JENSEN HUGHES

Memo

Rev 00	November 26, 2025
Rev 01	March 10, 2026
Rev 02	August 13, 2026

To:	Mayor Lambert and Borough Council Borough of Beach Haven, New Jersey
From:	Jensen Hughes, Inc.
Subject:	Beach Haven BESS Third Party Risk Assessment Memo 315 2nd Street, Beach Haven, New Jersey 08008

1.0 Introduction

The Borough of Beach Haven (Client) has requested Jensen Hughes (Consultant) to perform a third-party risk assessment of the Atlantic City Electric (ACE) Beach Haven Battery Energy Storage System (BESS) located at 315 2nd Street, Beach Haven, New Jersey 08008. The objective is to assess the alignment of the BESS installations with the applicable provisions of the 2021 International Fire Code (IFC) Section 1207 (as adopted by New Jersey) and best practice guidance from NFPA 855.

This memorandum is based solely on the documents provided by the Borough and publicly available information. No site inspection, testing, or independent verification of installed systems was performed. Recommendations are intended to assist the Borough in addressing documentation gaps and verifying code compliance prior to commissioning. This review is limited to a document review and code requirements analysis and does not include testing, detailed hazard modeling, or field verification.

3/10 UPDATE: *This memorandum has been updated based on a meeting between Jensen Hughes representatives and ACE representatives at the Borough of Beach Haven Municipal Facility on Tuesday, March 10th, 2026. ACE also provided Jensen Hughes with the opportunity to perform a visual, noninvasive, nonfunctional walkthrough of the project site on the same day, which was also used to inform the update to this memorandum.*

8/13 UPDATE: *This memorandum has been updated based on additional information furnished by ACE on May 15, 2026 regarding the wind loading and weather-resistant design of the BESS enclosure.*

Documentation Reviewed (Initial)

[1]. Atlantic City Electric, Beach Haven Battery Factsheet. dated March 2025.

[2]. Atlantic City Electric, Beach Haven Battery Storage Project Community Open House

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[3]. Atlantic City Electric, Beach Haven BESS Emergency Response Plan (ERP), dated July 2025.

[4]. UL Solutions Field Evaluation Preliminary Findings Report (UL Order No. 15888653, dated August 21, 2025)

[5]. Borough of Beach Haven Solicitor, Letter with Photographs Documenting Security Concerns at BESS Facility, dated July 17, 2025

Code and Standards Referenced

[6]. IFC 2021 Section 1207 – Electrical Energy Storage Systems (ESS)

[7]. NFPA 855 – Standard for the Installation of Stationary Energy Storage Systems, 2023 Edition.

[8]. 2021 International Building Code (IBC)

3/10 UPDATE: *On March 10, 2026, Jensen Hughes representatives met with representatives of ACE to review documentation associated with the BESS project site. Jensen Hughes representatives were permitted to review the following and take handwritten notes on the contents of the following documents:*

Documentation Reviewed (3/10 Update)

[9]. UL Solutions, Field Evaluation Services Final Report for Energy Storage Building (UL 9540), Hitachi Energy USA Inc., UL Order No. 15888653, dated November 12, 2025.

[10]. Atlantic City Electric, Beach Haven BESS Safety Analysis Report (BESS-SAR), Revision 6, dated November 14, 2025.

[11]. UL 9540A Cell-Level Test Report, Samsung SDI Cell E3 (NMC Prismatic, 3.8 V, 100 Ah), Model CSI000RT00IA, dated February 12, 2020.

[12]. UL 9540A Module-Level Test Report, Model EM762AL001A (48 cells, 2P/24S configuration), dated February 14, 2020.

[13]. UL 9540A Unit-Level Test Report, Model PHR0000-004AE30 (14 modules in series, stacked vertically), dated June 22, 2020.

[14]. Hitachi BESS Runaway Gas Concentration Analysis in Ventilated Enclosure.

[15]. Operating Manual, dated May 6, 2025.

[16]. Atlantic City Electric, Operating Procedures, dated May 19, 2025

[17]. Samsung BMS Documentation.

[18]. Beach Haven Manufacturer Operation Manual.

[19]. Atlantic City Electric, Pre-Fire Plan (PFP), date March 10, 2026

[20]. Emergency Operation Plan (EOP), Annex A, dated January 2025.

[21]. Various Documents, Fire Alarm System (FAS) Specifications and Calculations (Novec system).

[22]. Fire Folder Documentation.

[23]. Global Power Components Structural Analysis Calculations ABB, Beach Haven ACE NJ, (including design loads and ASCE 7-16 seismic design criteria).

[24]. Report of Subsurface Exploration and Geotechnical Engineering Services, prepared by Hynes and Associates, dated June 4, 2019.

Documentation Reviewed (8/13 Update)

[25]. Atlantic City Electric, Correspondence Regarding Wind Loading and Weather-Resistant Design Features of the BESS Enclosure, dated May 15, 2026.

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2.0 Project Overview

The Beach Haven BESS is a utility-owned installation operated by ACE at 315 2nd Street, Beach Haven, New Jersey, 08008. The BESS has an energy capacity of approximately 2 MWh and is designed to provide approximately 1 MW of output capacity, with a peak of 2 MW.

The installation consists of a single elevated metal enclosure measuring approximately (37 feet × 11 feet) supported on concrete piers to mitigate flood risk associated with the barrier island location. The enclosure is subdivided internally into a battery room and a control/equipment room. The battery room is accessed via two doors on the west side, with thirteen (13) battery racks arranged in two rows (6 racks and 7 racks), each with a dedicated 1200A disconnect switch. The control room is accessed via a door on the south side. The BESS enclosure features an intake louver on one side and an exhaust fan and HVAC unit on the opposite side for ventilation and climate control. A 2-hour fire barrier is reportedly installed alongside the BESS enclosure to provide separation from the control room.

3/10 UPDATE: *Review of the as-built drawings confirmed the rating of the fire barrier installed between the BESS enclosure and the control room.*

The system utilizes lithium-ion battery technology housed in modular racks. The battery chemistry is a mix of Lithium Nickel Cobalt Aluminum Oxide (NCA), Lithium Nickel Cobalt Manganese Oxide (NCM), and Lithium Manganese Oxide (LMO) technologies. Each rack contains multiple battery modules managed by an integrated Battery Management System (BMS) for monitoring voltage, temperature, and state of charge. The BMS also interfaces with system controls to initiate protective actions, such as deactivating affected cell(s) in abnormal conditions.

