

SECTION 133423 - FABRIC MEMBRANE COVER AND STRUCTURE

PART 1 - General

1.1 INTENT OF SPECIFICATION

- A. This specification covers the design, manufacture, shipping, handling and erection of a prefabricated membrane covered structure.
- B. The specification as heretofore set forth is general in nature and scope and shall not be construed as to limit the work.
- C. It is the intent of this specification that the bidder shall include all labor, materials, equipment services and transportation to locate the building on the site designated with all other work.
- D. Buildings shall be complete and operating and shall include all exterior and interior materials and systems as shown or indicated in contract documents.
- E. All workmen shall be skilled and qualified for the work that they perform. All materials used, unless otherwise specified, shall be new and of the types and grades specified. The contractor shall certify that no asbestos containing building materials that exceed Federal mandated safe asbestos levels have been used in the construction of the membrane-covered structure.
- F. Work shall be performed as necessary and required for the construction of the project as indicated. Such work includes the supply and installation of a membrane-covered structure complete with exterior and interior finishes. The building shall be as dimensioned with all features and quantities as per specification.

1.2 RELATED WORK

- A. The following specifications are referenced and included in the scope of work.
  - 1. None
- B. The following specifications are referenced for coordination with the scope of work.
  - 1. Section 033000 Cast-In-Place Concrete
  - 2. Section 310000 Earthwork: By owner
  - 3. Section 321216 Asphalt Concrete Paving: By owner

1.3 REFERENCES AND STANDARDS

- A. The following publications are for the standards listed below but referred to within the document by basic letter designation only. They form a part of this specification to the extent referenced thereto:
  - 1. American Institute of Steel Construction (AISC):
    - a. S326-78 Design, Fabrication and Erection of Structural Steel Buildings
    - b. S329-85 Structural Joints Using ASTM A325 or A490 Bolts.
  - 2. American Iron and Steel Institute (AISI)
    - a. SG 503-76 The Design of Fabrication of Cold-Formed Steel Structures

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- b. c. American Society for Testing and Materials (ASTM):
  - c. A 36-89 Structural Steel
  - d. A 123 A-89 Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
  - e. A 307-89 Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
  - f. A 325-89 High-Strength Bolts for Structural Steel Joints
  - g. A 500 A-90 Standard Specification for Cold Formed Welded And Seamless Carbon Steel Structural Tubing in Rounds and Shapes
  - h. A 563 Rev A-89 Carbon and Alloy Steel Nuts
  - i. A 687-89 High-Strength Non-Headed Steel Bolts and Studs.
- 3. American Society of Civil Engineers (ASCE) Minimum Design Loads for Building and Other Structures. Latest edition as required by State Code.
  - a. ASCE 7-02 American Society of Civil Engineers
  - b. ASCE 7-05 American Society of Civil Engineers
  - c. ASCE 7-08 American Society of Civil Engineers
  - d. ASCE 7-10 Minium design loads for buildings and other structures.
- 4. American Welding Society (AWS)
  - a. D1.1-2004 Structural Welding Code-Steel
  - b. D1.3-98 Structural Welding Code-steel sheet steel
- 5. National Fire Protection Association
  - a. NFPA 701-89.1 Standard methods of Fire Tests for Flame Resistant Textiles and Films. Small and Large Scale Test.
  - b. NFPA 701-96 Standard methods of Fire Tests for Flame Resistant Textiles and Films. Test Method 1 and Test Method 2.
- 6. New York State Uniform Fire Prevention and Building Code; Latest addition.

#### 1.4 SUBMITTALS

- A. The Contractor shall furnish detailed drawings for all structural work stamped by an engineer certified by the State of New York to verify compliance to local building code. Site specific calculation packages shall be provided upon request of the customer (Additional Fees shall apply).
- B. All work to be performed under the conditions of this specification shall comply with the rules and regulations of all agencies having jurisdiction for this classification of construction and design and shall conform to the applicable live loads due to wind, rain and snow.
- C. Building supplier must provide written certification that they have been in the steel tension membrane building business for 10 years or more under the same name.
- D. Duration of the Building supplier warranty must not exceed their number of years of business under the same name.
- E. Building supplier must provide written references with contact information for at least five salt sheds currently in operation local to this location and of the same square footage.

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- F. Complete, current, and extensive set of site-specific calculations for the entire structure including but not limited to the following:
- a. Certification that the proposed structure meets all requirements of the New York State Uniform Fire Prevention and Building Code including provisions for drifting and unbalanced snow load, according to ASCE 7-10 - Minimum Design Loads for Buildings and other Structures. This is a pre-award submittal; refer to Section 002217 Supplementary Instructions to Bidders - Condition of Award.
  - b. Certification that the proposed structure shall hold the salt capacity required by the contract documents. This is a pre-award submittal; refer to Section 002217; Supplementary Instructions to Bidders - Condition of Award.
  - c. Design loads and load combinations
  - d. Foundation design and loads including proposed structures allowable differential settlement
  - e. Finite element analysis of any proposed thin shelled structure, any structure that relies on stressed skinned panels to resist lateral loads or any non-conventionally framed structure
  - f. Lateral load resisting system calculations showing path of all loads from the roof to the foundation wall.

#### 1.5 WORKMANSHIP

- A. The workmanship of all materials and components of the structure shall be commensurate with the functional requirements of the item.
- B. Building prefabrication shall be performed under factory conditions in a plant specifically arranged for this type of work. Contractor shall provide adequate space, equipment, personnel, and technical ability to coordinate the assembly and factory prefabrication of all major components of the work and all necessary operations in the packing, shipping and installation procedures. No fabrication shall be done until the materials have been tested and approved.
- C. Welding: Welding shall be employed only when specified in the original design. As per Section 1704.2 of IBC, the truss fabricator must be an Approved Welding Fabricator to AWS B5.17 and QC17. Successful bidder MUST supply AWS certificate of approval.
- D. On Site Welding: If welding is required on site, no welding shall be started until the AWS welding inspector has inspected and approved the materials, joint preparation, equipment and the qualifications of the welders. Welders doing unsatisfactory work will be removed and required to pass qualification tests again before returning to work.
- E. Manufacturer: The structure supplier shall be a reputable manufacturer, that shall have at least 10 years direct experience in the design, manufacture and installation of structures of the type specified herein; shall operate according to a comprehensive quality system and shall provide three references with structures in use for at least five

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years which are clear span and each must enclose an area in excess of the square footage as stated in section 1.2.4.

