN A SPECIAL FLOOD ZONE AREA ACCORDING TO FLOOD INSURANCE INTERACTIVE FLOOD MAP: NO MAP PRINTABLE.
- THE SUBJECT PROPERTY IS NOT LOCATED WITHIN NATURAL HERITAGE & ENDANGERED SPECIES PROGRAM (NHESP) JURISDICTION.

#### EXISTING CONDITIONS PLAN

LOT 1, 17 ACE PRECISION WAY  
LOT 2, 24 ACE PRECISION WAY  
LOT 3, 6 ACE PRECISION WAY  
Parcel ID 16-2-26, 16-2-27, 16-2-14  
AGAWAM MA.



PREPARED FOR:

ACE PRECISION INC.  
17 ACE PRECISION WAY  
AGAWAM MA.

ISSUANCE DATE: June 17, 2024

| REVISIONS:                        | DATE:  |
|-----------------------------------|--------|
| A. Labels and utility stubs added | 7/3/24 |

DRAFTED BY: J.T. & T.A.

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

SCALE: As Noted

RLA PROJ. NUMBER: 240316

| DRAWING# | REV. |
|----------|------|
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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 SWEEPED 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

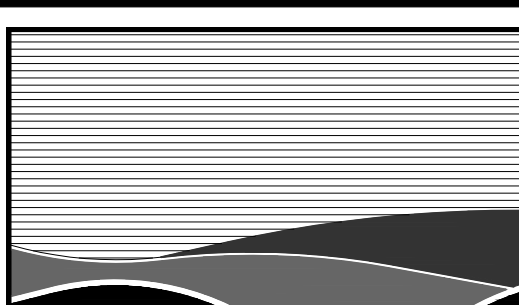
- GENERAL:
1. ALL FILL MATERIAL IS TO BE IN PLACE, AND COMPACTED BEFORE INSTALLATION OF PROPOSED UTILITIES.
  2. TOPS OF EXISTING MANHOLES SHALL BE SET EQUAL TO FINISH GRADE. IN GRASSED LANDSCAPED AREAS WITH WATER TIGHT LIDS.
  3. ALL CONCRETE FOR ENCASEMENTS SHALL HAVE A MINIMUM 28 DAY COMPRESSION STRENGTH 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 HARDNESS 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.



**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**

**CONSTRUCTION NOTES**

**Proposed Contractor Buildings  
6 Ace Precision Way & 24 Ace Precision Way  
Agawam, MA 01001**



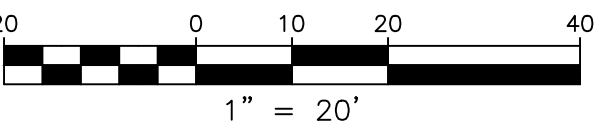
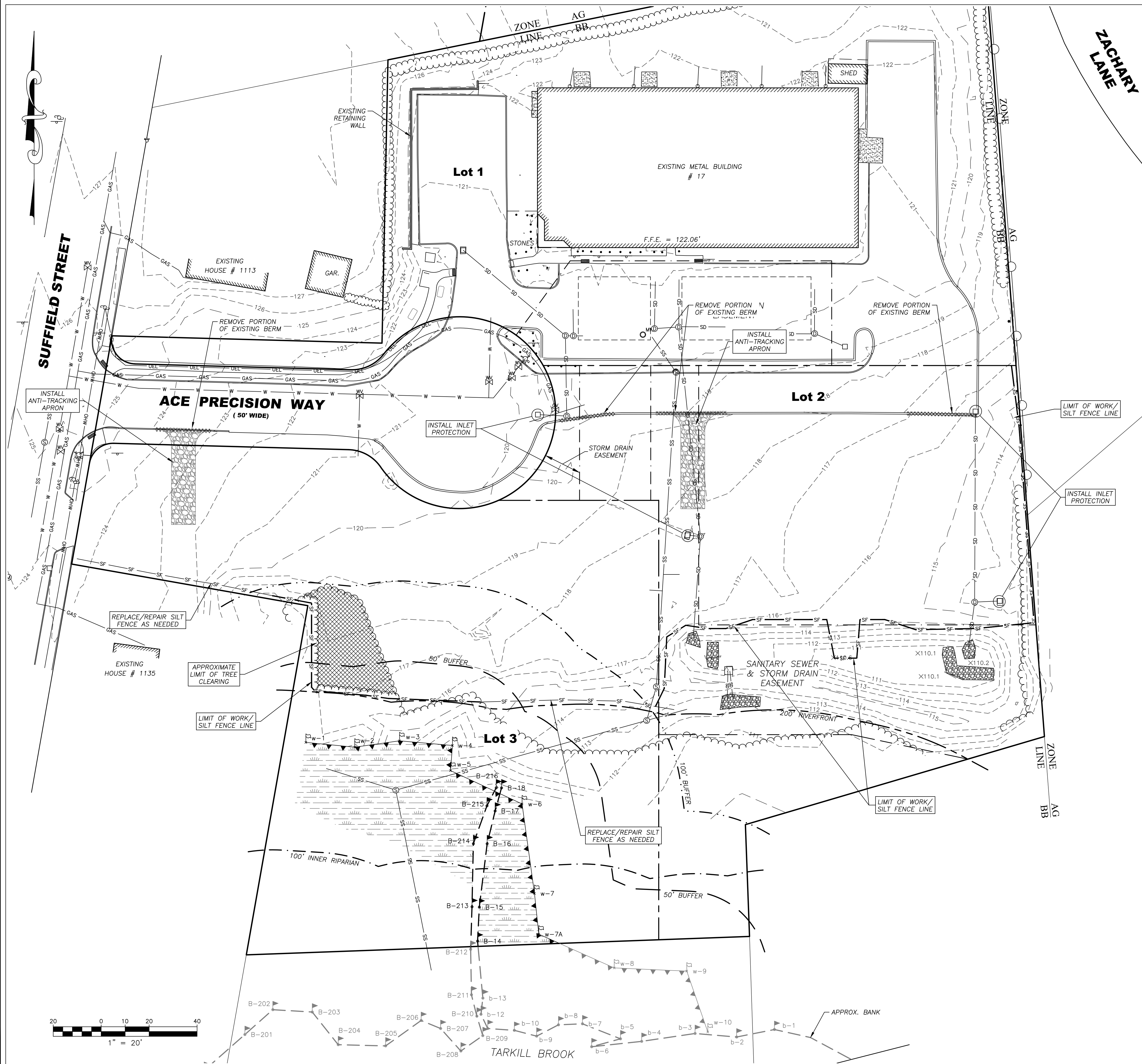
**PREPARED FOR:**

TGE Realty LLC  
c/o Mr. Sadiq Elias  
53 Cecile Street  
Agawam, MA 01001

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| <b>ISSUANCE DATE:</b> June 17, 2024                                                |              |
| <b>REVISIONS:</b>                                                                  | <b>DATE:</b> |
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| <b>DRAFTED BY:</b> J.T.                                                            |              |
| UNAUTHORIZED ALTERATION OF THIS DOCUMENT IS A VIOLATION OF MASSACHUSETTS STATE LAW |              |
| <b>SCALE:</b> As Noted                                                             |              |
| <b>RLA PROJ. NUMBER:</b> 240316                                                    |              |
| <b>DRAWING#</b>                                                                    | <b>REV.</b>  |
| <b>C-2</b>                                                                         | <b>-</b>     |

PERMITTING  
NOT FOR CONSTRUCTION





#### 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. 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. CONTACT THE TOWN OF AGAWAM AT LEAST FORTY-EIGHT HOURS PRIOR TO COMMENCEMENT OF ANY DEMOLITION, CONSTRUCTION, OR EARTHWORK ACTIVITY ON THIS PROJECT.
3. CONSTRUCT ANTI-TRACKING PAD AT ENTRANCE AND INSTALL ANY REQUIRED INLET PROTECTION AS DEPICTED ON THE PLAN.
4. INSTALL SILT FENCE AS SHOWN ON THE PLANS.
5. PRIOR TO THE START OF CONSTRUCTION AND/OR CLEARING OF THE SITE, THE CONTRACTOR SHALL CONTACT THE AGAWAM DPW ENGINEERING DIVISION TO INSPECT AND APPROVE THE INSTALLATION OF THE EROSION AND SEDIMENT CONTROL MEASURES.
6. 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.
7. COMMENCE EARTHWORK BY EXCAVATING FOR THE CUT/FILL SLOPES AS SHOWN ON THE PLANS. STABILIZE/SEED ANY SLOPES THAT HAVE ACHIEVED FINAL GRADE.
8. INSTALL UTILITIES AS SHOWN ON PLANS INCLUDING WATER SERVICE, SEWER SERVICE, GAS SERVICE, ELECTRICAL SERVICE AND STORMWATER MANAGEMENT SYSTEM.
9. GRADE THE SITE TO ACCEPT PAVEMENT SECTION MATERIALS.
10. INSTALL PAVEMENT AS SPECIFIED ON THE PLANS.
11. UPON INSTALLATION OF PAVEMENT SURFACE, INSTALL INLET PROTECTION AS REQUIRED ON ANY NEW INLET STRUCTURES.
12. FINAL GRADING AND STABILIZATION OF ANY REMAINING EXPOSED AREAS.
13. AT THE DIRECTION OF THE TOWN OF AGAWAM, EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED.

**PERMITTING**  
NOT FOR CONSTRUCTION

**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

**DEMOLITION & REMOVALS PLAN**  
Proposed Contractor Buildings  
6 Ace Precision Way & 24 Ace Precision Way  
Agawam, MA 01001

PREPARED FOR:  
TGE Realty LLC  
c/o Mr. Sadiq Elias  
53 Cecile Street  
Agawam, MA 01001

ISSUANCE DATE: June 17, 2024

| REVISIONS: | DATE: |
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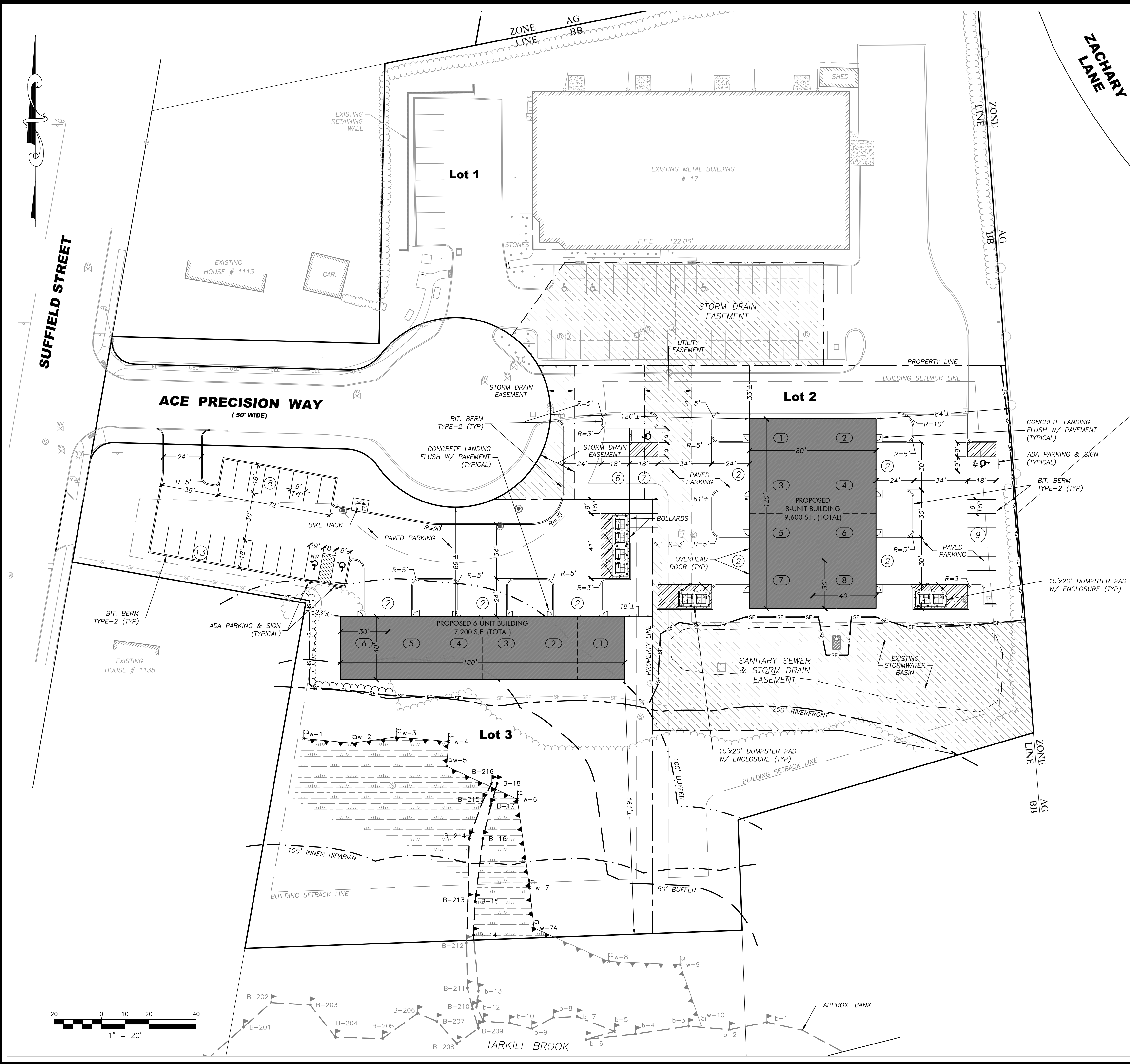
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SCALE: As Noted

RLA PROJ. NUMBER: 240316

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| ZONING REVIEW - Business B (BB) |                       |                  |                  |
|---------------------------------|-----------------------|------------------|------------------|
| TYPE (MINIMUM)                  | REQUIRED              | PROPOSED (LOT 2) | PROPOSED (LOT 3) |
| LOT AREA                        | 10,000 SQ FT          | 72,080 SQ FT     | 79,170 SQ FT     |
| FRONTAGE                        | 100 FT                | 100 FT           | 275 FT           |
| FRONT YARD                      | 35 FT                 | 126 FT           | 69 FT            |
| SIDE YARD                       | 10 FT <sup>1</sup>    | 33 FT            | 18 FT            |
| REAR YARD                       | 35 FT                 | 84 FT            | 161 FT           |
| BUILDING HEIGHT (MAX)           | 45 FT                 | 21 FT            | 21 FT            |
| BUILDING STORIES (MAX)          | 3                     | 1                | 1                |
| BUILDING COVERAGE (MAX)         | 50%                   | 13.3%            | 9.1%             |
| PARKING <sup>2</sup>            | LOT 2: 24 / LOT 3: 18 | 24 SPACES        | 33 SPACES        |

<sup>1</sup> SIDE YARD REQUIREMENTS SHALL BE A MINIMUM OF 10 FEET, EXCEPT ADJACENT TO RESIDENTIAL OR AGRICULTURAL ZONES, AT WHICH TIME IT WOULD BE 15 FEET  
<sup>2</sup> REQUIRED PARKING BASED ON TOWN OF AGAWAM PARKING GUIDELINES:  
SERVICE INDUSTRIAL BUILDING: ONE (1) PARKING SPACE FOR EACH FIVE HUNDRED (500) SQUARE FEET OF GROSS FLOOR AREA

- LAYOUT NOTES**
- SITE CONTRACTOR SHALL REFER TO REMAINING PLAN SET FOR INFORMATION REGARDING SITE LAYOUT.
  - IT SHALL BE THE SITE CONTRACTORS RESPONSIBILITY TO CROSS REFERENCE INFORMATION CONTAINED IN OTHER SHEETS WITH SITE INFORMATION SHOWN HEREON.
  - 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**
- 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".
  - STOP BARS SHALL BE 12" WIDE (WHITE).
  - ALL PARKING STALL LINES SHALL BE 4" WIDE (WHITE).
  - 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**
- ALL ACCESSIBLE ROUTES, TRANSITIONS, AND ACCESSIBLE PARKING/LOADING AREAS, INCLUDING ALL ENTRANCES TO BUILDING, SHALL ADHERE TO 521 CMR.
  - SHOULD THE ARCHITECT PROVIDE ADDITIONAL ENTRANCES OR MEANS OF EGRESS, ADDITIONAL ACCESSIBLE ROUTES MAY BE REQUIRED.
  - 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.
  - THE CONTRACTOR SHALL REVIEW IN DETAIL THE REQUIREMENTS OF 521 CMR AND SHALL BE RESPONSIBLE FOR CONFORMANCE WITH SAID REGULATIONS.