Fire detection is provided via smoke, thermal, and gas detection devices connected to a Fire Alarm Control Panel (FACP) located in the control/equipment room. Gas detection explicitly monitors flammable gases, with readings communicated to the Fire Command Center (FCC). Detection signals trigger local alarms and send remote notifications to ACE's control center and the Borough's dispatch center.

The external FCC, located just outside the initial BESS fence line, enables the fire department to view alarms and system status without entering the unit. It contains a first responder service panel equipped with a FACP remote annunciator that displays alarm, trouble, and supervisory conditions from the main FACP in the control room; an emergency stop (E-Stop) button for initiating high-speed shutdown of the BESS; a 30-amp twist-lock male plug on the panel exterior to supply emergency 120 V AC power to the combustible gas mitigation system fan and louvers; and a computer display providing real-time BESS operational information. According to the ERP provided, a copy of the ACE Pre-Fire Plan (PFP) and associated procedure is also intended to be stored at the FCC for access upon the arrival of ACE personnel. Jensen Hughes did not review the PFP at the time of this memo.

3/10 UPDATE: *Jensen Hughes has confirmed that the PFP is stored at the FCC and has reviewed the contents of the PFP.*

Fire suppression within the enclosure consists of a Novec 1230 clean agent fire suppression system designed to protect sensitive electrical equipment without water damage. The clean agent system is activated automatically upon confirmed fire detection and can also be discharged manually. A plumbed water deluge system is also provided, which can be supplied through one of two fire department connections (FDCs) located outside the enclosure if supplemental suppression with water is required.

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An explosion prevention system via combustible gas mitigation is integrated into the design to mitigate deflagration and explosion hazards. The system is interlocked with gas detection sensors and can be manually operated from the FCC. Ventilation systems are provided to support both normal operation and emergency exhaust. These systems can activate automatically or manually to promote unit cooling, prevent over-pressurization, and work in coordination with the explosion prevention system to facilitate the controlled release of gases, thereby reducing the potential for explosive or deflagration hazards.

The site is unmanned, and access is restricted to authorized personnel via locked doors. The site is surrounded by a security fence with a sliding vehicle gate on the west end and a personnel gate on the south end. Yard equipment includes a dry-type transformer and a power conversion system (PCS, inverter) enclosure located adjacent to the BESS enclosure on the elevated platform. Vegetative screening is provided to reduce public visibility. Hydrants are provided within 150 feet (at Delaware Ave) and within 400 feet (at Bay Ave).

The site is located in a mixed-use area on a barrier island, with nearby residential and commercial occupancies. The elevated installation and enclosure design account for flood hazard mitigation, maintaining electrical components above the design flood elevation.

8/13 UPDATE: *ACE stated that the enclosure was designed using a 135 mph design basis wind speed. ACE also stated that the enclosure construction was designed to be weather resistive consistent with consistent with Section 1402 of the 2018 International Building Code (IBC) and the characteristics of a NEMA 3R-rated enclosure. ACE further indicated that the enclosure utilizes interlocking construction tested to IP55 criteria and that ventilation openings include dampers, weather hoods, and rain hoods intended to limit water and debris intrusion. ACE also stated that the intake dampers are fire/smoke rated and that HVAC units are provided with manufacturer-supplied rain hoods.*

Site security measures include continuous site fencing, locked access doors, restricted key control, and CCTV surveillance, all of which are monitored by ACE. The ACE Mobile Command Center is equipped with exterior camera systems for direct on-site monitoring, and ACE's headquarters can remotely monitor BESS conditions through a relay from the FACP inside the BESS enclosure.

From a code classification perspective, the Beach Haven BESS is considered an indoor installation and required to comply with the requirements of IFC §1207.7 due to its dimensions exceeding the IFC §1207.5.6 limits for outdoor walk-in units (53 feet × 8 feet × 9.5 feet). More specifically, the BESS is classified as a dedicated-use building per IFC §1207.7.1, as it is a standalone enclosure with no mixed uses, no administrative or public access zones, and restricted entry solely for maintenance purposes. It is also understood that the BESS is located less than 100 feet from buildings, lot lines, public ways, stored combustible materials, hazardous materials, high-piled stock, and other exposure hazards, and therefore is considered an outdoor near-exposure installation per IFC §1207.8.2.

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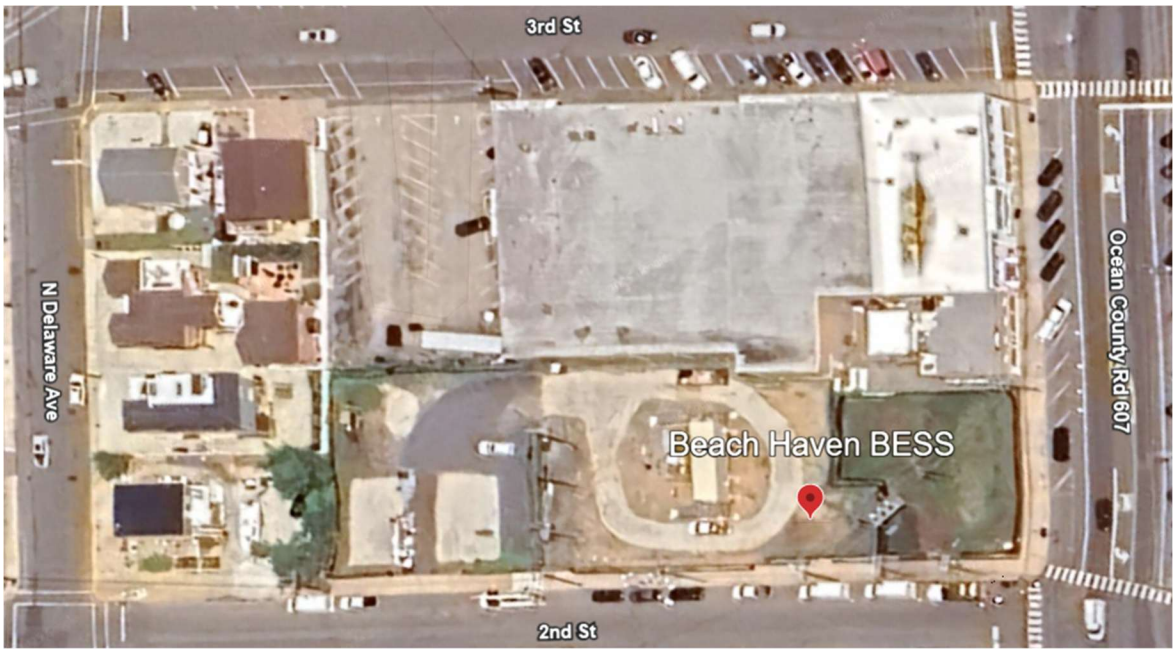

Figure 1. Google Earth View of the Beach Haven BESS Project Site.