## 1.6 SCOPE OF WORK

- A. Rigid steel frame supporting membrane covered roof and wall structure of the type described herein:
- B. The structure must provide a minimum height above the foundation in accordance with the construction drawings.
- C. Flat gable ends with 4' x 4' passive vents in accordance with the construction drawings. Ventilation openings shall be located at or near the highest and lowest point of the roof providing a ratio of one square inch of free air area for each 55 square feet of structure floor area. Each ventilation opening shall be weatherproof.
- D. Soffit vent system at top of foundation wall in accordance with construction drawings.
- E. Termination of Fabric to Concrete Wall System shall permit air flow along the eave edge, overlap the foundation, secured for all loading conditions and provide a weatherproof connection.
- F. Foundation Anchors-Bolt Connections must be engineered using Hilti Stainless Steel products. Provide design calculations and submittal on all materials signed and sealed by a NYS PE.
- G. Site Work (by owner)
- H. Delivery to Site
- I. Complete Structure & Accessory Installation.

## PART 2 - PRODUCTS

### 2.1 PRODUCT MANUFACTURER

- A. The following manufacturer is preapproved and meets or exceeds this Specification:  
Calhoun Super Structures, 3702 Bruce Road #10, Tara, Ontario N0H 2N0 Ph: 1-800-264-3994

### 2.2 GENERAL DESIGN REQUIREMENTS

- A. Scope
  - 1. The membrane shall be tensioned over the framework. The structure shall be rectangular in shape with vertical gable end walls. The interior of the structure below the main trusses shall be clear span free of any structural support members and shall provide unobstructed floor space. No exterior purlins, guy ropes or cables shall be used for anchoring the structure.
  - 2. The structure shall include accessories to the extent shown on the project drawings required for the scope and intended use for:
  - 3. Overhead doorways (not applicable)

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4. Ventilation systems. (passive, vented)
5. Other structure accessories

B. Design Requirements - Structural Frame

1. Roof and Wall Surfaces: To provide for maximum compatibility with standard door, window, ventilation and other accessory and cladding systems, the structure shall be designed such that gable surfaces form flat planes.
2. Purlin Spacing: To provide for structural stability and to provide for installation of accessory items, the main structural trusses shall be laterally braced by load bearing purlins at intervals required by the truss design. Purlins must be Hot Dipped Galvanized post fabrication.
3. Wind and Frame Bracing: The structure shall be appropriately stabilized with wind bracing cable as well as any required secondary node restraint assemblies so as to efficiently transfer wind, snow and seismic induced stresses to the foundation/anchoring system. Cable diameter for main wind bracing shall be a minimum of 3/16" diameter and larger if so required. The end bays of the structure shall be designed to be X - braced early during installation to allow for permanent stability of the frame during installation.
4. Connecting Joints: Connections between structural elements shall be designed so as to transfer the compressive and tensile forces present in a given joint. A minimum of Grade 5 bolts shall be used at each truss chord joint. Primary axial steel, secondary purlins, and end wall frame connections shall be made with a minimum of Grade 5 hex bolts, carriage bolts and self drilling screws.
5. Mechanical Equipment Interface: The main structural roof trusses shall allow for installation of electrical and mechanical equipment based on collateral loads as defined in section 2.2.2. Likewise, the structure shall accept penetrations through the membrane for access doors and mechanical services with minimal modification.
6. Ancillary Systems: The structure shall be designed such that it can be readily retrofitted with insulation systems and other ancillary systems such as lighting, sprinklers, HVAC, provided collateral load factors are taken into account.
7. Alternative Cladding materials: The structure shall be designed such that alternative covering materials such as metal wall cladding can be added with minimal modification, if required (provided collateral load factors are taken into account).
8. Shipping: The main structural trusses shall be standard planar-style trusses which nest tightly together in order to minimize shipping and storage volume.

C. Design Requirements - Membrane Cladding System

1. Membrane: The roof membrane shall form a weather tight shell over the structural frame. In order to provide for a good finished appearance and to insure weather tightness, the membrane shall be assembled and tensioned, in a manner to minimize wrinkles in hot and cold temperatures.
2. The gable wall membrane cladding shall be manufactured and connected to form one piece to the adjacent end wall and roof cladding.
3. Roof membrane horizontal stretch shall be maintained with horizontal purlins requiring no ongoing maintenance. Vertical stretch shall be maintained with a winch lock system requiring minimal ongoing maintenance.
4. Each bay shall have an individual fabric panel attached to each truss via a keder system. The keder system must include a vinyl cap to seal all extrusion.
5. Base Tensioning System: The membrane cladding shall be provided with a mechanical tensioning system that allows the membrane to be fully tensioned around the structure perimeter. The system shall be designed such that the membrane can be tightly and neatly secured over the structural frame and such that the system has remaining range of adjustment.
6. Membrane Seal at Openings and Base: The Dealer supplying the structure shall provide all materials and methods necessary to fully tension and seal the membrane material around all door, ventilation and other openings as well as around the structure perimeter below the main tensioning system. This seal shall provide a neat and finished appearance and eliminate any loose membrane cladding that could otherwise be damaged by flapping or abrasion.
7. The membrane shall not be designed to function as a structural member such that, should any damage to or penetrations of the membrane occur, the integrity of the structural framework shall not be affected.
8. The Contractor shall provide drawings and calculations acceptable to the Architect/Engineer of Record, meeting the provisions of the applicable State Building Code. The Contractor shall bear all costs for production of drawings and associated structural calculations. Contractor shall make all revisions and corrections to those documents required for approval and shall resubmit as required to obtain approvals.
9. Successful bidders shall make all required changes or corrections and shall deliver to the Owner's Architect all approved drawings and reactions.