**PERMITTING**  
NOT FOR CONSTRUCTION

**R LEVESQUE ASSOCIATES INC**

Landscape Architects  
Civil Engineers - Land Surveyors  
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Westfield, MA 01085  
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**LAYOUT & MATERIALS PLAN**

**Proposed Contractor Buildings**  
**6 Ace Precision Way & 24 Ace Precision Way**  
**Agawam, MA 01001**

**PREPARED FOR:**

TGE Realty LLC  
c/o Mr. Sadiq Elias  
53 Cecile Street  
Agawam, MA 01001

**ISSUANCE DATE:** June 17, 2024

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| A. Roundtable review comments | 7/3/24 |
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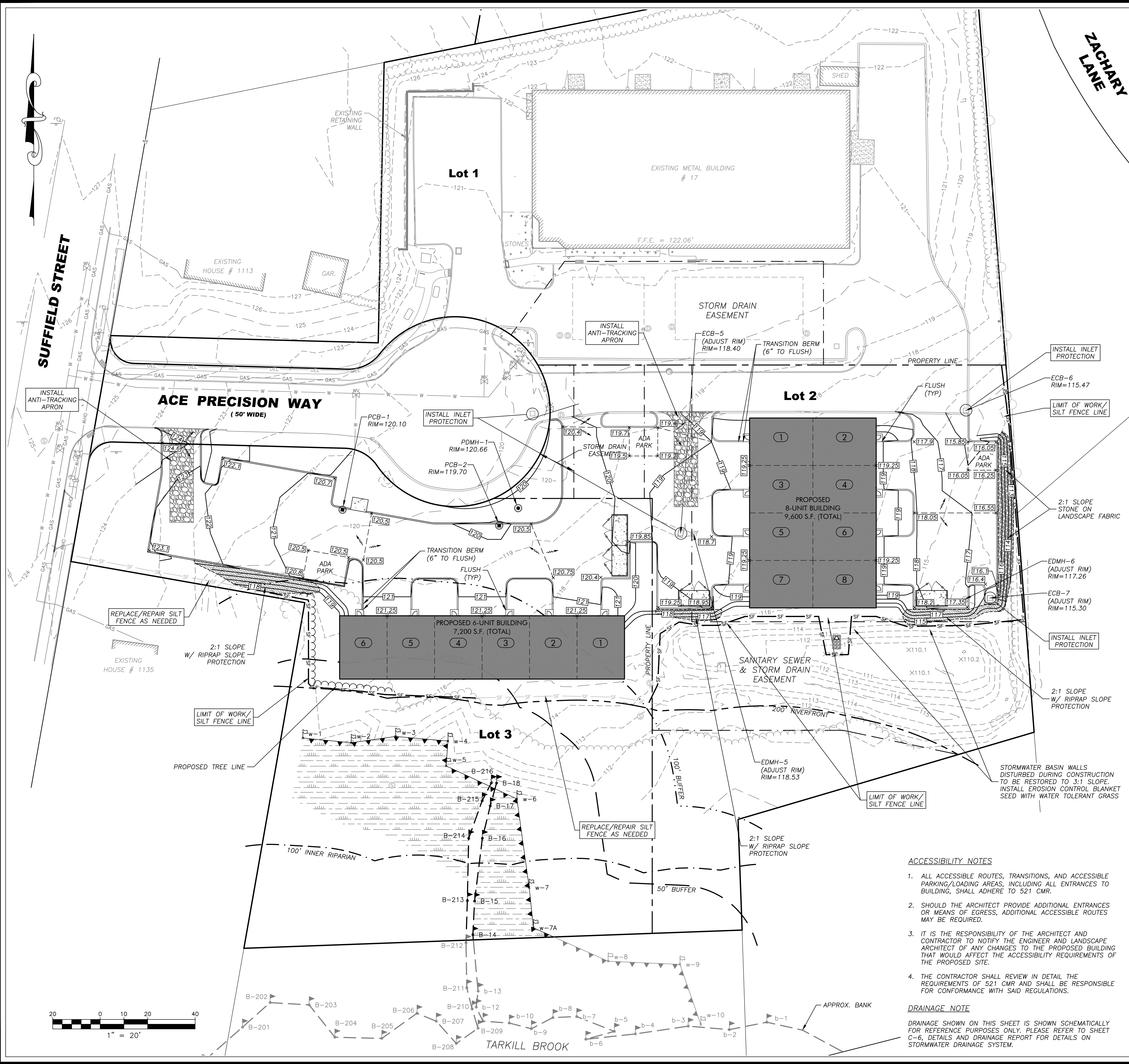
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**RLA PROJ. NUMBER:** 240316

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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 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/TOWN DEPARTMENT SPECIFICATIONS.

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 SEEDDED.
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. ALL LAYOUT WORK REQUIRED SHALL BE PERFORMED BY A LICENSED SURVEYOR OR ENGINEER EMPLOYED BY THE CONTRACTOR.
4. CONTRACTOR TO NOTIFY DIG SAFE A MINIMUM OF 72 HOURS PRIOR TO START OF CONSTRUCTION ACCORDING TO MA GENERAL LAWS.
5. APPROVED PLANS TO BE ON SITE AT ALL TIMES.
6. CHANGES TO THIS PLAN MAY OCCUR AS UNFORESEEN CONDITIONS ARISE. ALL CHANGES TO BE APPROVED BY DESIGN ENGINEER, FIELD INSPECTOR AND CITY/TOWN ENGINEER.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND SAFETY OF TRAFFIC ON THE PUBLIC AND PRIVATE WAYS AFFECTED BY THE CONSTRUCTION OF THIS PROJECT.
8. CONTRACTOR SHALL PROTECT ALL SLOPES, VEGETATION, PAVING, WALKS, AND IMPROVEMENTS OUTSIDE THE AREAS TO BE AFFECTED BY THE CONSTRUCTION OF THIS PROJECT.
9. TREES, BRUSH AND STUMPS REMOVED BY CLEARING AND GRUBBING OPERATIONS SHALL BE TRANSPORTED OFF THE PROJECT SITE TO AN APPROVED DISPOSAL LOCATION.
10. ALL PAVEMENT MARKINGS CHANGED, ALTERED OR REMOVED SHALL BE REAPPLIED.
11. ALL CONSTRUCTION METHODS TO CONFORM TO AGAWAM PLANNING BOARD REGULATIONS AND BOARD OF PUBLIC WORKS SPECIFICATIONS.
12. 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.
13. ALL CATCH BASINS TO HAVE 48" SEALED SUMPS AND HOODS.
14. EROSION CONTROL MEASURES TO BE IN PLACE PRIOR TO START OF CONSTRUCTION.

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.

DRAINAGE NOTE

DRAINAGE SHOWN ON THIS SHEET IS SHOWN SCHEMATICALLY FOR REFERENCE PURPOSES ONLY. PLEASE REFER TO SHEET C-6, DETAILS AND DRAINAGE REPORT FOR DETAILS ON STORMWATER DRAINAGE SYSTEM.

**RLA**  
**R LEVESQUE ASSOCIATES INC.**  
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40 School Street  
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**GRADING, EROSION & SEDIMENTATION CONTROL PLAN**  
**Proposed Contractor Buildings**  
**6 Ace Precision Way & 24 Ace Precision Way**  
**Agawam, MA 01001**

**MASSACHUSETTS**  
**REGISTERED LANDSCAPE ARCHITECT**  
**NO. 1386**  
**1/3/24**

**PREPARED FOR:**  
TGE Realty LLC  
c/o Mr. Sadiq Elias  
53 Cecile Street  
Agawam, MA 01001

**ISSUANCE DATE:** June 17, 2024  
**REVISIONS:**  
A. Roundtable review comments 7/3/24

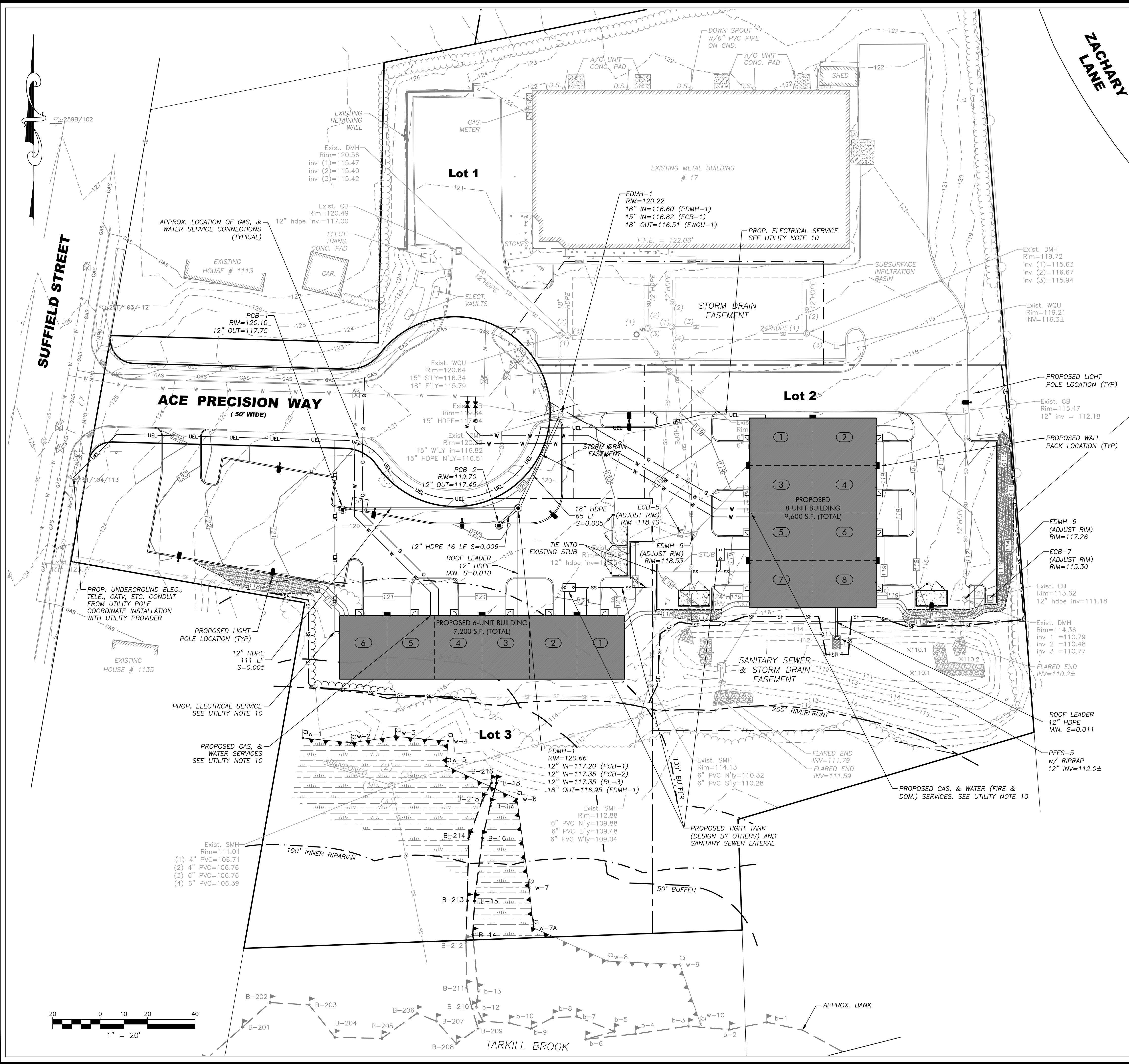
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UTILITY NOTES

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 PROPOONENT 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. CONTRACTOR SHALL NOTIFY DESIGNER/ENGINEER OF ANY UNEXPECTED CONDITIONS THAT ARE ENCOUNTERED DURING CONSTRUCTION.
8. 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.
9. ALL UTILITY CONSTRUCTION SHALL CONFORM TO THEIR RESPECTIVE TOWN DEPARTMENT SPECIFICATIONS.
10. PROPOSED UTILITY CONNECTIONS TO BUILDINGS ARE SHOWN SCHEMATICALLY. FINAL LOCATIONS AND SERVICE SIZES TO BE DETERMINED BASED ON BUILDING USE AND ARCHITECTURAL PLANS.

GRADING & DRAINAGE NOTES

1. SITE CONTRACTOR SHALL REFER TO REMAINING PLAN SET FOR INFORMATION REGARDING GRADING AND DRAINAGE.
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6. ALL UTILITY CONSTRUCTION SHALL CONFORM TO THEIR RESPECTIVE CITY/TOWN DEPARTMENT SPECIFICATIONS.