Figure 2. Exterior View of the Beach Haven BESS. Reproduced from [1].

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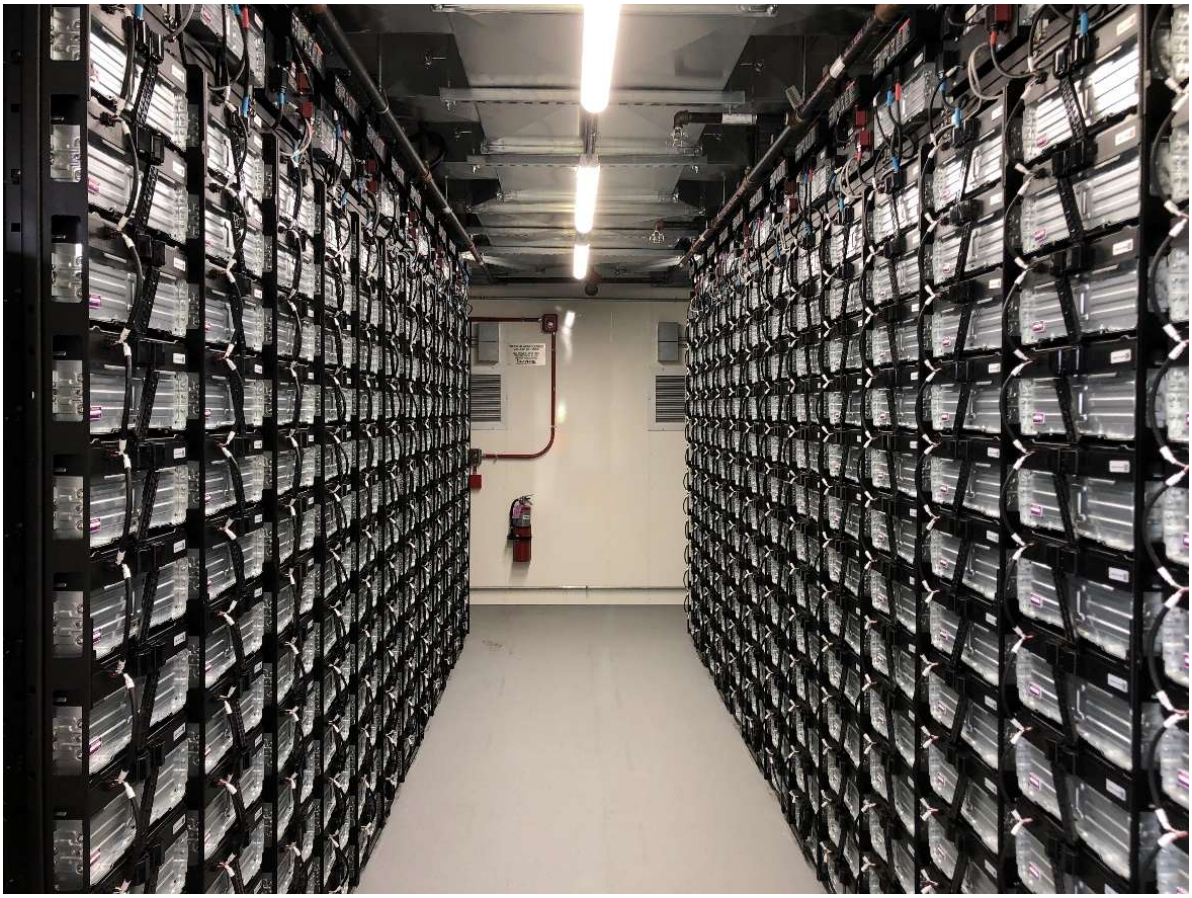

Figure 3. Interior View of the Beach Haven BESS. Reproduced from [2].

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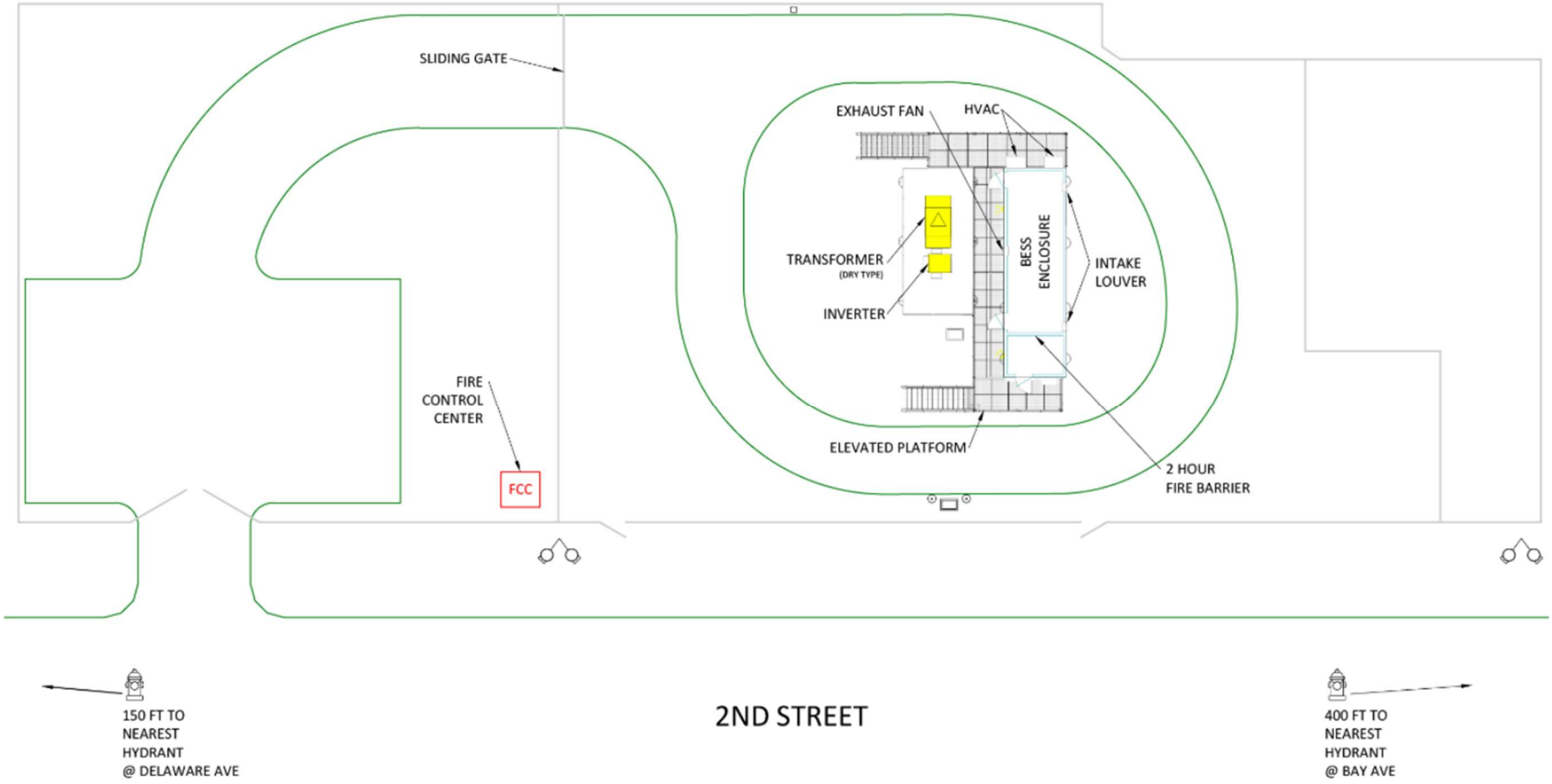