## 2.3 ENGINEERED DESIGN CRITERIA

- A. 2.2.1 The structure shall be designed using methodology as per the ASCE 7 standard referenced from the applicable building code. Primary and secondary framing shall comply with current issues of AISC, AISI, NEMA and ASTM specifications, as applicable. Structural members shall be designed using Allowable Stress Design (ASD) or Load Resistance Factored Design (LRFD) for the design loads given below. Appropriate safety factors to yield and ultimate shall be maintained. Wind load factors and coefficients used in design of structural members must be in accordance with the applicable ASCE 7 guidelines. An appropriately justified analysis method which considers both the large displacement geometric and material nonlinearities of the fabric cladding shall be used in determination of the load effects on all supporting elements. Upon request use of the methodology must be proven by providing a detailed calculation package. The use of Metal Building Software (MBS) is not acceptable for the aforementioned analysis.
- B. Snow Loads: The structure shall be designed based upon a minimum ground snow load for Lewis NY in accordance with NYS Building Code (70 PSF), including unbalanced snow loading conditions.
- C. Wind Loads: The structure shall be capable of withstanding a basic wind speed (3-second gust ) 120 mph, from any direction in accordance with NYS Building code The design wind pressure shall be based on an exposure category of C and appropriate wind load factors and coefficients in accordance with the applicable referenced ASCE 7 guidelines. In no event shall the wind load used in the design of the main wind force resisting system be less than 10 pounds per square foot multiplied by the area of the building or structure projected on a vertical plane that is normal to the wind direction ( or as prescribed by the applicable building code). Wind Uplift Resistance: Per ASTM D7158 Class-G 120-MPH Basic Wind Speed
- D. Rainfall: The structure shall be capable of withstanding the effects of rainfall up to 4 inches per hour for at least 2 hours.
- E. Deflection: For safety of specified or future suspended accessories, the maximum allowable deflection of structural members shall be no more than 1/180 of the clear span of that member when subjected to the design loads described herein.
- F. Design Loads: The design shall be based as a minimum on the following design loads. Each member shall be designed to withstand stresses resulting from combinations of design loads that produce maximum percentage of actual to allowable stress in that member as per referenced ASCE 7 standard from applicable building code.
1. D= Dead Load + Collateral Load
  2. S= Symmetrical Snow or Live Load (Balanced or Unbalanced)
  3. W<sub>s</sub> = Wind with internal suction
  4. W<sub>p</sub> = Wind with internal pressure
  5. E = Earthquake

## 2.4 OPERATION AND USE

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- A. The main structural frame and cover shall be warranted to provide a minimum 15-year operational use period with appropriate inspection and maintenance.
- B. The structure shall be capable of being assembled, operated, and dismantled in all ambient temperatures between -20°F and 120°F.

2.5 MATERIALS

- A. All materials used in the structure shall be new, without defects and free of repairs. The quality of the materials used shall be such that the structure is in conformance with the performance requirements as specified herein.
- B. Cladding Membrane: The structure shall be clad with a coated polyolefin fabric manufactured by an approved and reputable supplier with demonstrated long-term performance. The polyolefin membrane fabric shall be waterproof and free from defects. All roofs, walls, end walls and connecting sections shall be weather tight. The material shall be selected from the manufacturer's standard colors for the sidewalls and roof panels. The material scrim and coating must be UV stabilized, and must carry a minimum twenty five -year manufacturer's warranty and have a minimum life expectancy of 25 years. The minimum fabric specification is as follows:

Unit Weight	oz/yd2	13.8		ASTM D3776
Temp Rating	Deg C	-65		ASTM 2136
Grab Tensile	lbf	400	Warp	ASTM D5034
		400	Weft	
1" Tensile Strength	lbf/inch	260	Warp	ASTM D5035
		255	Weft	
Tongue Tear Strength	lbf	90	Warp	ASTM D2261
		90	Weft	
Mullen Tear	psi	650		ASTM D3786
Acc. UV Weathering Strength retention	%	90		ASTM G154

Flammability		Class A		ASTM E84-94
Light Transmission	%	16		
Thickness (minimum)	mil	24		Caliper

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- C. Acceptable membrane suppliers include: Fabrene, Intertape and Hagihara. The membrane manufacturer must demonstrate a minimum of five years successful field experience with provision of polyolefin membrane cladding in use on similar or larger size structures of the type contemplated in this specification.
- D. Metal: The main structure shall consist of a welded truss arches with parallel tube chords separated apart by webbing. A minimum of 3" of weld shall join the webb to the cord at each location. The webb shall be an open section to allow access to all surface areas for hot dip galvanization. Continuous tubular webbing is not acceptable.
- E. Truss sections are manufactured and post dip galvanized to insure proper protection on the inside as well as the external surfaces of the truss sections. All sections must be post dipped galvanized post fabrication to a minimum of CSA G-164 / ASTM A123-15. Truss shall be manufactured of a cold-formed and induction welded modified grade carbon steel, providing a finished tubular product with exceptional mechanical and corrosion resistant properties. Purlins must be hot dipped galvanized.
- F. Tolerances: All dimensional tubing tolerances are in accordance with ASTM A500, Section 10.
- G. Tubing shall be manufactured using steel conforming to ASTM A568, ASTM A1011 and G40.21 350W. Finished steel tubing used in the structure must have minimum structural and mechanical properties based on standard ASTM A500.
- H. All steel flat bar, cross rods and other steel components shall be fabricated from hot dipped galvanized material, meet the stated standards and have minimum structural and mechanical properties based on standard CSA G40.20/40.21-44W or ASTM A572 Grade C
- I. Corrosion Protection: as per 2.4.3 all Metal sections shall be hot dipped galvanized to a minimum of CSA G-164 / ASTM A123-15. This allows for maximum protection on all welded surfaces including the interior sections.
- J. Hardware:
  - 1. Bolts: Bolts subject to extreme stress and wear shall be structural bolts of Grade 5 and plated / galvanized that has been upgraded with a corrosion resistant topcoat finish. All bolts shall be installed and securely torqued so as to prevent change in tightness. Those subject to removal or adjustment shall not be swaged, peened, staked or otherwise installed.
  - 2. Membrane Tensioning Hardware: The fabric membrane shall be tensioned with load rated hardware which is plated/hot dip galvanized so as to prevent corrosion. Hardware shall allow full and free rotation at the foundation connection to avoid fatigue failure of threaded assemblies.