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. ALL LAYOUT WORK REQUIRED SHALL BE PERFORMED BY A LICENSED SURVEYOR OR ENGINEER EMPLOYED BY THE CONTRACTOR.
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.
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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.
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**DRAINAGE & UTILITIES PLAN**  
**Proposed Contractor Buildings**  
**6 Ace Precision Way & 24 Ace Precision Way**  
**Agawam, MA 01001**

**PREPARED FOR:**  
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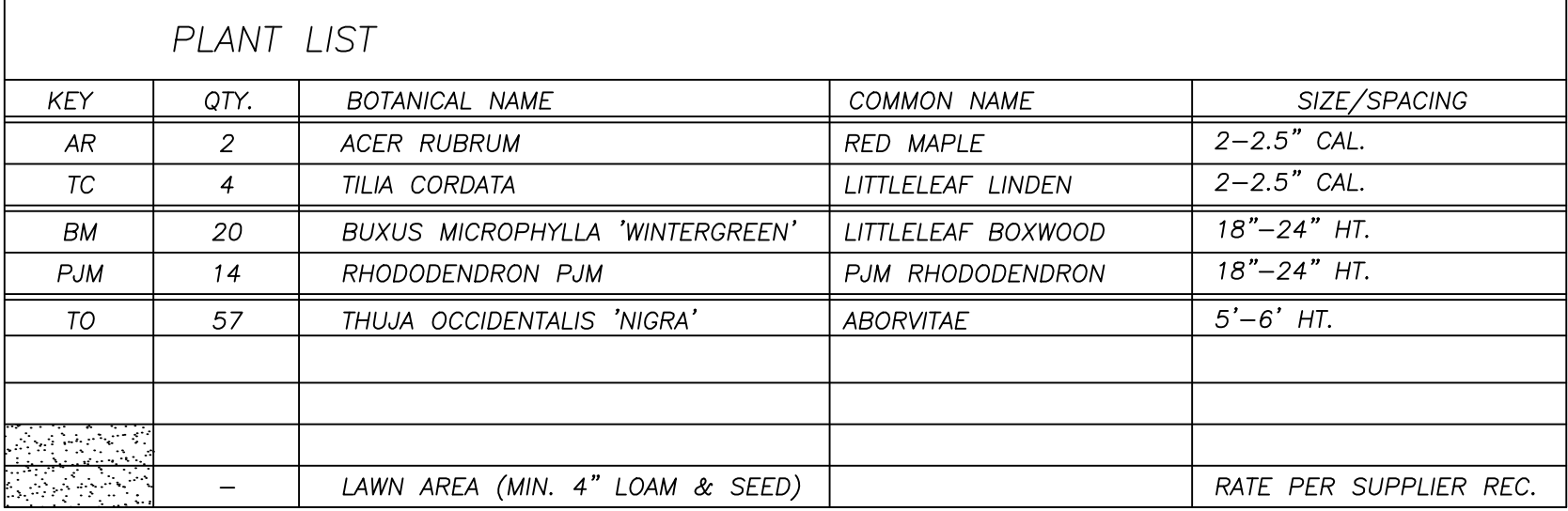
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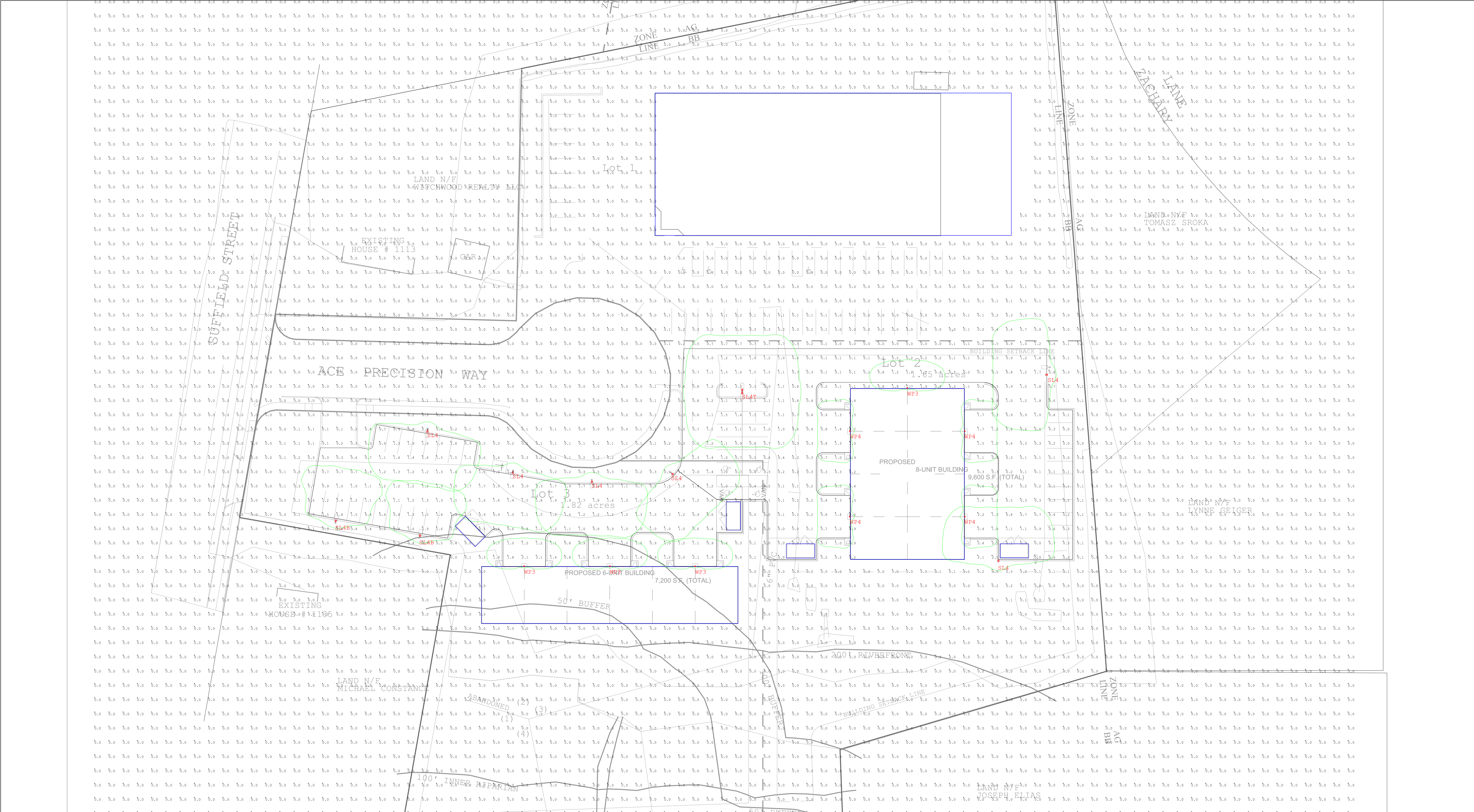


LANDSCAPE NOTES

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 FOREMENTIONED 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 HAVE LANDSCAPE ARCHITECT AND PROJECT PROPONENT IF ANY CONFLICTS ARISE AND STOP ALL WORK UNTIL CONFLICT IS RESOLVED.

**PERMITTING**  
**NOT FOR CONSTRUCTION**





| Luminaire Schedule |       |       |             |       |                                                                                 |
|--------------------|-------|-------|-------------|-------|---------------------------------------------------------------------------------|
| Qty                | Label | Watts | Arrangement | LLF   | Description                                                                     |
| 2                  | SL4B  | 39.1  | SINGLE      | 0.900 | Beacon VP-ST-1-36L-39-3K7-4W-UNV-A-x-BC / SHD-1-HSS-90-B / Mounted to 16ft Pole |
| 4                  | WP3   | 15    | SINGLE      | 0.900 | EXO LNC2-48L-15-3K7-3-UNV-x / Mounted at 10ft AFG                               |
| 4                  | WP4   | 15    | SINGLE      | 0.900 | EXO LNC2-48L-15-3K7-4W-UNV-x / Mounted at 10ft AFG                              |
| 6                  | SL4   | 39.1  | SINGLE      | 0.900 | Beacon VP-ST-1-36L-39-3K7-4W-UNV-A-x / Mounted to 16ft Pole                     |
| 1                  | SL4T  | 39.1  | BACK-BACK   | 0.900 | (2 HEADS) Beacon VP-ST-1-36L-39-3K7-4W-UNV-A-x / Mounted to 16ft Pole           |

| Calculation Summary |       |      |     |     |         |         |
|---------------------|-------|------|-----|-----|---------|---------|
| Label               | Units | Avg  | Max | Min | Avg/Min | Max/Min |
| CalcPts_1           | Fc    | 0.06 | 2.5 | 0.0 | N.A.    | N.A.    |
| BEYOND PROP LINES   |       |      |     |     |         |         |
| LOT 2               | Fc    | 0.76 | 2.5 | 0.0 | N.A.    | N.A.    |
| LOT 3               | Fc    | 1.27 | 2.3 | 0.3 | 4.23    | 7.67    |

Project:  
24155 - 1123 SUFFIELD ST

Contact:  
Liza Tuttle  
Specifacaiton Sales  
(860) 751-4388  
ltuttle@illuminatene.com

**illuminate**  
44 Sixth Road  
Woburn, MA 01801  
(781) 935-8500  
333 Pleasant Valley Road  
South Windsor, CT 06074  
(860) 282-0597

Detail: Photometric Calculation  
Date: 6/17/2024  
Revision:D  
Scale: 1" = 30'-0"  
Drawn By: AJS

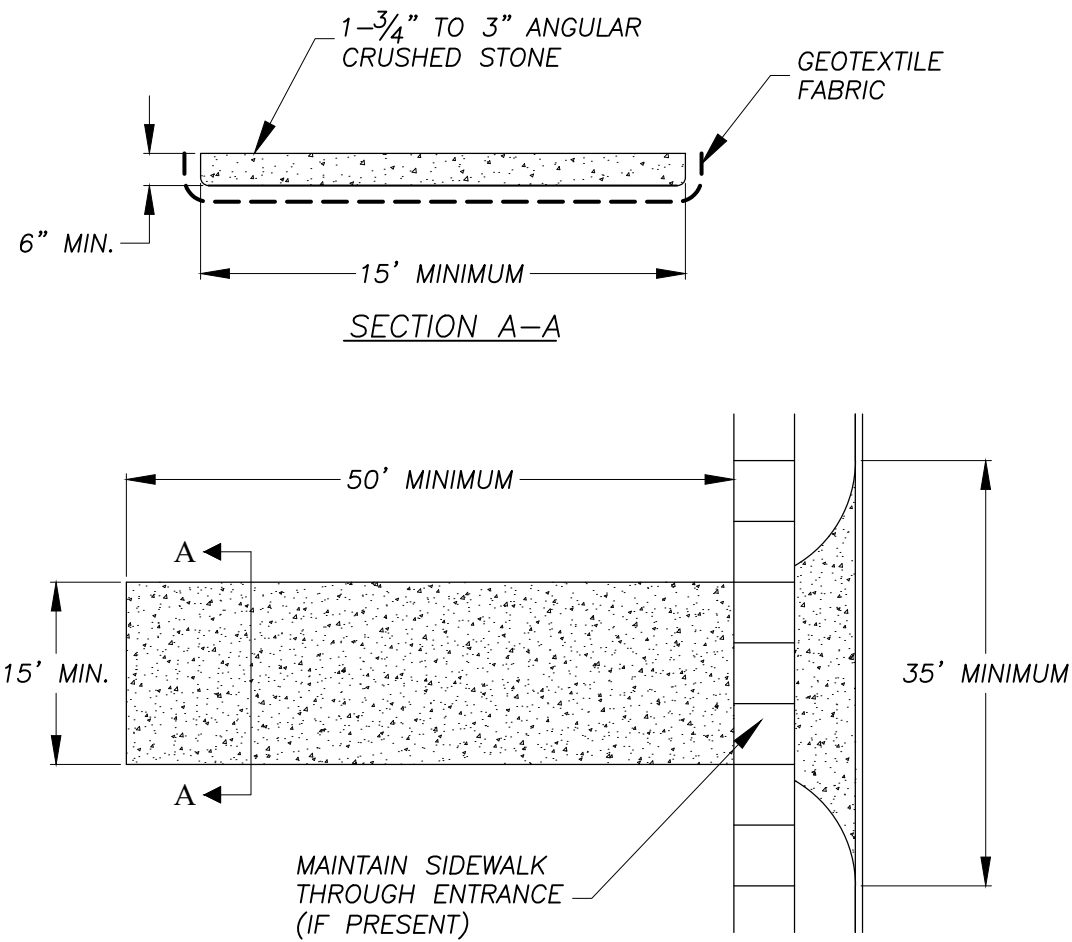
Drawing Number:

L-1B

Sheet 1 of 1



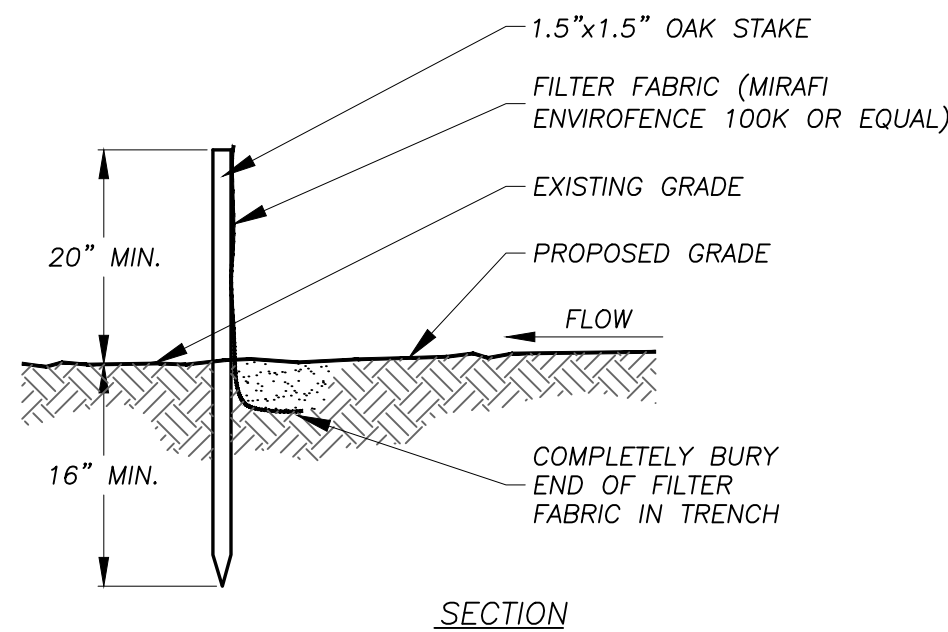
S:\Projects\2024\240316 - Elias - 1123 Suffield St., Agawam\05 Civil 3D\240316 - SITE.dwg



- 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. PLACE GEOTEXTILE OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
  4. ANY SEDIMENT TRACKED INTO THE ROADWAY NEEDS TO BE CLEANED IMMEDIATELY.
  5. ADDITIONAL STONE IS TO BE ADDED TO THE PAD AS NEEDED TO MAINTAIN THE ORIGINAL DEPTH.
  6. ANY SIDEWALK DAMAGED DURING CONSTRUCTION MUST BE REPLACED AT THE CONTRACTORS/DEVELOPERS EXPENSE.
  7. SIDEWALK MUST REMAIN PASSABLE, IF THE SIDEWALK BECOMES UNSAFE OR IMPASSABLE, A TEMPORARY SIDEWALK/ SIDEWALK DETOUR MUST BE PROVIDED.