Figure 4. Beach Haven BESS Site Layout. Reproduced from [3].

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3/10 UPDATE:

Figure 5. UL Field Evaluation Product Label as observed on the BESS enclosure in the field.

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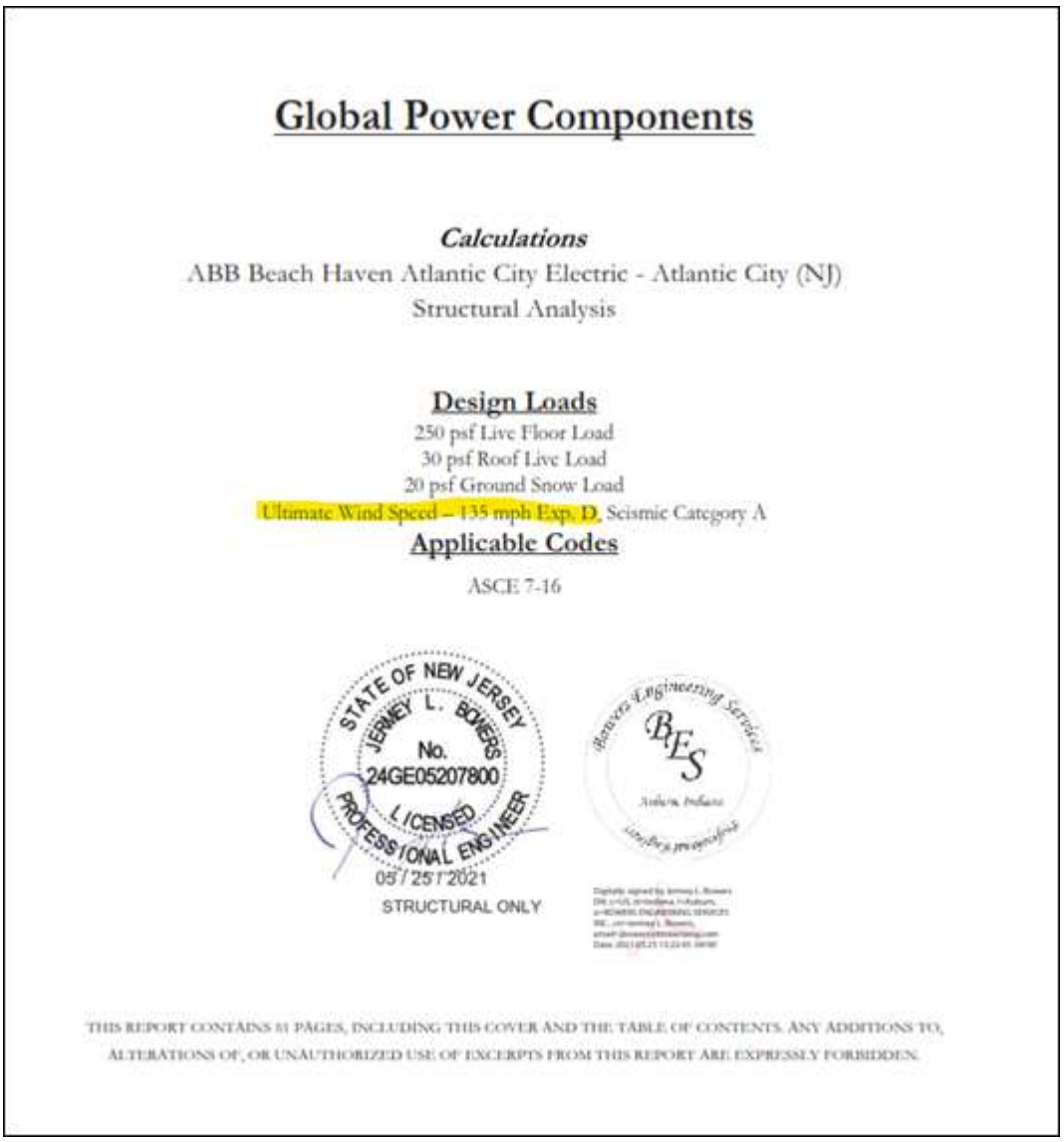
8/13 UPDATE:



Global Power Components

Calculations

ABB Beach Haven Atlantic City Electric - Atlantic City (NJ)

Structural Analysis

Design Loads

250 psf Live Floor Load

30 psf Roof Live Load

20 psf Ground Snow Load

Ultimate Wind Speed – 135 mph Exp. D, Seismic Category A

Applicable Codes

ASCE 7-16

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Figure 5. Cover page of the Civil Engineering Calculation

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3.0 Compliance Gap Review

The following table summarizes the evaluation of the Beach Haven BESS against applicable codes and associated standards based on the available documentation reviewed. This review identifies compliance gaps, documentation deficiencies, and areas where additional verification or corrective action is required prior to final approval and commissioning.