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3. Membrane Tensioning Webbing: The membrane shall be tensioned with load-tested tie-downs.
4. Cable Assemblies: Main and wind bracing cable assemblies shall be manufactured to the required length and press swaged with metal sleeves. The cables are manufactured using preformed 7-19 stainless steel cables, sized with appropriate safety factors.
  - a. 3/16" dia. = 4,200 lbs.
  - b. 1/4" dia. = 7,000 lbs.
  - c. 5/16" dia. = 9,800 lbs.
  - d. 3/8" dia. = 14,400 lbs.
  - e. 1/2" dia. = 22,800 lbs
5. Other Fasteners: Non-structural fasteners such as wood screws, Tek screws, etc., shall be of standard commercial quality
6. Exterior Trim: The aluminum alloy used in the extrusion shall meet or exceed 6063-T6.

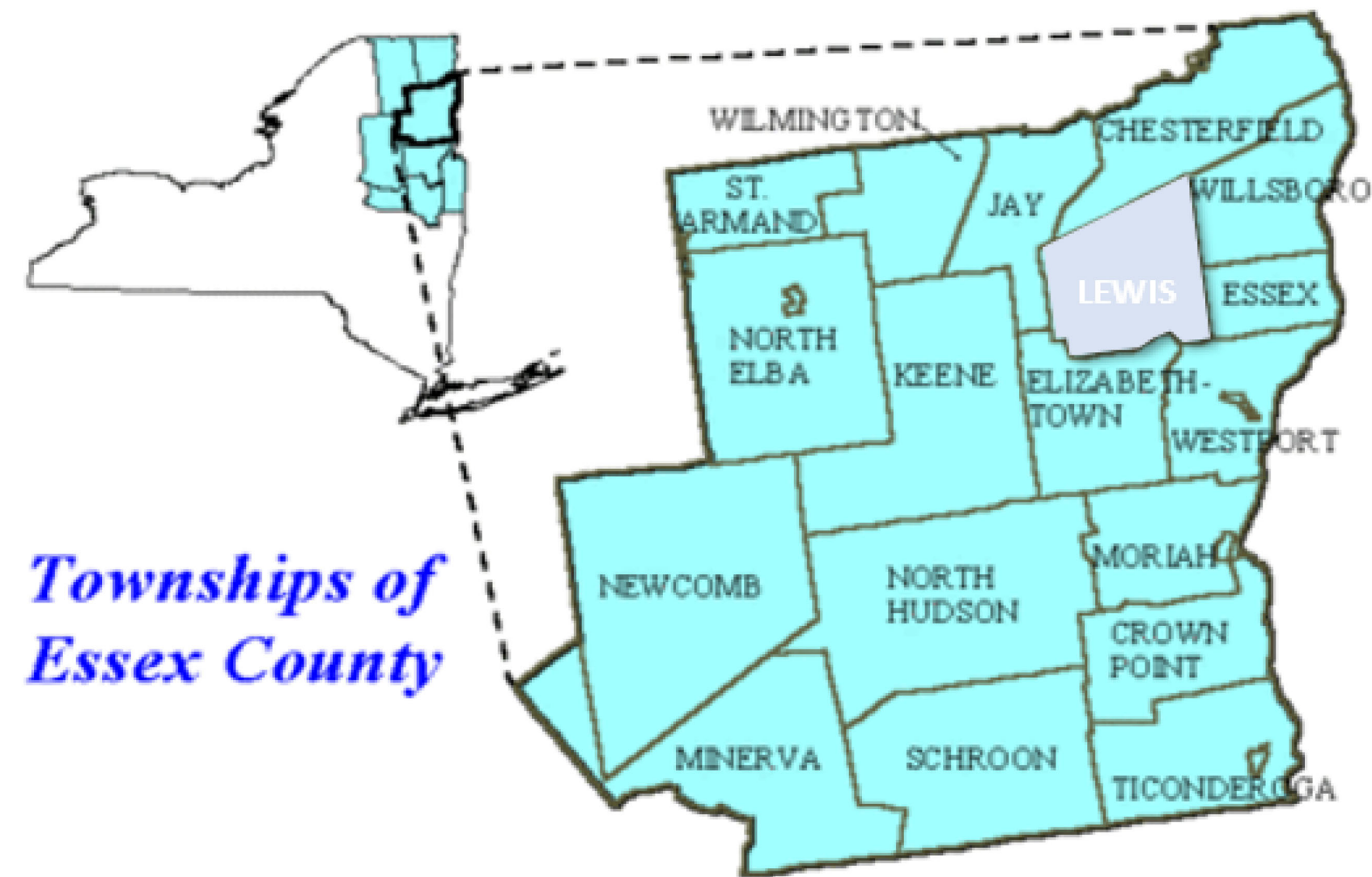
### PART 3 - EXECUTION

#### 3.1 EXAMINATION AND HANDLING

- A. Piece marking and Identification: All individual parts or bundles and packages of identical parts are to be clearly marked for identification. Bolts, nuts, washers and fasteners shall be packaged according to type, size and length. Shipping documentation shall include a list showing the description, quantity and piece mark of the various parts, components and elements.
- B. Material Delivery: The building system materials shall be delivered to the project site during normal working hours on weekdays. Installation contractor shall provide adequate workmen and equipment to promptly unload, inspect and accept material delivery.
- C. Handling: The installation contractor shall be responsible for unloading, field storage, protection and transfer to the work area of all materials and equipment required to perform the work. At no time shall materials be dropped, thrown or dragged over the transport equipment or the ground. Damage to any piece under its own or superimposed weight shall be cause for repair or replacement.
- D. Short, Damaged or Excess Materials: Installation contractor shall inspect, count and verify quantities based on the shipping documents.