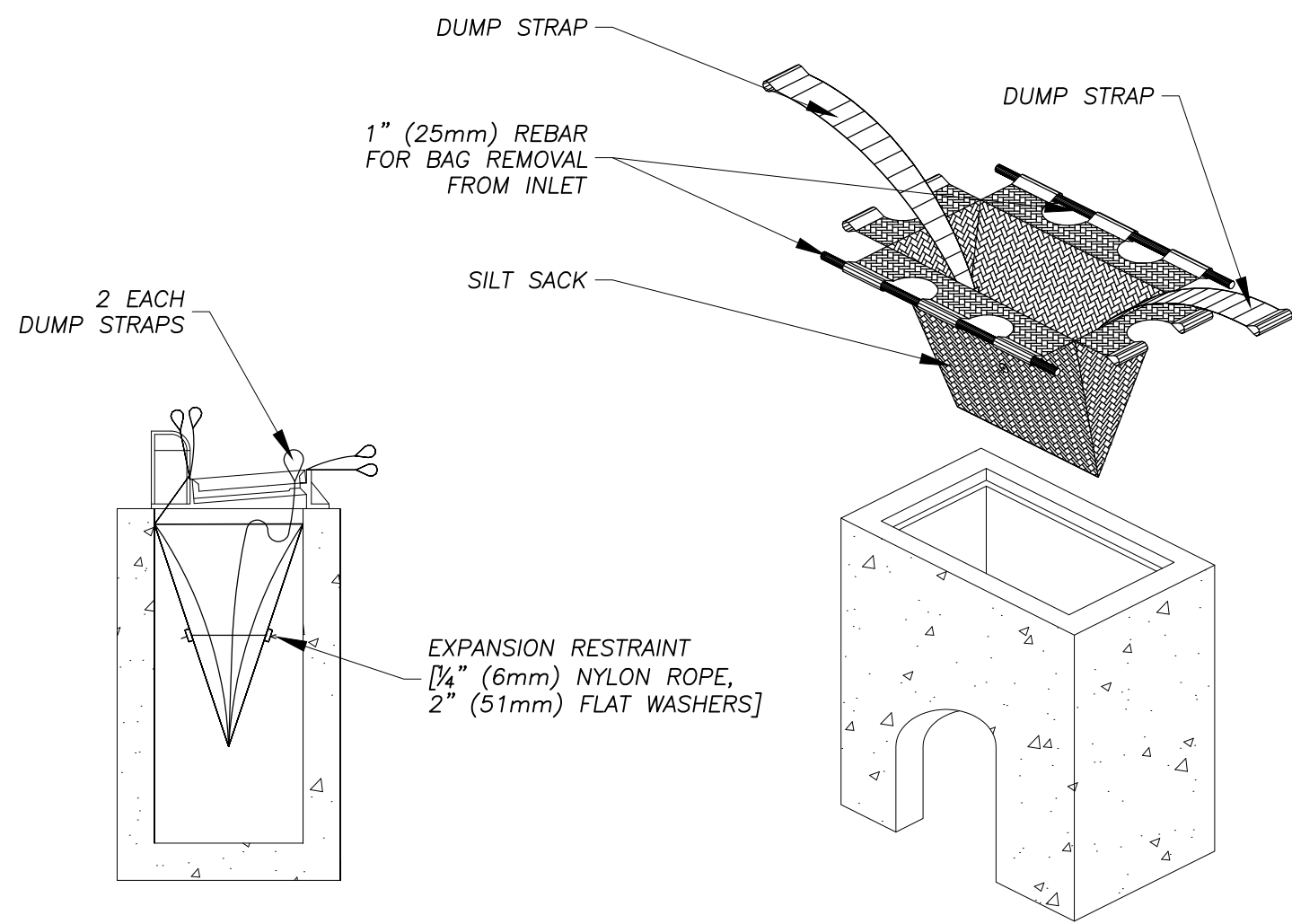
#### ANTI-TRACKING APRON (AS REQ'D)

NO SCALE



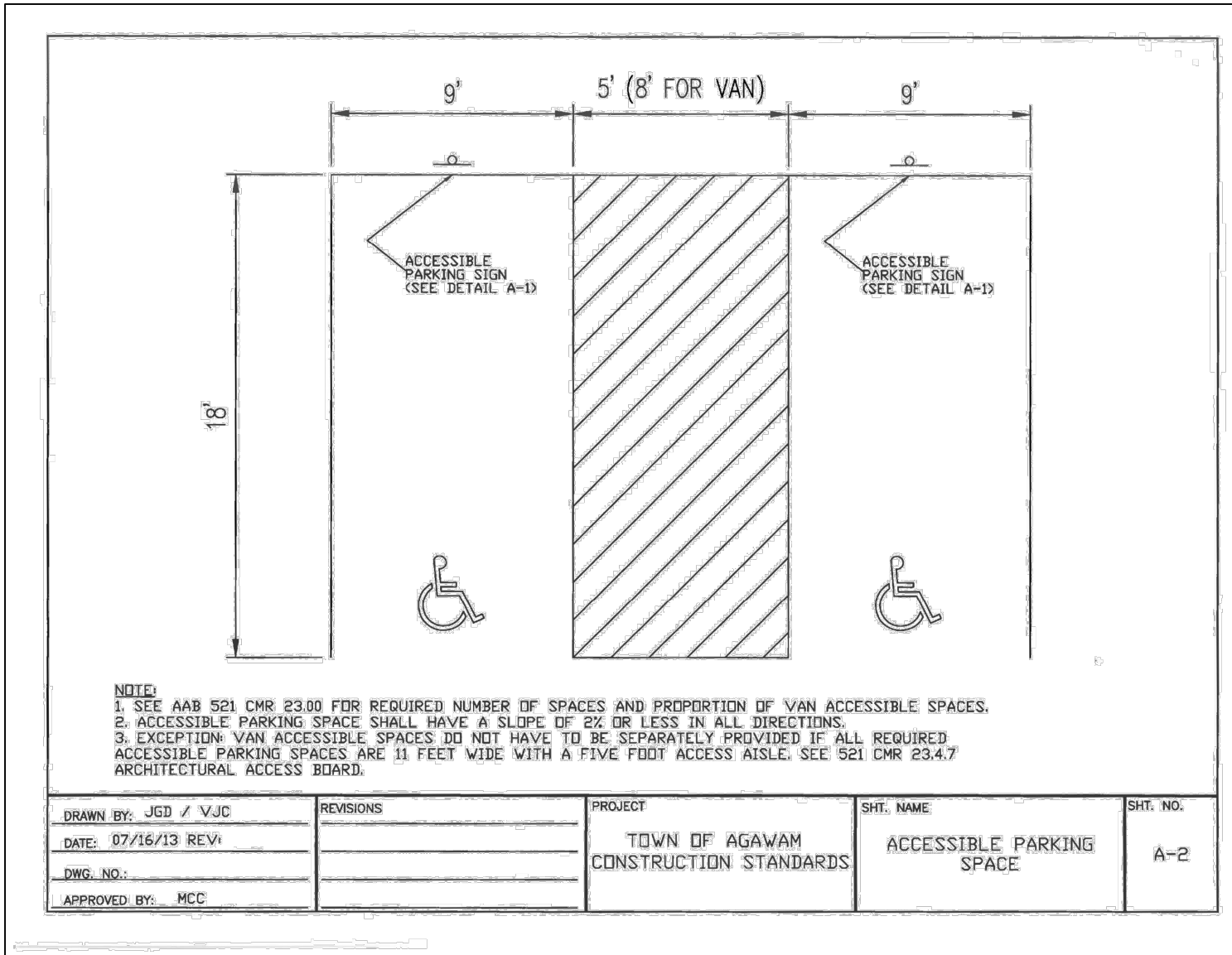
#### SILT FENCE DETAIL

NO SCALE



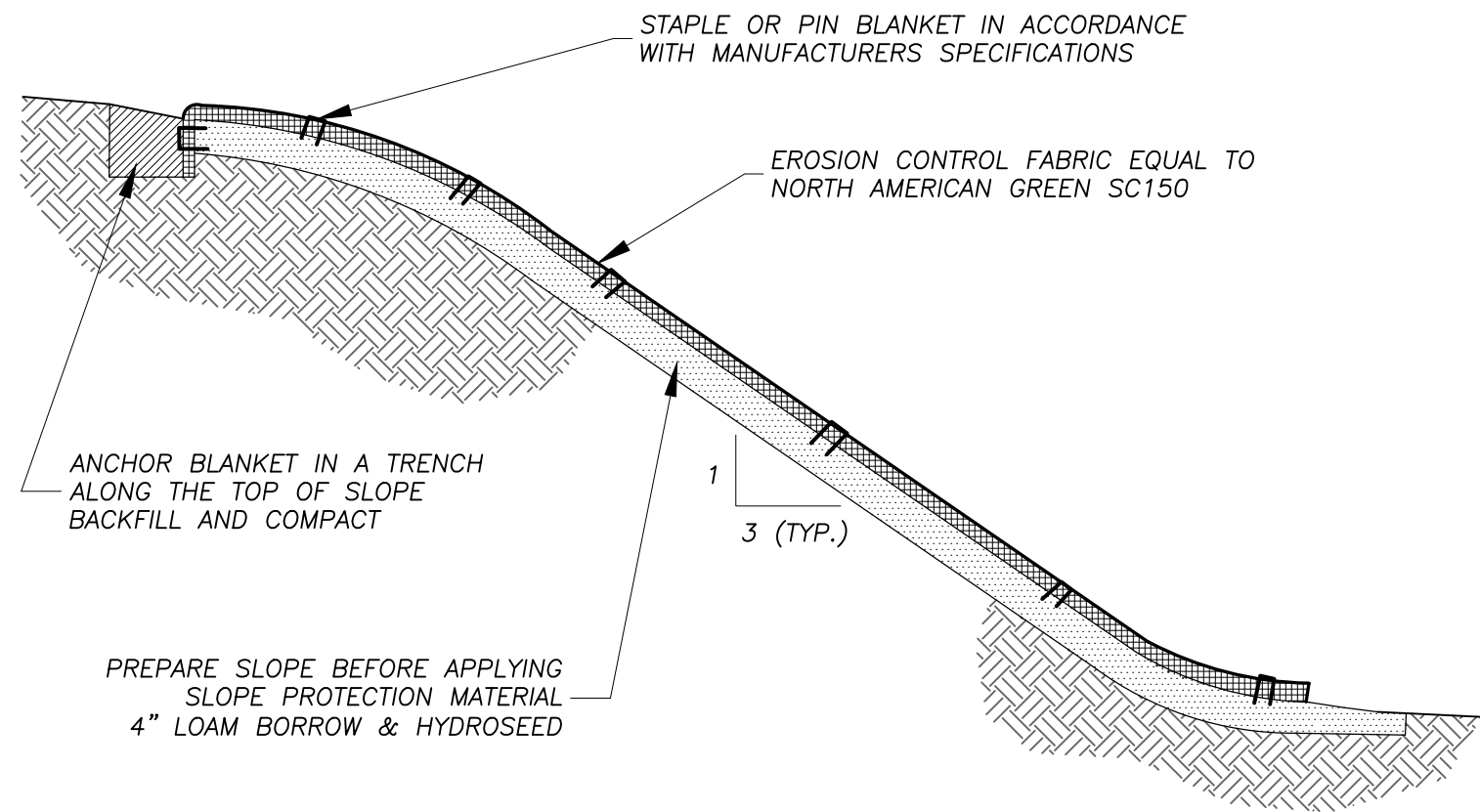
#### INLET PROTECTION - SEDIMENT FILTER SACK

NO SCALE



#### SLOPE PROTECTION MATERIAL INSTALLATION (AS REQ'D)

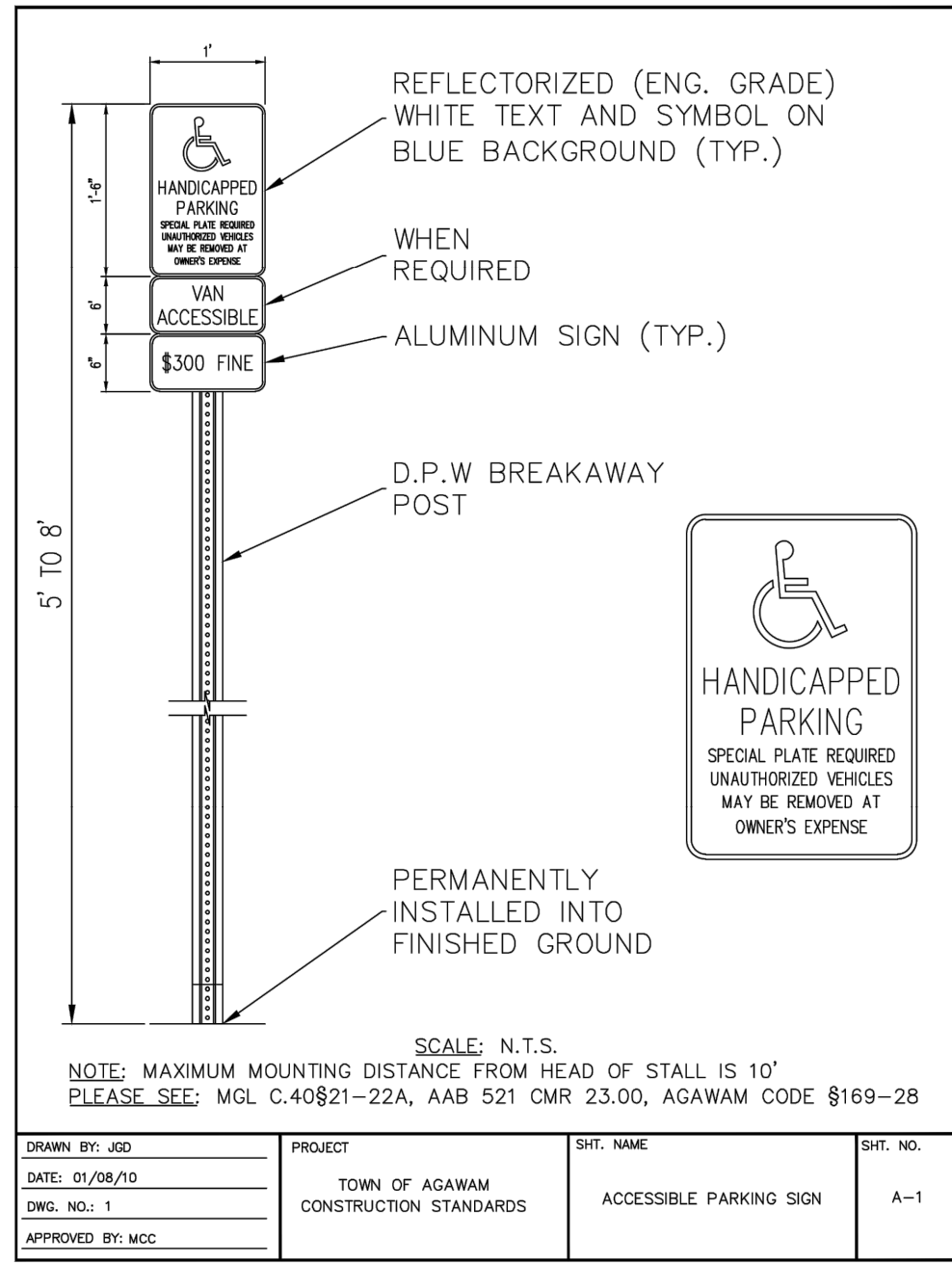
NO SCALE



- 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.