Requirement	Section	Observation	Recommendation
Equipment Listings	IFC §1207.3 NFPA 855 §4.6	Documentation of listing to UL 1973, UL 9540, and UL 1741 (Inverter, PCS) could not be verified. The ERP notes system is designed to "meet applicable listing standards," but specific listings were not included. UL's field evaluation determined that the unit does not meet all requirements, and a Field Evaluated Product Label has not been applied. ***3/10 UPDATE:*** *Documentation of UL 1973, UL 9540, UL 1741, and Field Evaluation Services Final Report was furnished by ACE in person for review. UL Field Evaluation Product Label was observed in the field.*	Request complete listing/certification documentation. Verify that the listing covers the installed system configuration. A field evaluation certification is required and not currently available. ***3/10 UPDATE:*** *No further recommendations.*
Hazard Mitigation Analysis (HMA)	IFC §1207.1.4 NFPA 855 §4.4	No HMA was available for review. An HMA is required for walk-in units containing BESS that exceed the maximum allowable quantity (MAQ) in §1207.5.2 & Table 1207.5 (i.e. 600 kWh for lithium-ion BESS). ***3/10 UPDATE****: An HMA, as part of the "BESS Safety Analysis Report," that addresses the installed product and site-specific conditions, was furnished by ACE in person for review and was found to meet the requirements of the code.*	Request the site-specific HMA document demonstrating hazard scenarios, mitigation strategies, and compliance with IFC/NFPA requirements. ***3/10 UPDATE:*** *No further recommendations.*

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Requirement	Section	Observation	Recommendation
Large-Scale Fire Test (UL 9540A test)	IFC §1207.1.5 NFPA 855 §9.1.5	No UL 9540A test documentation (cell, module, unit) was provided in the reviewed materials. ***3/10 UPDATE:*** *Cell, module, and unit levels UL 9540A testing were furnished by ACE in person for review.*	Request the whole sequence of UL 9540A test reports. Verify that the testing covers the installed system configuration and spacing as built. ***3/10 UPDATE:*** *No further recommendations.*
Commissioning, Decommissioning, Operation and Maintenance (O&M)	IFC §1207.2 / NFPA 855 §4.2	No commissioning test plan or decommissioning strategy provided. ERP references future commissioning. No preventive or operational and maintenance (O&M) schedule was provided in the reviewed materials. ***3/10 UPDATE:*** *Commissioning and decommissioning procedures were described in "Operating Manual" & "Operating Procedures", "UL Field Evaluation", and "BESS Safety Analysis Report", but were not provided as standalone plans within the formal document review referenced.* *Operational & maintenance activities (with frequencies) were described in "Operating Manual" & "Operating Procedures" furnished by ACE for review in person.*	Request a commissioning plan outlining functional testing, decommissioning plans, and O&M plans to be available before the system is operational. ***3/10 UPDATE:*** *No further recommendations.*

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Requirement	Section	Observation	Recommendation
Energy Management System	IFC §1207.3.1 NFPA 855 §9.2.3	EMS is not explicitly described in the reviewed documents. BMS functions are described, but no details on integration with site-level EMS for controls, isolation, or remote monitoring. ***3/10 UPDATE:*** *EMS features are described in the Design Basis Document (DBD) as part of the "BESS Safety Analysis Report" furnished by ACE for review in person, and are suitable for this application.*	Request EMS description, including listing, functional integration with BMS, and remote monitoring capabilities. ***3/10 UPDATE:*** *No further recommendations.*
Electrical Disconnects (signage)	IFC §1207.4.1	Disconnect switches are noted for each rack in the battery room; signage details on locations and compliance with NFPA 70 are not provided. ***3/10 UPDATE:*** *Disconnect signage in compliance with NFPA 70 was observed in the field.*	Verify that disconnect signage is provided in accordance with NFPA 70 and provide the as-built layout with dimensions. ***3/10 UPDATE:*** *No further recommendations.*
Working Clearances	IFC §1207.4.2	UL verified workspace clearances as compliant, but a Field Evaluated Product Label has not been applied until all corrective actions are met. ***3/10 UPDATE****: Field Evaluated Product Label has been observed to be applied in the field, as corrective actions have been taken as per the "Field Evaluation Services Final Report".*	None ***3/10 UPDATE:*** *No further recommendations.*

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Requirement	Section	Observation	Recommendation
Fire-resistance-rated Separations	IFC §1207.4.3 NFPA 855 §9.6.4	ERP notes a 2-hour fire barrier separating the battery room from the control room. No documentation of the tested assembly or listing was provided. The need for this barrier may be influenced by UL 9540A test results for the installed configuration, which were not included in the reviewed materials. ***3/10 UPDATE**: Wall assembly documentation furnished by ACE for review in person indicated a wall assembly that would meet or exceed a 2-hour fire resistance rating. UL 9540A unit-level testing indicated no spacing in between units, which matches the observed field condition.*	Provide fire-resistance test/listing documentation for the installed barrier assembly and provide UL 9540A results that support an alternative compliance path. ***3/10 UPDATE:** No further recommendations.*
Seismic & Structural Design	IFC §1207.4.4 NFPA 855 §4.7	Elevated enclosure supported on concrete piers. UL verified that the structural calculations for the elevated enclosure are suitable, but a Field Evaluated Product Label has not been applied until corrective actions are taken. ***3/10 UPDATE**: Field Evaluated Product Label has been observed to be applied in the field, as corrective actions have been taken as per the "Field Evaluation Services Final Report".*	None ***3/10 UPDATE:** No further recommendations.*