#### 3.2 INSTALLATION AND ERECTION

- A. Inspect and verify foundation wall for mounting of substructure.

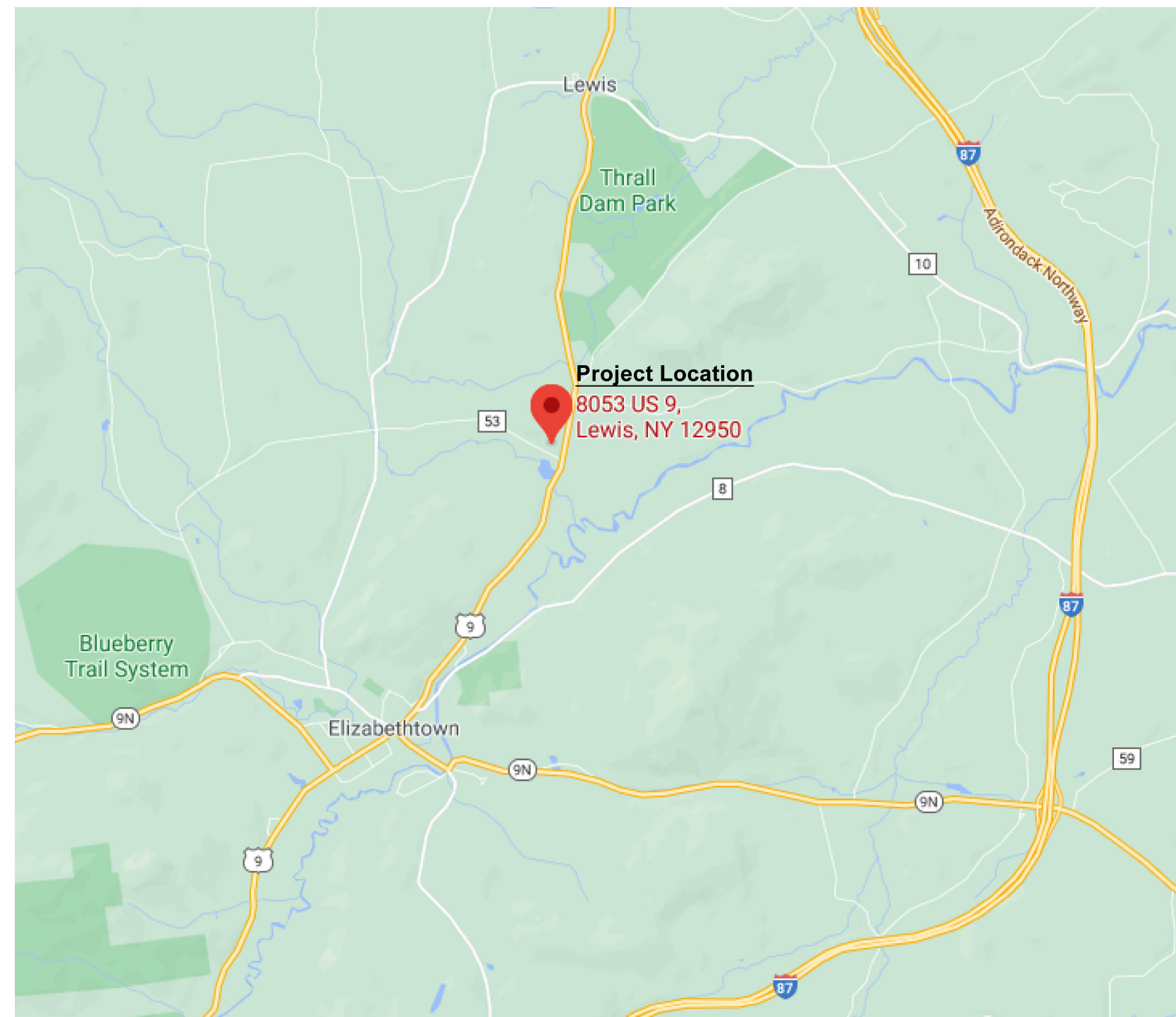


Townships of  
Essex County

1 PROJECT AREA  
SCALE: NTS

# ESSEX COUNTY SALT STORAGE FACILITY LEWIS, NY

NYS DEC WQIP # C100551G  
ESSEX COUNTY PROJECT # P-0101-2017



2 PROJECT LOCATION  
SCALE: NTS

**GENERAL NOTES:**

IT IS THE RESPONSIBILITY OF ALL CONTRACTS TO REVIEW ALL DRAWINGS FOR COORDINATION, REFERENCE LOAD CONDITIONS, PENETRATIONS, ANCHORS, ELEVATIONS PERTAINING TO THE SCOPE OF WORK SPECIFICALLY IDENTIFIED IN THE PLANS AND SPECIFICATIONS.

ALL CONTRACTS ARE RESPONSIBLE FOR MEANS, METHODS, SCHEDULING, SAFETY AND SECURITY AT THE PROJECT SITE.

THE OWNER IS RESPONSIBLE FOR THE BUILDING PERMIT, ELECTRICAL INSPECTION AND OTHER PERMITS BY REGULATORY AGENCIES.