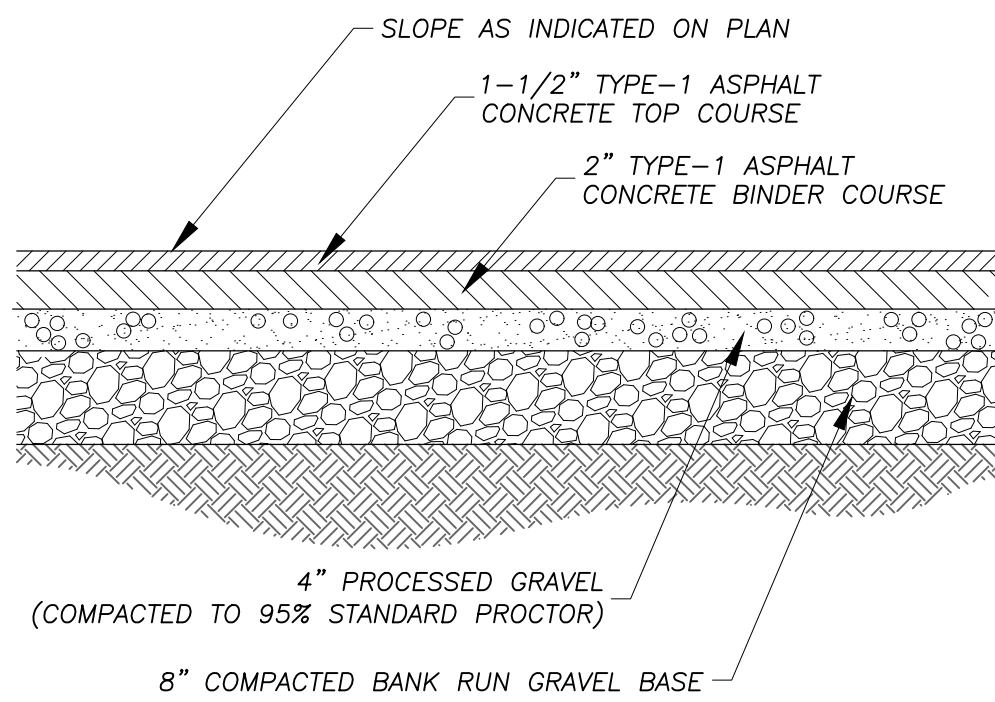
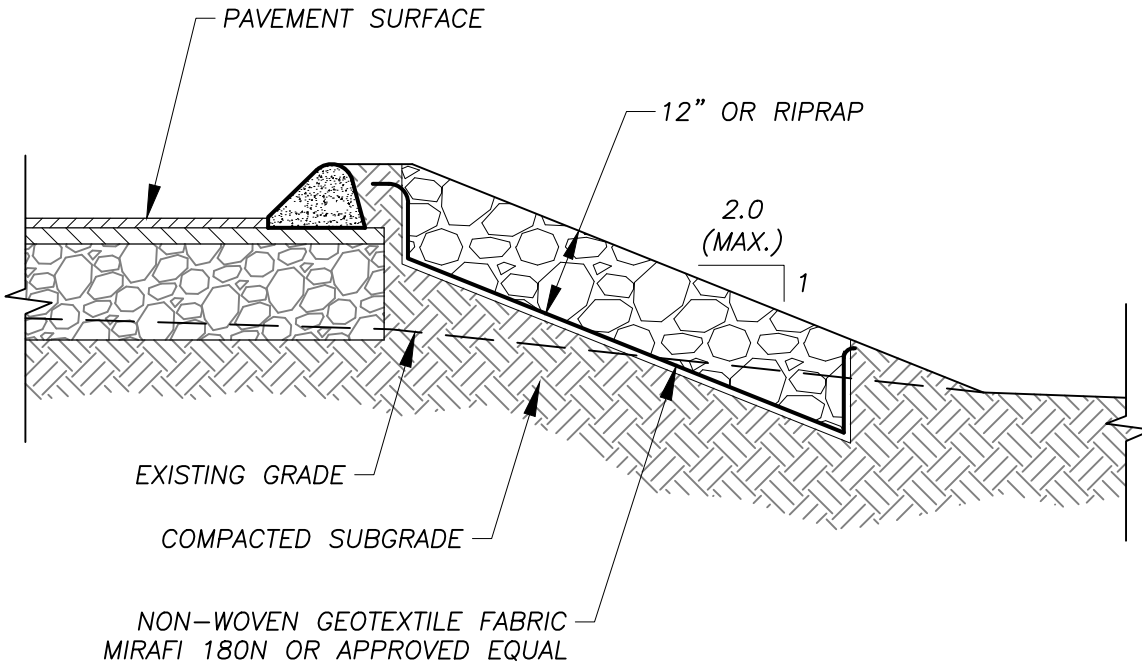
#### REINFORCED CONCRETE SIDEWALK SECTION

NO SCALE



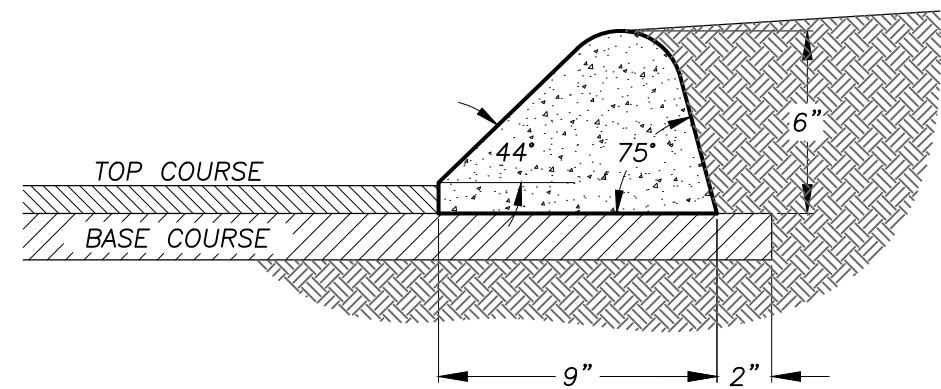
#### RIP-RAP SLOPE PROTECTION

NO SCALE



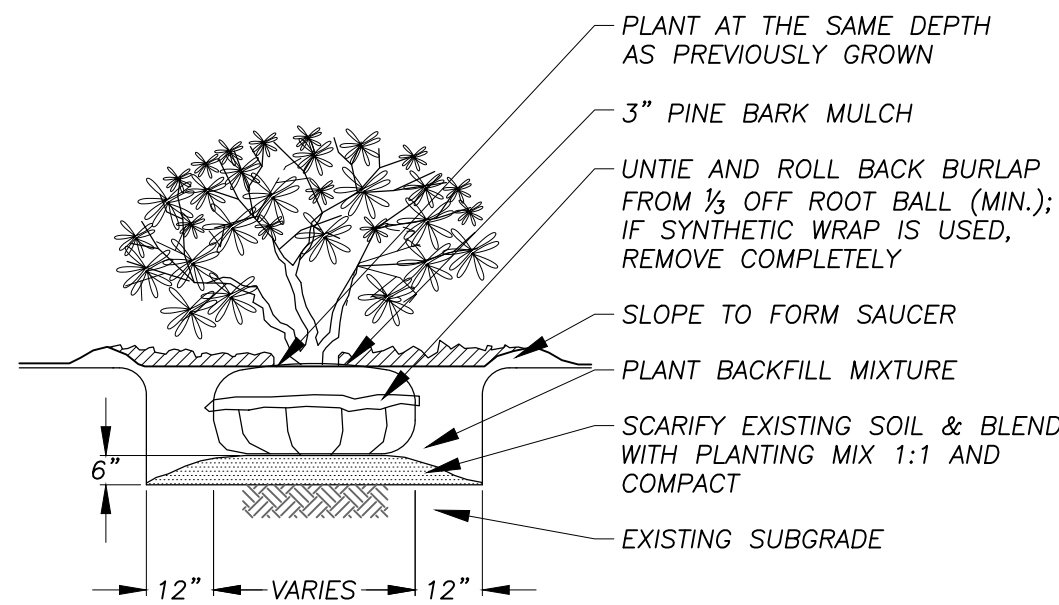
#### BITUMINOUS CONCRETE PAVING DETAIL

NO SCALE



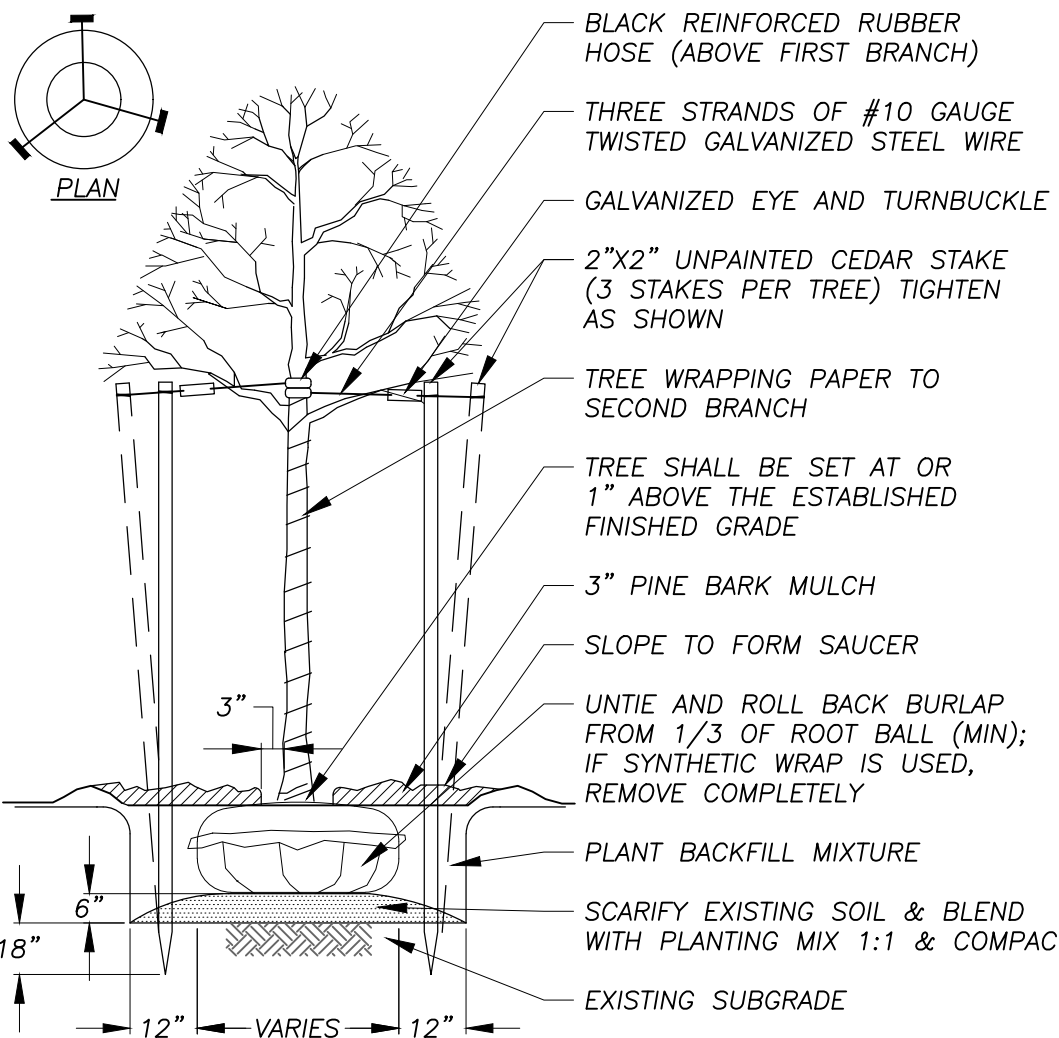
#### BITUMINOUS CONCRETE BERM (TYPE-2)

NO SCALE



#### SHRUB PLANTING DETAIL

NO SCALE



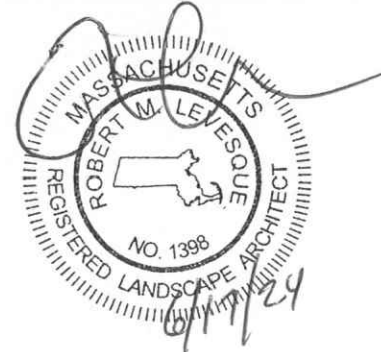
#### TREE PLANTING DETAIL

NO SCALE

**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

Proposed Contractor Buildings  
6 Ace Precision Way & 24 Ace Precision Way  
Agawam, MA 01001



PREPARED FOR:

TGE Realty LLC  
c/o Mr. Sadiq Elias  
53 Cecile Street  
Agawam, MA 01001

ISSUANCE DATE: June 17, 2024

REVISIONS: DATE:

DRAFTED BY: J.T.

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OF MASSACHUSETTS STATE LAW

SCALE: As Noted

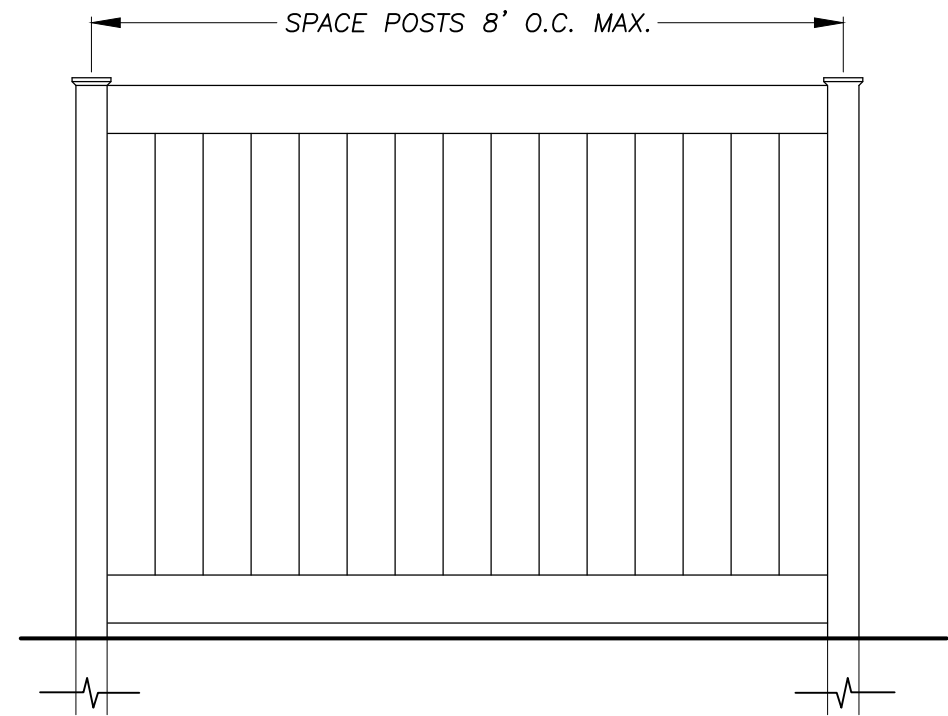
RLA PROJ. NUMBER: 240316

DRAWING# REV.