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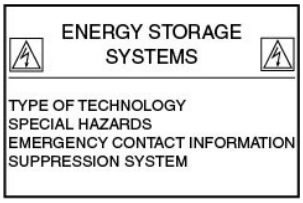
Requirement	Section	Observation	Recommendation
Vehicle Impact Protection	IFC §1207.4.5 NFPA 855 §4.7.5	No documentation of vehicle impact protection measures (bollards, barriers) around the staircase or piers, particularly on the west-facing side of the vehicle gate, is provided. ***3/10 UPDATE:*** *Fencing is provided around the entire site.*	Confirm whether crash barriers or bollards are provided by code. ***3/10 UPDATE:*** *No further recommendations.*
Combustible Storage	IFC §1207.4.6 NFPA 855 §4.5	Not addressed in the reviewed materials. ***3/10 UPDATE:*** *No combustible storage was observed inside the BESS enclosure in the field.*	Confirm that no combustible storage is stored or allowed within the BESS enclosure. ***3/10 UPDATE:*** *No further recommendations.*
Signage	IFC §1207.4.8 / NFPA 855 §4.7.3	No signage details provided. Hazard signage (e.g., voltage, battery hazard, emergency contact information) isn't visible in the photo; the code requires posting on enclosure doors and at entry points. ***3/10 UPDATE:*** *Hazard signage observed on the enclosure doors, entry points, and perimeter fencing in the field.*	Provide code-compliant signage on the front doors/entry points to the BESS enclosure. Signage should include the type of technology, ratings, the type of suppression system installed, and emergency contact information. A template from NFPA 855 is shown below:  ***3/10 UPDATE:*** *No further recommendations.*

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Requirement	Section	Observation	Recommendation
Security of Installations	IFC §1207.4.9 / NFPA 855 §4.7.6	ERP notes site fencing, locked doors, and CCTV. However, correspondence from the Borough Solicitor (August 2025) indicates that the facility gates and/or doors have been observed open on multiple occasions, offering unimpeded public access. Photographs were enclosed in that letter as supporting evidence. ***3/10 UPDATE:*** *Closing/locking of site gate was observed during site visit.*	Request clarification and corrective actions regarding procedures to ensure that gates and doors remain secured at all times. Confirm whether an inspection and maintenance schedule exists for security measures. It is recommended that both documentation of procedures and training for personnel be provided to prevent the recurrence of unsecured site access. ***3/10 UPDATE:*** *No further recommendations.*
Size and Separation	IFC §1207.5.1 / NFPA 855 §9.4.2	No information on grouping/clearance within the BESS enclosure. No UL 9540A spacing data provided to justify grouping/clearance. ***3/10 UPDATE:*** *UL 9540A unit-level testing results indicate zero spacing between units, in alignment with the observed field conditions.*	Verify that 50 kWh groups of racks are spaced at a minimum of 3 feet from each other, unless UL 9540A test results permit larger groups and reduced spacing. ***3/10 UPDATE:*** *No further recommendations.*

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Requirement	Section	Observation	Recommendation
Fire and Smoke Detection	IFC §1207.5.4 / NFPA 855 §4.8	ERP notes smoke, heat, and gas detection tied to ventilation and FCC are provided. Detector count and locations are not visible in photos. Device specifications and fire alarm design compliance with NFPA 72 were not available in the reviewed materials. ***3/10 UPDATE:*** *Fire alarm as-built drawings and device specifications were furnished by ACE for review in person and were determined to be suitable for the application in the field.*	Verify detection type, quantity, and placement (ceiling-mounted, wall-mounted) meet NFPA 72 requirements. Confirm that gas detector placement and type are evaluated as part of the NFPA 69 analysis for combustible gas mitigation. Request as-built fire alarm drawings and device specs. ***3/10 UPDATE:*** *No further recommendations.*
Fire Control & Suppression	IFC §1207.5.5 / NFPA 855 §4.9	ERP states Novec 1230 clean agent suppression provided; NFPA 2001 compliance not documented. Plumbed water deluge available via FDC. ***3/10 UPDATE:*** *Sprinkler and clean agent system as-built drawings and associated calculations were furnished by ACE for review in person and were determined to be suitable for the application in the field. The sequence of operations, which prioritizes explosion prevention over clean agent deployment, was confirmed by ACE's representatives and the documentation they furnished for review in person.*	Provide suppression system design, agent quantity, NFPA 2001 compliance verification, and coordination with ventilation/explosion prevention systems. [See discussion in **Section 4.0**] ***3/10 UPDATE:*** *No further recommendations.*
Vegetation Control	IFC §1207.5.7	Not addressed in the reviewed materials. ***3/10 UPDATE:*** *No vegetation observed within the BESS site fencing.*	Confirm combustible vegetation is cleared within 10 feet of all sides of the BESS enclosure. ***3/10 UPDATE:*** *No further recommendations.*

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Requirement	Section	Observation	Recommendation
Means of Egress Separation	IFC §1207.5.8 NFPA 855 §4.7.8 NFPA 855 §9.5.2	No details on exhaust outlet locations and egress path separations. Egress stairways appear narrow with handrails but may require verification for NFPA/IBC compliance (minimum width, landing size, and guardrail height). HVAC louvers and potential explosion vent panels appear to be located in areas that could be exposed to the public. UL noted that panic hardware was damaged on one exit door. ***3/10 UPDATE:*** *Panic hardware was observed to be functional. 10 foot egress clearance from HVAC louvers was confirmed in the field.*	Request site plan showing means of egress separation from the BESS enclosure, exhaust outlet locations, and distances to openings/paths. Request confirmation that they meet the 10-foot clearance requirements from doors, windows, and public ways. ***3/10 UPDATE:*** *No further recommendations.*
Explosion Control	IFC §1207.6.3 NFPA 855 §9.6.5	ERP notes an explosion prevention system with gas detection and ventilation interlock; however, NFPA 69 compliance is not documented. ***3/10 UPDATE:*** *ACE furnished "Hitachi BESS Runaway Gas Concentrations in Ventilated Enclosures" which confirms compliance with NFPA 69 for review in person.*	Request NFPA 69 compliance documentation for the explosion protection system in the BESS enclosure. ***3/10 UPDATE:*** *No further recommendations.*