CONTRACT DRAWINGS ARE SUPPLEMENTED BY SPECIFICATIONS, WHICH COMPLETES THE MINIMUM REQUIREMENTS FOR MATERIALS AND INSTALLATION AND THE TERM "PROVIDED BY". CONFLICTS BETWEEN DOCUMENTS ARE TO BE ASSUMED TO BE THE MOST STRINGENT REQUIREMENTS OF THE TWO, WITH FINAL RESOLUTION BY THE ENGINEER.

ALL CONTRACTORS ARE RESPONSIBLE FOR COORDINATION OF RESPECTIVE SUBCONTRACTORS, SUPPLIERS, DELIVERIES, UNLOADING AND LOADING OF ALL MATERIALS AND EQUIPMENT.

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C001	COVER
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S201	FOUNDATON SECTIONS AND DETAILS
W101	FABRIC MEMBRANE STRUCTURE AND COVER
E001	ELECTRICAL NOTES AND DETAILS
E101	ELECTRICAL PLAN AND SECTION

**CONTRACT**

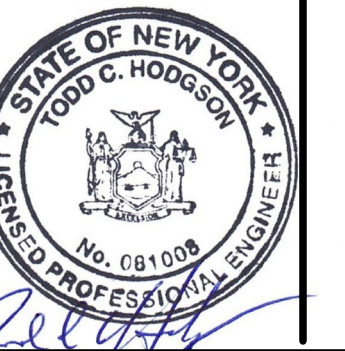
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SITE (BY OWNER)
SITE (BY OWNER)
STRUCTURAL (SC)
STRUCTURAL (SC)
SPECIAL CONST (WC)
ELECTRICAL (EC)
ELECTRICAL (EC)