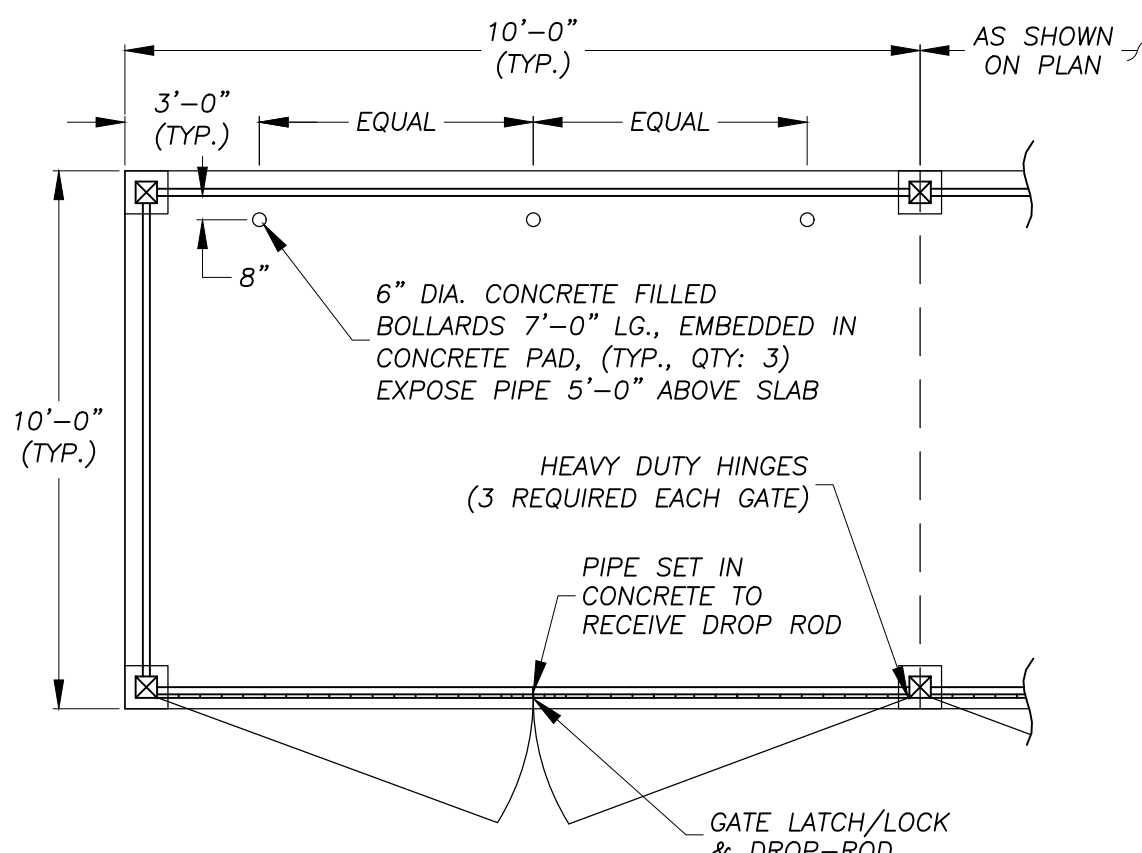
D-1

**PERMITTING**  
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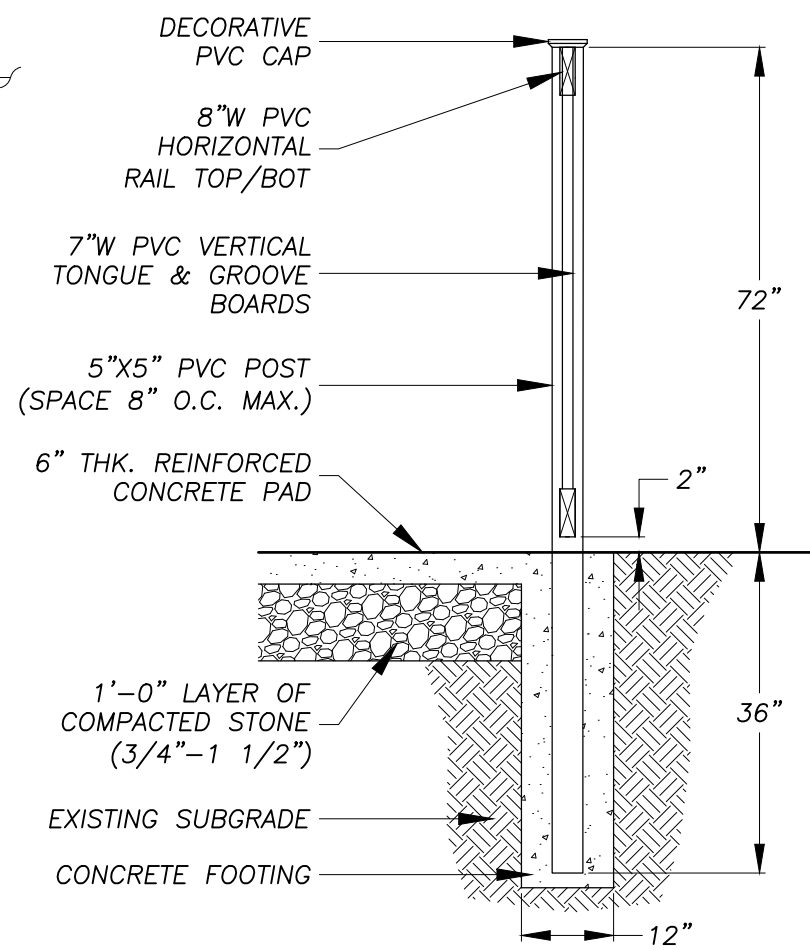




TYPICAL DUMPSTER ENCLOSURE ELEVATION



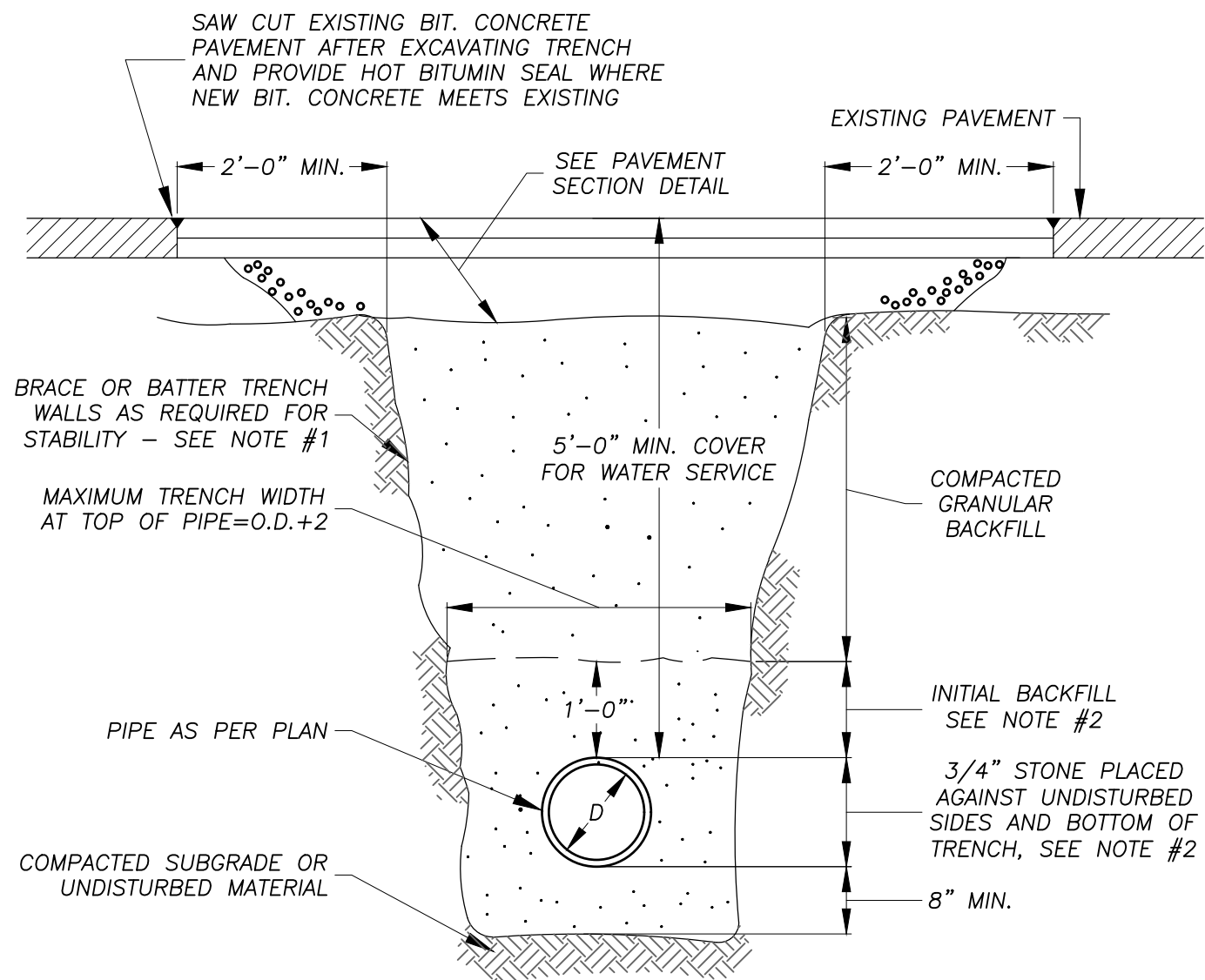
TYPICAL ENCLOSURE PLAN VIEW



TYPICAL ENCLOSURE DUMPSTER SECTION

### DUMPSTER ENCLOSURE

NO SCALE

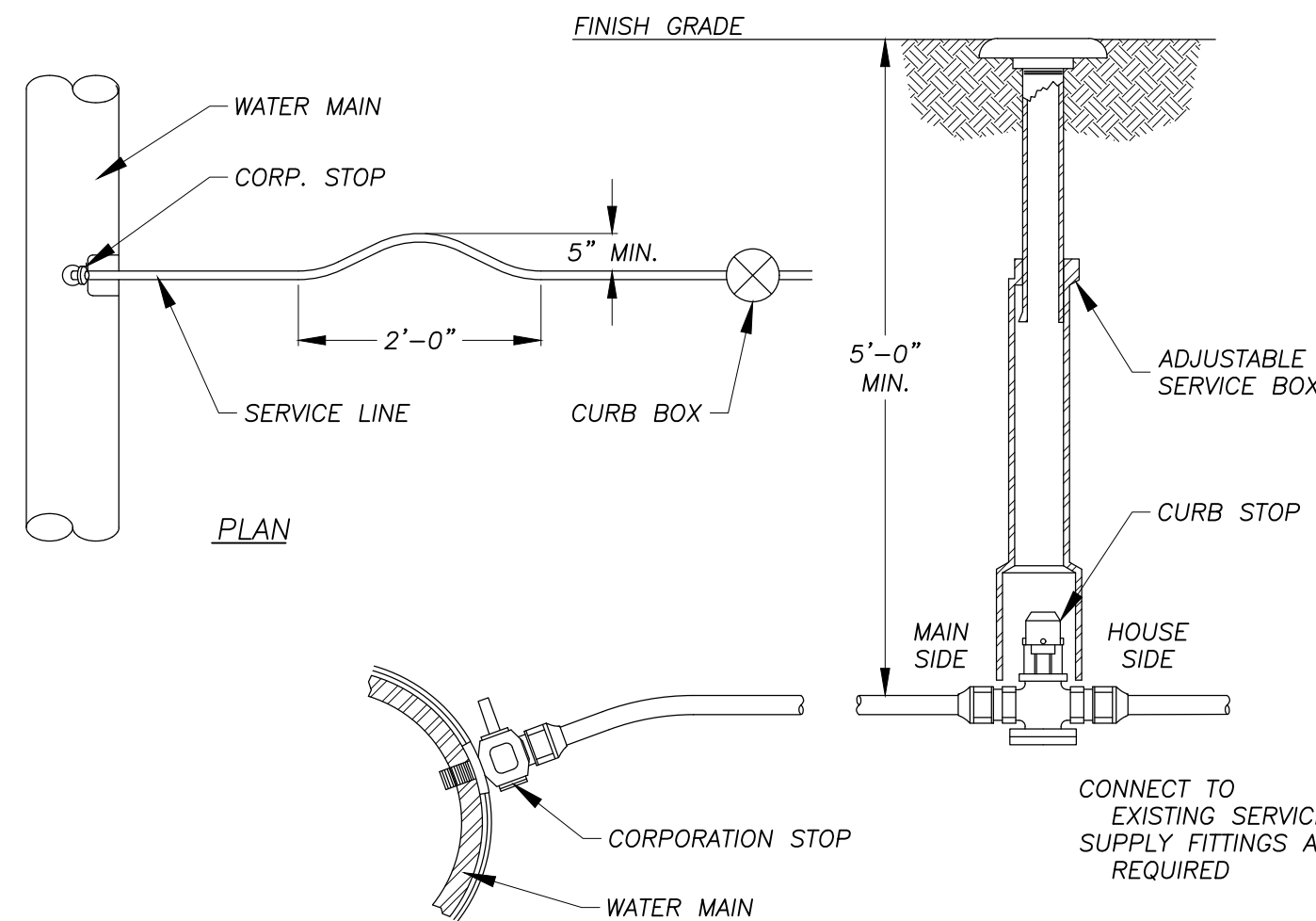


### PIPE TRENCH DETAIL (STANDARD)

NO SCALE

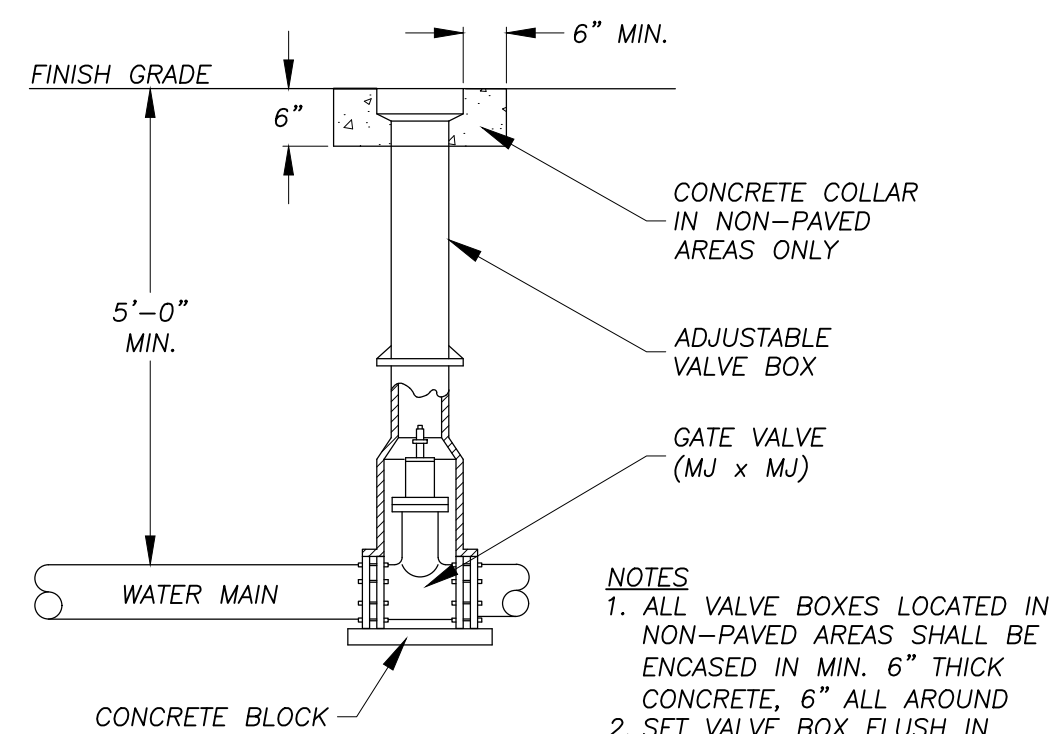
### TRENCH NOTES

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. 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.