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Requirement	Section	Observation	Recommendation
Thermal Runaway Protection	IFC §1207.6.5 NFPA 855 §9.6.5	BMS functions are described, but there is no evidence that it has been evaluated with a battery as part of the UL 1973 listing or the UL 9540A listing. UL noted that BMS integration with the inverter and EMS is incomplete, and functional safety assessments have not been verified. ***3/10 UPDATE:*** *Documentation that shows BMS features have been evaluated using batteries has been furnished by ACE for review in person. Field Evaluated Product Label has been observed to be applied in the field, as corrective actions have been taken as per the "Field Evaluation Services Final Report".*	Provide listing documentation that shows BMS features evaluated with the battery system as part of the certification/listing process. ***3/10 UPDATE:*** *No further recommendations.*
Clearances to Exposures	IFC §1207.8.3 NFPA 855 §9.5.2	Distances to nearby exposures and separation could not be confirmed to meet the minimum 10-foot requirement. ***3/10 UPDATE:*** *10-foot separations from other exposures were observed in the field.*	Verify clearances or request evidence from HMA and UL 9540A results, and that the 2-hour fire rating allows for reduced spacing that does not fall below 3 ft. ***3/10 UPDATE:*** *No further recommendations.*

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Requirement	Section	Observation	Recommendation
Emergency Planning and Training	NFPA 855 §4.3	The ERP provided contains hazard identification, isolation procedures, evacuation perimeters, fire department coordination, and post-incident recovery. This plan serves as an annex to the Borough's Emergency Operations Plan (EOP). No mention of training for personnel/fire department on the EOP/ERP. ***3/10 UPDATE:*** *Training procedures are described in the "Pre-Fire Plan (PFP)" and "Emergency Operation Plan (EOP)" which were furnished by ACE for review in person.*	Add training provisions in the ERP/EOP to include periodic training for operations staff, emergency responders, and coordination with the fire department on drills. ***3/10 UPDATE:*** *No further recommendations.*

4.0 Risk Considerations

The Beach Haven BESS installation presents several operational, compliance, and environmental challenges that directly influence the selection and adequacy of fire and life safety measures. The following considerations were only evaluated based on the limited available documentation, applicable code requirements, and industry best practices.

Fire Hazards

The lithium-ion battery chemistries in use (NCA, NCM, LMO) remain susceptible to thermal runaway during internal or external fault conditions. Once initiated, thermal runaway can propagate between cells, modules, and racks, producing high heat release rates, flammable gases, and visible open flames.

The internal rack configuration, with thirteen racks (6 and 7 in two rows), presents propagation pathways if cooling, spacing, or detection/mitigation systems are not adequately maintained. Because UL 9540A testing data for the as-built configuration have not been provided, the adequacy of current clearances cannot be confirmed, and assumptions about fire spread remain uncertain.

It is understood that while basic mechanical and structural load ratings have been verified for the enclosure, there are gaps in documentation related to UL 9540A thermal propagation testing and UL 1973 evaluations of safety components, such as the BMS. Additionally, UL's field evaluation identified non-conformances in system certifications. Additionally, UL's field evaluation identified non-conformances in certifications, including DC disconnects, transformer listings, and arc-flash/SCCR documentation, which represent both fire and electrical hazards if left uncorrected and further increase uncertainty about the installation's ability to contain or limit fire growth during an internal failure.

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Recommendation #1: Obtain and review full UL 9540A large-scale fire test results for the as-built configuration. Confirm allowable rack grouping and clearances and, if necessary, revise the suppression and separation/clearance strategy. Incorporate a water-based suppression system to provide surface cooling and prevent escalation.

3/10 UPDATE: *Recommendation #1 has been satisfied. All three levels of UL 9540A testing have been demonstrated to be performed, and the testing configurations reflect the configurations installed in the field (i.e., no separations are provided/required between units). A water-based suppression system has also been shown (in documentation and in the field) to be present.*

Explosion and Deflagration Hazards

Vented gases during a battery thermal runaway can create flammable mixtures within the enclosure. If ventilation is delayed or obstructed, this may lead to deflagration hazards. While the system incorporates combustible gas detection linked to an explosion prevention system, effective mitigation relies on system performance, enclosure integrity, and timely activation.

It is understood that testing and performance documentation for the gas detection system and explosion prevention system were not verified. This means that the system's reliability in detecting and mitigating explosive concentrations cannot yet be confirmed. Furthermore, the orientation of exhaust vents and louvers may direct gases toward public exposure areas, and this has not been evaluated against clearance requirements.

Recommendation #2: Provide complete documentation demonstrating compliance with NFPA 69 for the explosion prevention system. Confirm that gas detectors are UL 2075 certified and integrated adequately into safety circuits, with appropriate setpoints and interlocks for timely activation. Include verification of vent/louver placement to prevent hazardous discharge toward exposed areas.

3/10 UPDATE: *Recommendation #2 has been satisfied. ACE furnished "Hitachi BESS Runaway Gas Concentrations in Ventilated Enclosures", which confirms compliance with NFPA 69, for review in person. Gas detector specification sheets indicate certification by UL 2075. Vent/louver locations confirmed in the field to be at least 10 feet from egress paths.*

Suppression System Effectiveness

The current design includes a Novec 1230 clean agent system for the battery enclosure. While clean agents are suitable for specific energized electrical hazards, they present limitations in lithium-ion battery applications. Clean agents cannot cool batteries undergoing thermal runaway, meaning re-ignition or continued propagation is possible after discharge. Their discharge can interfere with ventilation systems designed to mitigate explosion hazards. Their effectiveness depends on maintaining enclosure integrity, which may be compromised during venting events.

UL's field evaluation noted gaps in the design, listing, and integration of the detection and suppression integration documentation, meaning compliance with UL 9540, NFPA 2001, and integration with ventilation and explosion prevention controls remains unverified.

Water-based suppression, whether via an automatic sprinkler or manual deluge connection, offers distinct advantages in this context. It provides surface cooling to reduce the likelihood of fire spread and limit thermal damage to adjacent racks. It can be applied in a controlled manner, and it does not require

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sealing the enclosure, allowing continued operation of ventilation/exhaust systems. Given the potential limitations of clean agents, a water-based approach may offer a more resilient and operationally compatible solution for this installation.

Recommendation #3: Replace or augment the clean agent suppression system with a water-based suppression solution compatible with lithium-ion hazards. Ensure that the water-deluge option is fully commissioned and that fire department personnel are trained on manual activation procedures.

3/10 UPDATE: *Recommendation #3 has been satisfied. Clean agent (NOVEC Sapphire) system has been augmented by the presence of a water-deluge system with two (2) fire department connections. Training materials have been furnished by ACE that indicate that manual activation of the sprinkler system may be accomplished, but it is a means of last resort, due to the likely damage to the BESS.*

Detection Dependencies

BMS, smoke, heat, and gas detection systems are used within the enclosure to detect hazards, initiate suppression, and activate the active ventilation system. False negatives, caused by shielded ignition points or slow-developing conditions, pose a risk. Redundant detection and careful placement can improve early hazard recognition.