ESSEX COUNTY DEPARTMENT OF PUBLIC WORKS

CONSTRUCTION WORK FOR

ESSEX COUNTY SALT STORAGE FACILITY

8053 US ROUTE 9, ELIZABETHTOWN, NY 12932

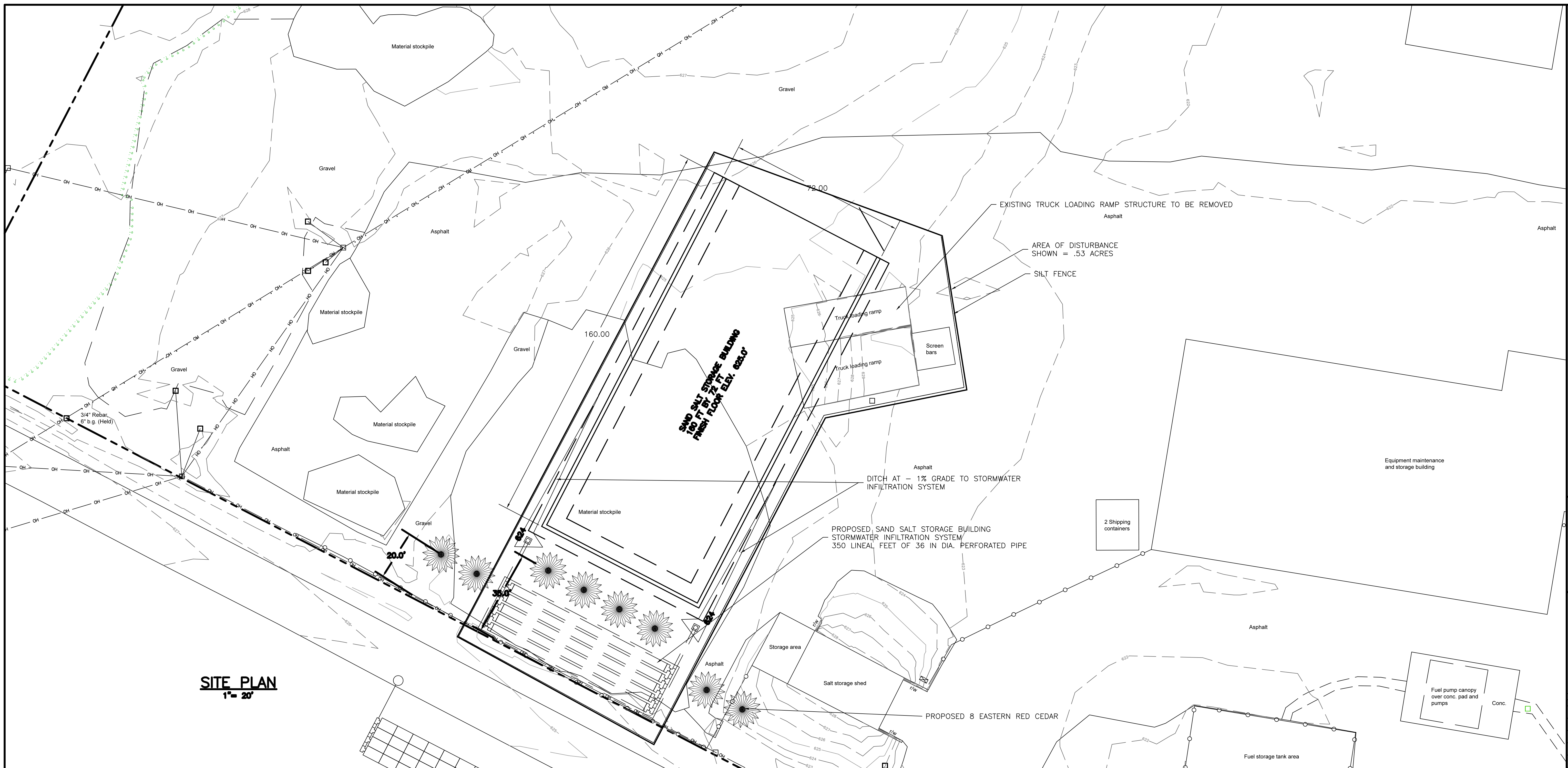


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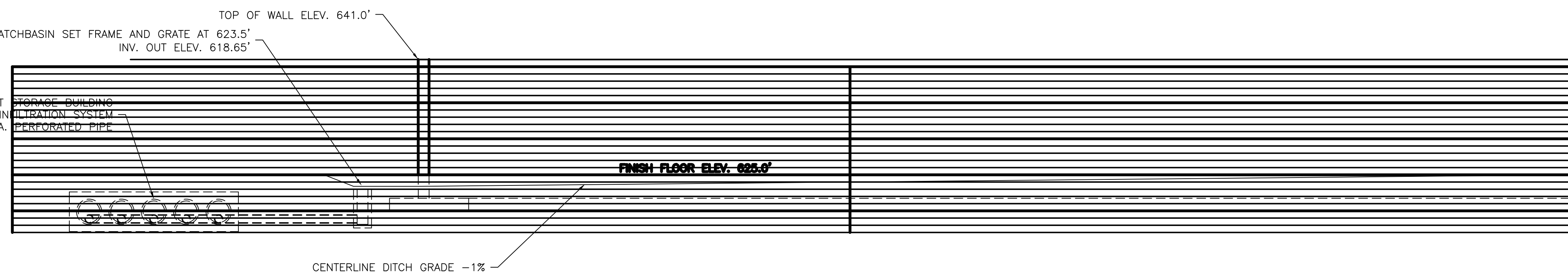
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DRAWING TITLE  
FOUNDATION AND BUILDING PLAN

DATE  
PROJECT NO. C001

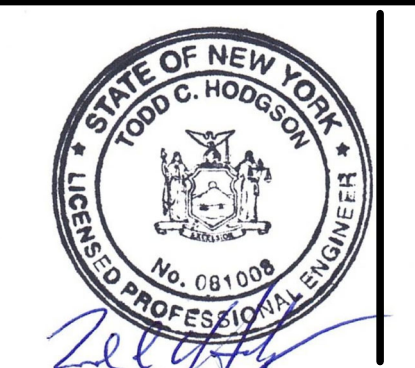


**SITE PLAN**  
1" = 20'



**PROFILE**  
VERT 1" = 10'  
HORZ 1" = 10'

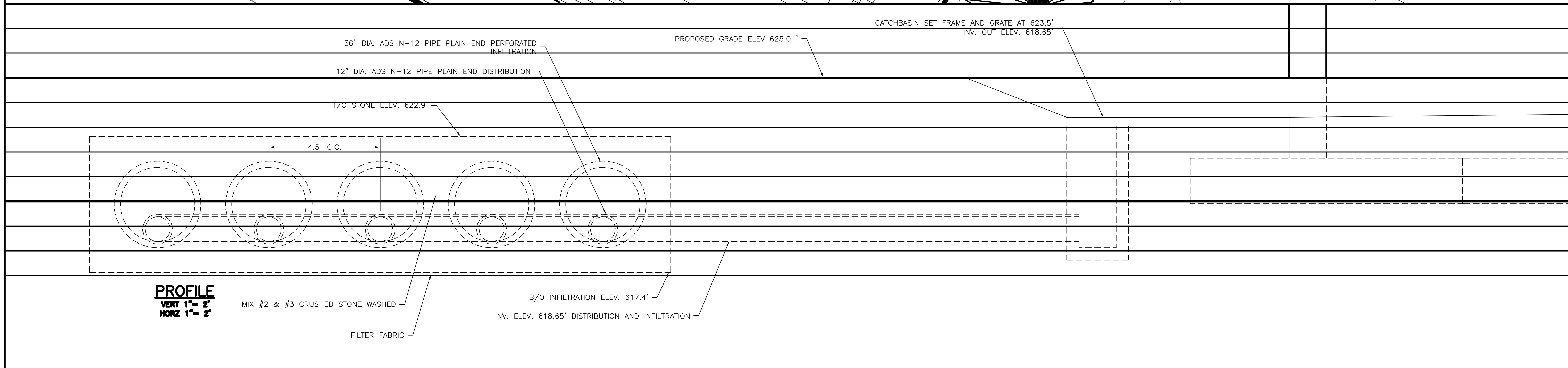
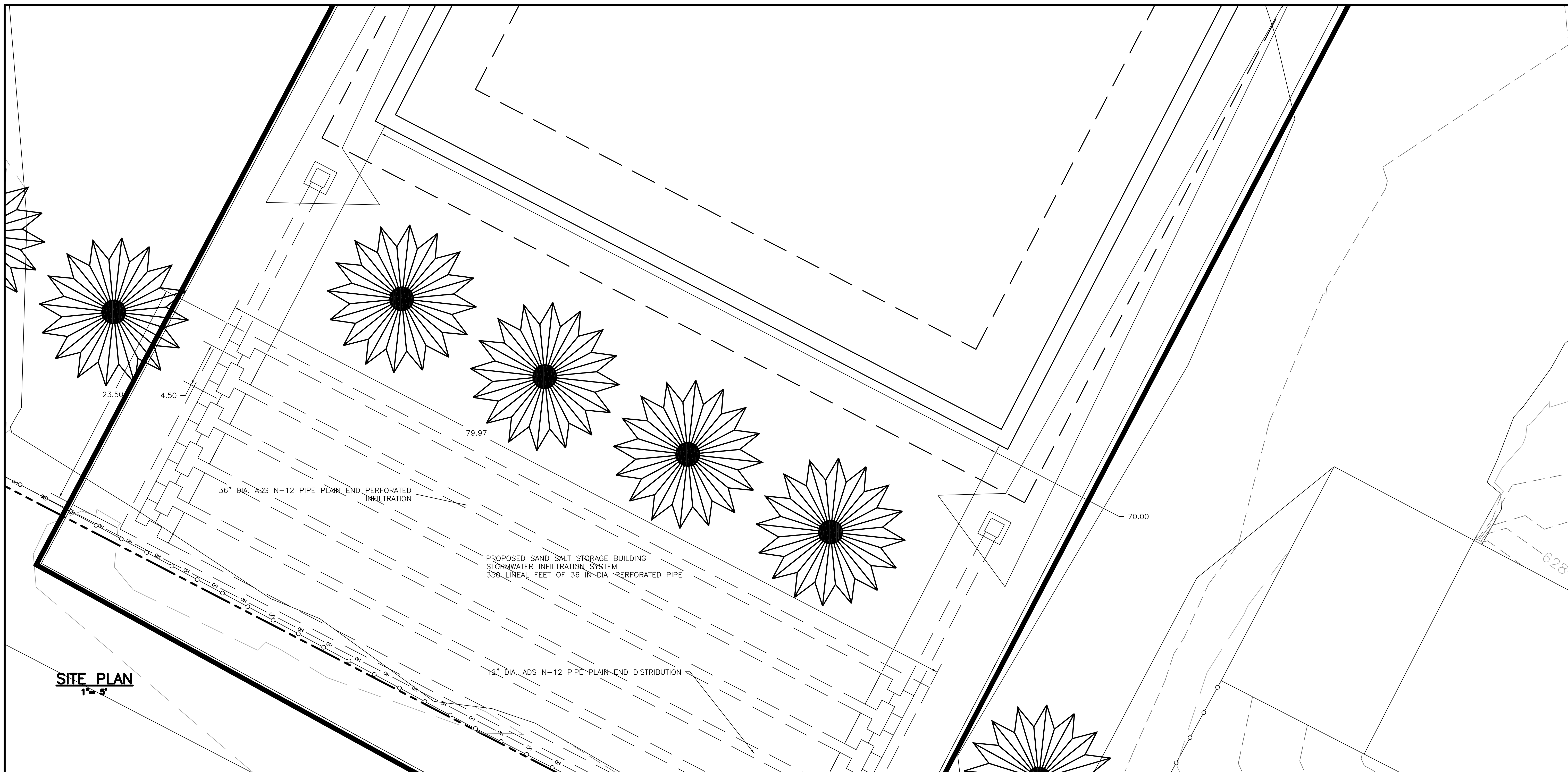
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CONSTRUCTION WORK FOR  
**ESSEX COUNTY SALT STORAGE FACILITY**  
8053 US ROUTE 9, ELIZABETHTOWN, NY 12932