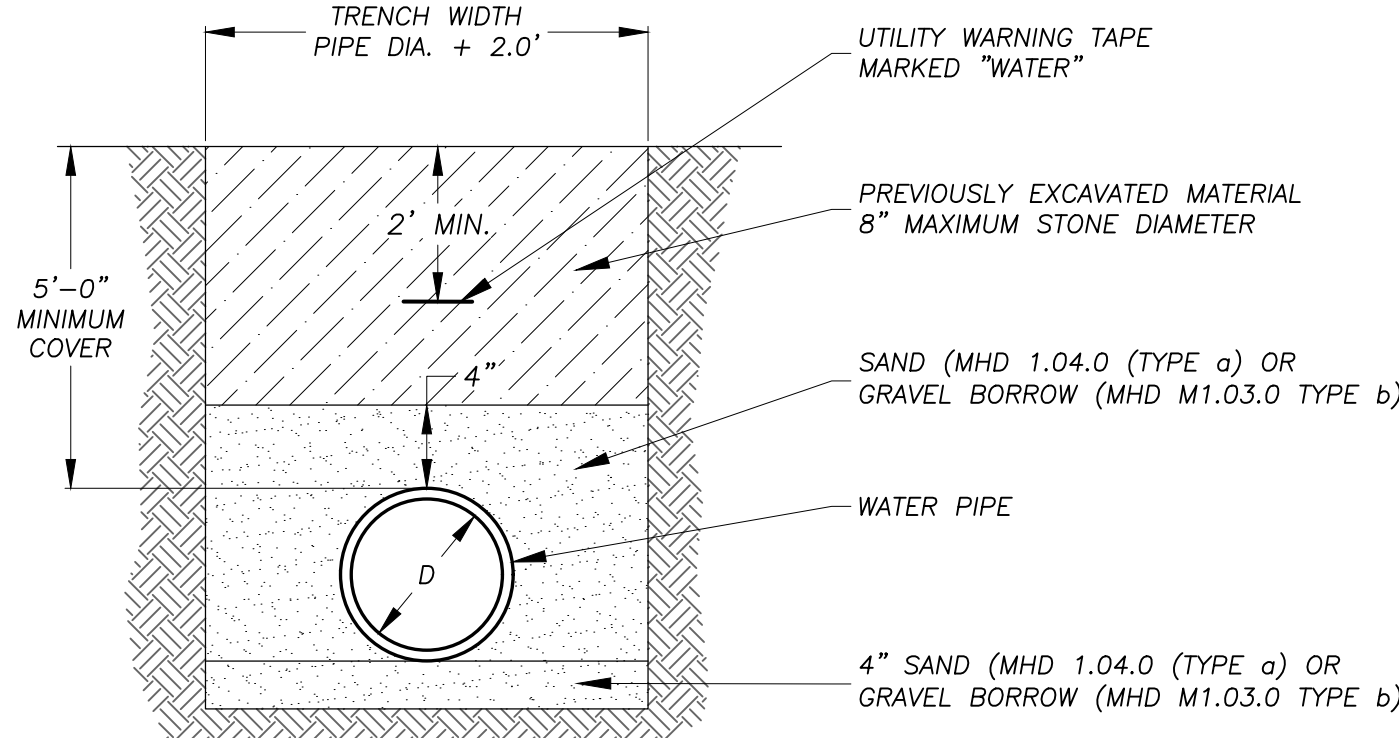
### TYPICAL WATER SERVICE CONNECTION

NO SCALE



### TYPICAL BURIED VALVE

NO SCALE

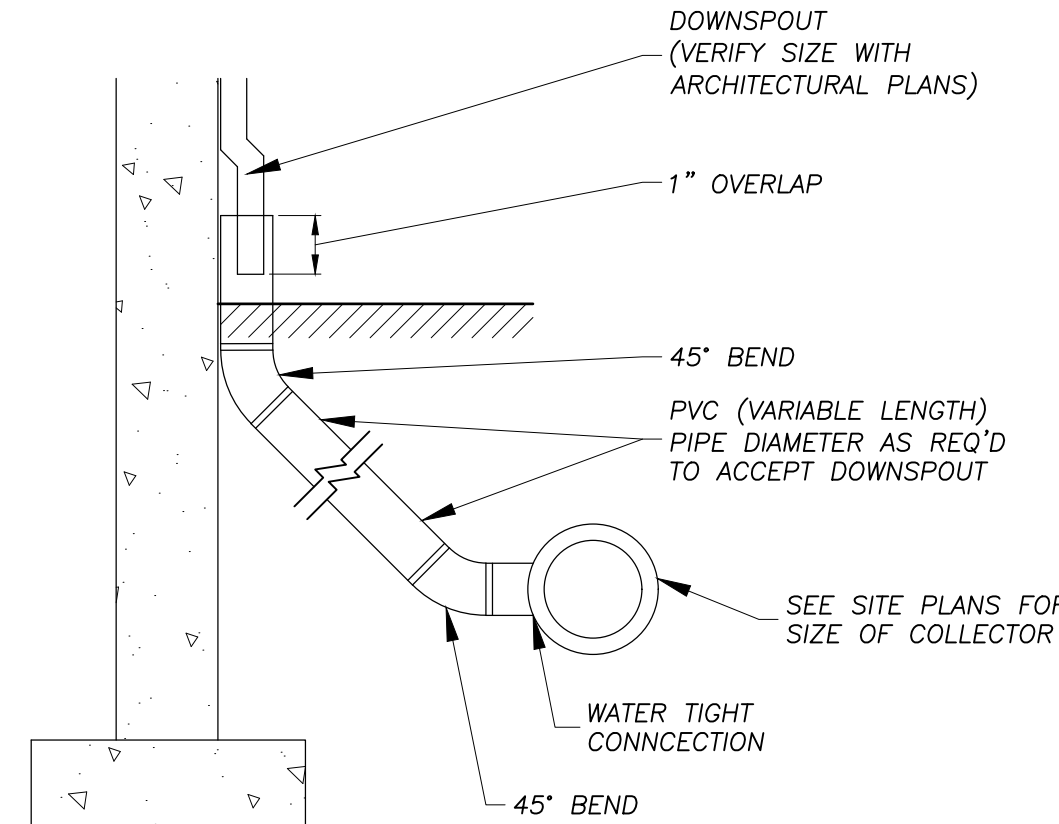


### NOTES:

- 1.) COMPACT ALL BACKFILL MATERIAL WITH VIBRATORY PLATE EQUIPMENT (MINIMUM TWO PASSES) TO A MINIMUM DENSITY OF 95% OF THE STANDARD PROCTOR DENSITY AS DETERMINED BY ASTM D698
- 2.) PLACE BACKFILL MATERIALS IN MAXIMUM ONE FOOT LIFTS

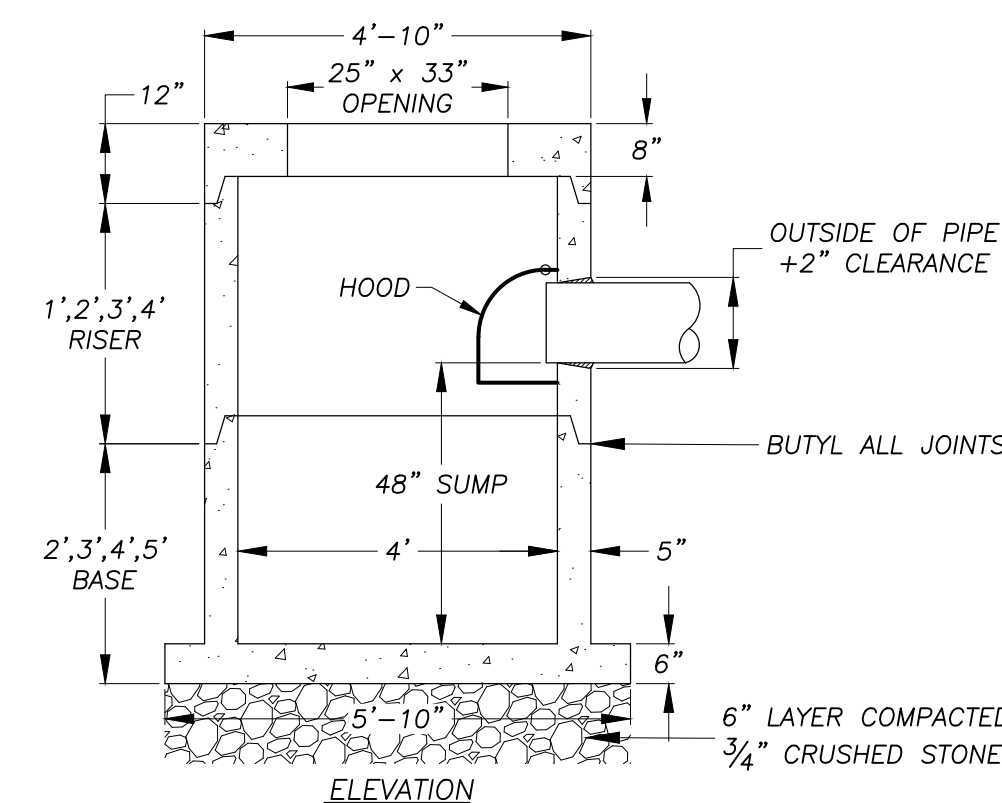
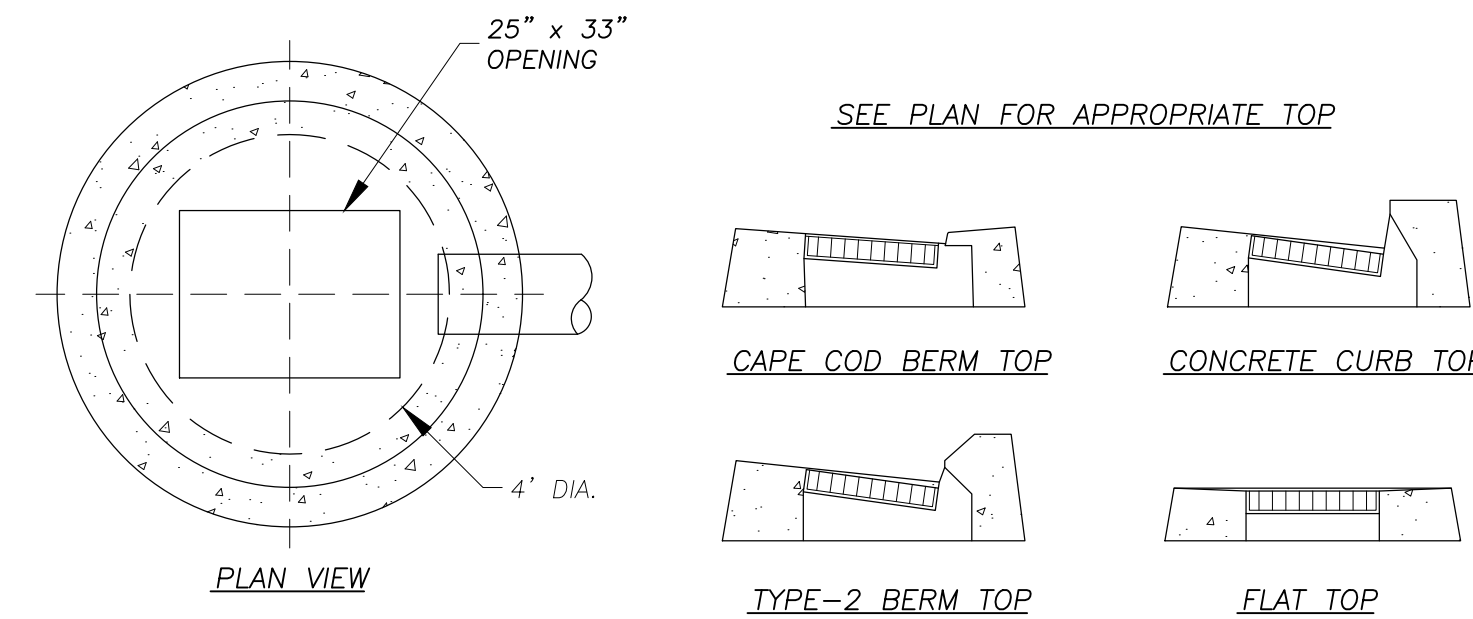
### TYPICAL WATER MAIN TRENCH SECTION

NO SCALE



### DOWNSPOUT COLLECTOR DETAIL

NO SCALE

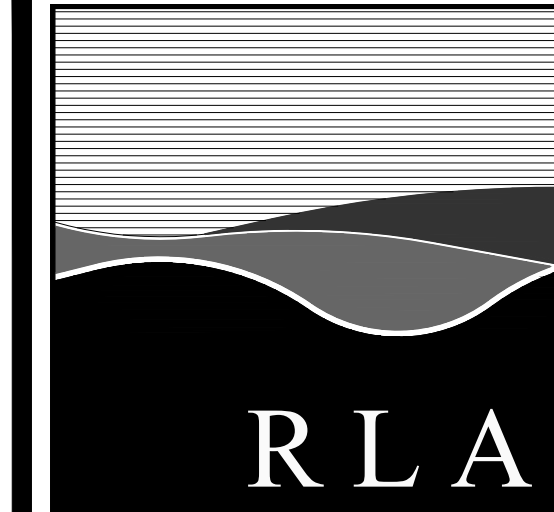


### PRECAST CONCRETE CATCH BASIN-CT STYLE/ROUND BASE

NO SCALE

### DESIGN NOTES

1. CONCRETE: 5,000 PSI, 28 DAYS
2. REINFORCING STEEL CONFORMS TO LATEST ASTM A615 AND A82 OR A185 SPECS.
3. MANHOLE DESIGN SPECS. CONFORM TO LATEST ASTM C478 SPEC. FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS"
4. H-20 DESIGN LOADING PER AASHTO HS-20-44
5. BUTYL RUBBER JOINT SEALANT CONFORMS TO LATEST ASTM C990-91 SPEC., FED SPEC. SS-S-210 (210A), AND AASHTO M-198B



### R LEVESQUE ASSOCIATES INC

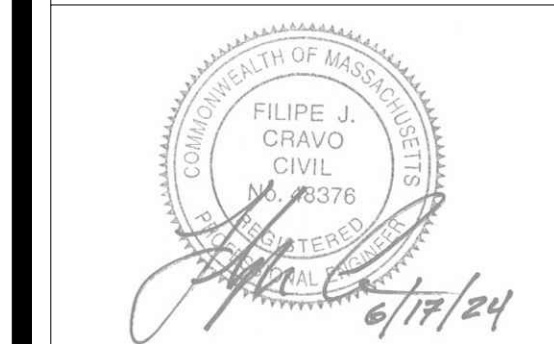
Landscape Architects  
Civil Engineers - Land Surveyors  
Environmental Consultants

ph: 413.568.0985 fax: 413.568.0986

40 School Street  
Westfield, MA 01085  
rlaland.com

## DETAILS

### Proposed Contractor Buildings 6 Ace Precision Way & 24 Ace Precision Way Agawam, MA 01001



### PREPARED FOR:

TGE Realty LLC  
c/o Mr. Sadiq Elias  
53 Cecile Street  
Agawam, MA 01001

### ISSUANCE DATE:

June 17, 2024

### REVISIONS:

DATE:

### DRAFTED BY:

J.T.