It is understood that there are gaps in detection certification and integration documentation, particularly with the gas (hydrogen) detectors and the fire alarm control system. If detectors are only wall-mounted, they may miss ceiling-level accumulations or localized aisle concentrations. Placement and type should be reviewed as part of NFPA 69 analysis. Additionally, documentation for safety control and communication systems (e.g., BMS integration with the inverter and EMS) is incomplete, and functional safety assessments have not been verified.

Recommendation #4: Provide an as-built detection layout with device locations, quantities, and specifications, and confirm design compliance with NFPA 69, NFPA 72, and NFPA 855. Verify that communication protocols and safety interlocks have been tested and documented under UL 9540 and UL 1998/UL 991 functional safety standards.

3/10 UPDATE: *Recommendation #4 has been satisfied. As-built drawings indicating device locations and quantities, along with device specifications, have been furnished by ACE for review in person. Design compliance with NFPA 69, 72, and 855 appears to be achieved upon review. Safety interlocks have been tested/documented under UL 9540 and UL 1998/991 functional safety standards. Field Evaluated Product Label has been observed to be applied in the field, as corrective actions have been taken as per the "Field Evaluation Services Final Report".*

Access, Security, and Response Constraints

The elevated fenced enclosure design limits immediate access by first responders during an incident. With the site being unmanned, there may be delays before manual intervention occurs. In addition, operational controls for emergency shutdown and ventilation could be at risk if communications or control systems fail during an event. UL noted damaged panic hardware on one exit door, which could further restrict emergency egress.

Security concerns have also been raised: correspondence from the Borough Solicitor (July 2025) documented repeated instances of facility gates and/or doors being left open, creating opportunities for

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unauthorized public access. Hazard signage was also not verified in the reviewed materials, meaning that responders or the public may lack critical information (battery type, hazard warnings, emergency contact information) at points of entry.

Recommendation #5: Maintain and test all FCC functions for remote shutdown, ventilation control, and manual deluge activation. Implement a formal inspection and maintenance schedule for fencing, locks, and access control systems to prevent recurrence of unsecured entry. Post and verify code-compliant hazard signage at all enclosure doors and access points.

3/10 UPDATE: *Recommendation #5 has been at least partially implemented. FCC functions have been confirmed to be tested. Adequate signage has been posted on enclosure doors, access points, and perimeter fencing. Security provisions could not be discussed with ACE in person.*

Emergency Response Preparedness

The documentation reviewed references an ERP and general coordination with the fire department. However, no information is provided on the frequency of emergency drills, responder training, or validation of FCC operations under live conditions. Without recurring training and testing, responder familiarity with the unique site hazards (elevated platform, FCC functions, manual deluge activation) cannot be assured.

Recommendation #6: Incorporate documented training frequencies and periodic joint exercises into the ERP/EOP. Provide periodic training for local fire department personnel on FCC operation, site hazards, and manual override procedures.

3/10 UPDATE: *Recommendation #6 has been satisfied. Documentation for training procedures has been provided, including training frequencies as described in the "Pre-Fire Plan (PFP)" and "Emergency Operation Plan (EOP)" which were furnished by ACE for review in person.*

Environmental and Recovery Factors

The barrier island location introduces flood hazard considerations, as well as environmental implications for fire, water, and runoff. Water used for suppression will require containment and potentially hazardous waste handling due to contamination with electrolyte and other battery byproducts. Nonetheless, water remains a viable suppression medium when coupled with appropriate spill containment and environmental controls. While the elevated piers mitigate flood exposure, UL noted that documentation for anchorage and lateral stability under wind/wave loads was not provided.

8/13 UPDATE: *ACE furnished additional clarification regarding enclosure weather protection features, including interlocking enclosure construction, dampers, weather hoods, and rain hoods intended to reduce water intrusion into the enclosure and associated ventilation systems during severe weather conditions.*

Recommendation #7: Incorporate spill containment and runoff management measures into the site design and EOP/ERP. Coordinate with local environmental agencies on post-incident handling protocols and decommissioning. Verify structural anchorage and lateral stability for flood/wind hazards.

3/10 UPDATE: *Recommendation #7 has been partially addressed. Available structural documentation, design considerations for structural loading (e.g., ASCE 7-16), anchorage, and lateral stability under flood and wave loading conditions were provided as described in the "Structural Analysis Calculations" and*

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Geotechnical Report" furnished by ACE for review in person. Field Evaluated Product Label has been observed to be applied in the field, as corrective actions have been taken as per the "Field Evaluation Services Final Report". Emergency response procedures are described in the "Pre-Fire Plan (PFP)" and "Emergency Operation Plan (EOP)". Specific documentation addressing environmental response actions/spill containment/runoff management was not identified in the material reviewed.

***8/13 UPDATE:** ACE stated that the enclosure was designed using a 135 mph design basis wind speed and incorporates weather-resistant construction features consistent with NEMA 3R and IP55-rated enclosure characteristics.*

5.0 Conclusion

Based on the current documentation, several key gaps remain in listings, testing data, and safety procedures. Addressing these items before commissioning is essential to reducing uncertainty and aligning the installation with IFC and NFPA 855 requirements. The recommendations outlined in this memorandum are intended to support the Borough in its discussions with ACE by highlighting areas where corrective action and additional documentation are needed. Taking these steps will help ensure that the Beach Haven BESS can be safely operated and maintained, while providing greater confidence to the Borough, first responders, and the community.

This memo was based solely upon and limited to the available information provided and/or presented. Details and/or information not presented or provided on the documentation provided by the Client are not considered a part of this analysis. This memo is not intended to verify or guarantee that the actual installation complies with the provisions of the code and the recommendations provided in this memo.

3/10 UPDATE: *Review of the materials furnished by ACE in person on March 10, 2026 at the Borough of Beach Haven Municipal Building, along with a visual, noninvasive, nonfunctional site walk-through of the BESS site with ACE representatives, confirms that the requirements of the 2021 IFC and of the 2020 edition of NFPA 855 have been met.*

If you have any questions about this memo, please do not hesitate to contact us at **mtownsend@jensenhughes.com**

Sincerely,

Jensen Hughes, Inc.

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