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### SCALE:

As Noted

### RLA PROJ. NUMBER:

240316

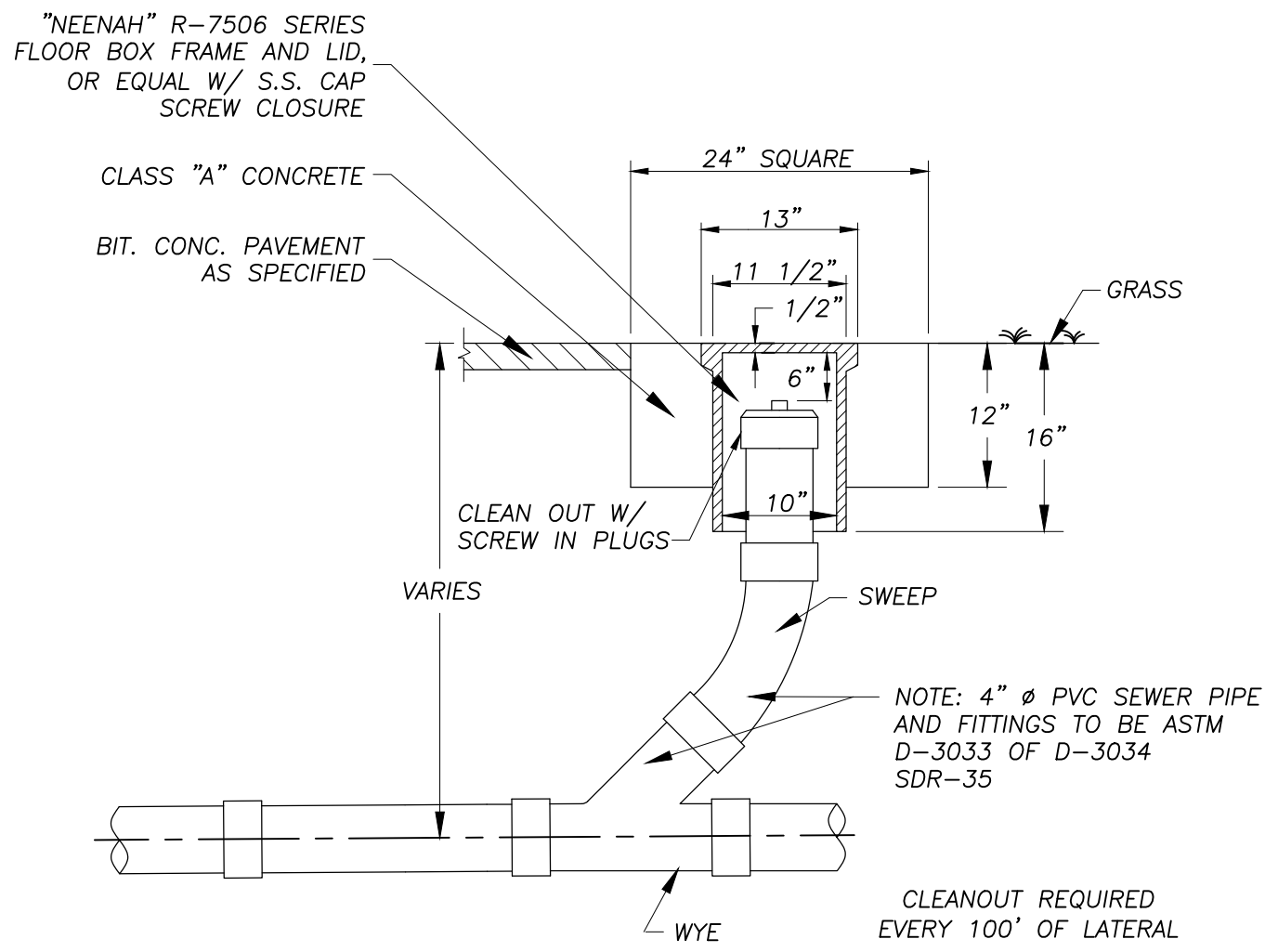
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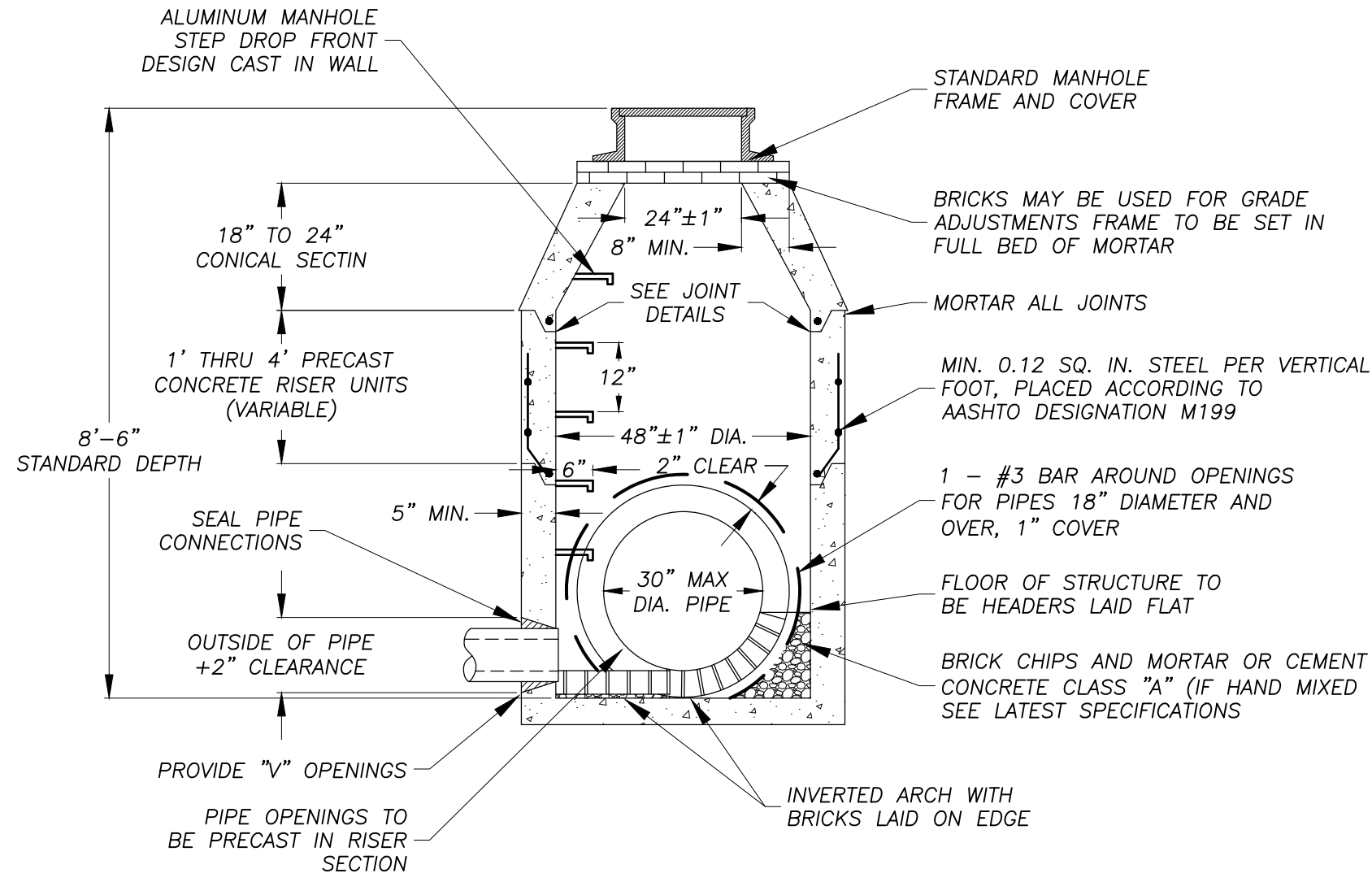
D-2 -

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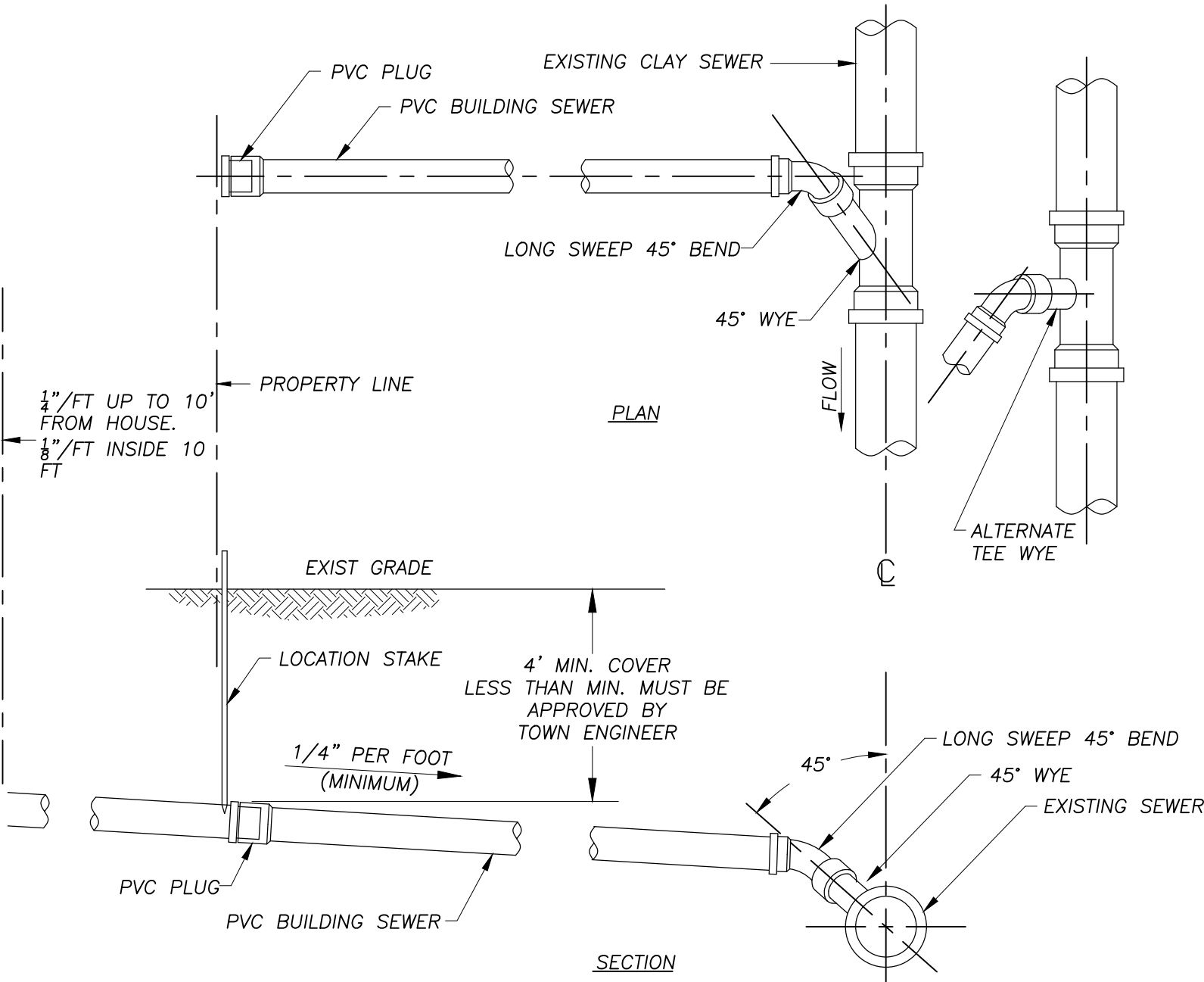




TYPICAL SANITARY CLEANOUT  
NO SCALE

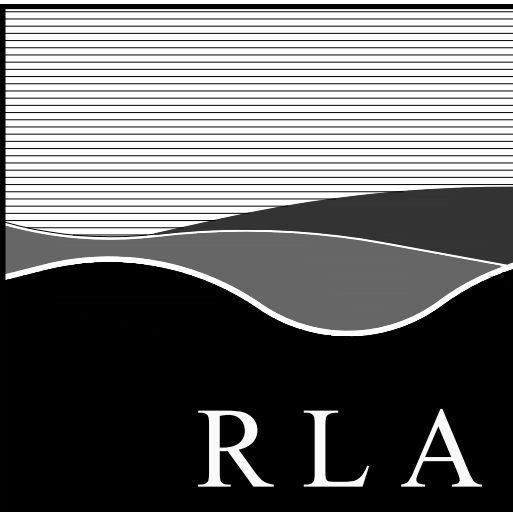


PRECAST CONCRETE MANHOLE  
NO SCALE



- NOTES:
- BUILDING SEWERS SHALL BE 4"Ø EXCEPT AS DIRECTED BY THE ENGINEER
  - LOCATION AND DEPTHS OF BUILDING SEWERS TO BE DETERMINED IN THE FIELD BY THE ENGINEER

TYPICAL BUILDING SEWER CONNECTION DETAIL  
NO SCALE



**R L A**

**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](http://rlaland.com)

**DETAILS**

**Proposed Contractor Buildings**  
**6 Ace Precision Way & 24 Ace Precision Way**  
**Agawam, MA 01001**



**PREPARED FOR:**

TGE Realty LLC  
c/o Mr. Sadiq Elias  
53 Cecile Street  
Agawam, MA 01001

**ISSUANCE DATE:** June 17, 2024

| REVISIONS: | DATE: |
|------------|-------|
|            |       |
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**SCALE:** As Noted

**RLA PROJ. NUMBER:** 240316

| DRAWING# | REV. |
|----------|------|
| D-3      | -    |

PERMITTING  
NOT FOR CONSTRUCTION

## Agawam Planning Board May 15, 2025

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### MEMBERS PRESENT:

Violet Baldwin, Chair  
Frank DeStefano, Vice Chair  
Michael DiLullo  
Michael Cleavall

### MEMBERS ABSENT:

Charles Elfman

### ALSO PRESENT:

Stefanie Kesecker

Ms. Baldwin called the meeting to order at 6:00pm.

#### 1. SITE PLAN-223 Garden Street-MBNZ Holding Co.

The Planning Board received a request to continue this agenda item to the June 5, 2025 meeting.

Motion was made by Mr. Cleavall and seconded by Mr. DeStefano to continue the SITE PLAN-223 Garden Street-MBNZ Holding Co. to the June 5, 2025 meeting as requested.

VOTE 4-0-0

#### 2. FORM A-31 & 38 D'amato Way-Bretta Construction, LLC.

The petition proposes to convey a portion of 31 D'amato Way to 38 D'amato Way. The petition meets all the zoning requirements.

Motion was made by Mr. DeStefano and seconded by Mr. DiLullo to approve the plan for 31 & 38 D'amato Way-Bretta Construction, LLC under "Subdivision Control Law Not Required".

VOTE 4-0-0

#### 3. APPROVAL OF MINUTES-May 1, 2025

Motion was made by Mr. DiLullo and seconded by Mr. Cleavall to approve the May 1, 2025 minutes as written.

VOTE 3-0-1(Baldwin)

#### 4. Correspondences

None

Motion was by Mr. Cleavall and seconded by Mr. DiLullo to adjourn the meeting.



## Agawam Planning Board May 15, 2025

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VOTE 4-0-0

Meeting adjourned at 6:05pm.

DRAFT