NO.	DATE	DESCRIPTION
1.	03/01/21	APA RESPONSE
2.	07/09/21	FINAL

DRAWING TITLE  
**SITE PLAN**

DRAWN BY GWR	DWG. NO. <b>C101</b>
DATE 03/2021	PROJECT NO.

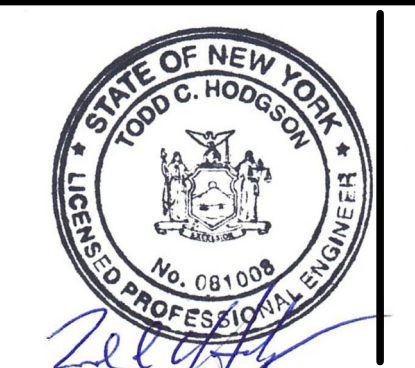


ESSEX COUNTY DEPARTMENT OF PUBLIC WORKS

CONSTRUCTION WORK FOR

**ESSEX COUNTY SALT STORAGE FACILITY**

8053 US ROUTE 9, ELIZABETHTOWN, NY 12932



DRAWING DATE: XX/XX/XX		
REVISIONS		
NO.	DATE	DESCRIPTION
1.	XX/XX/XX	XX/XX/XX
2.	07/09/21	FINAL

DRAWING TITLE

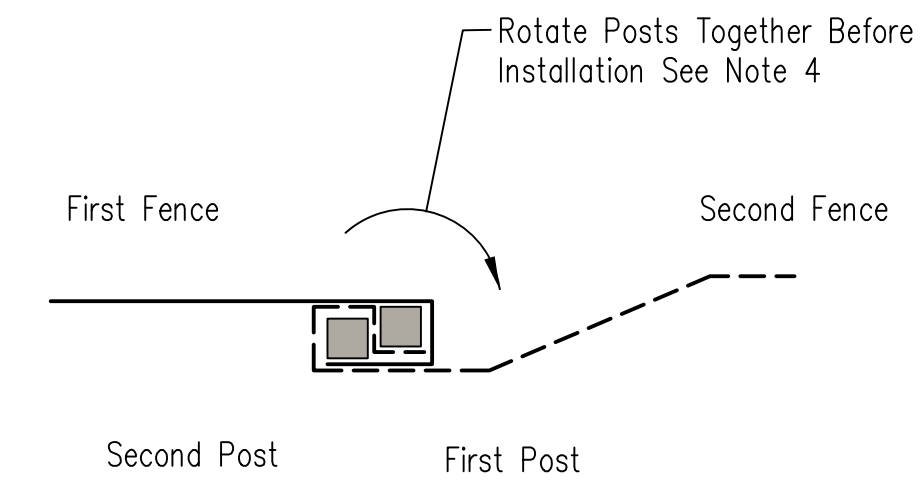
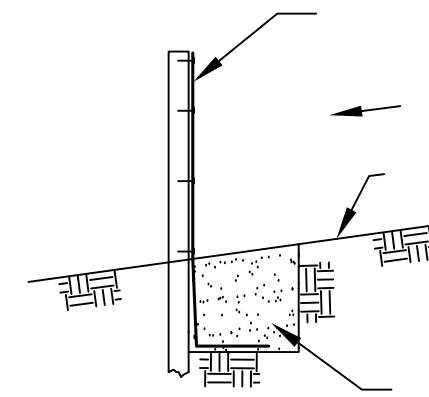
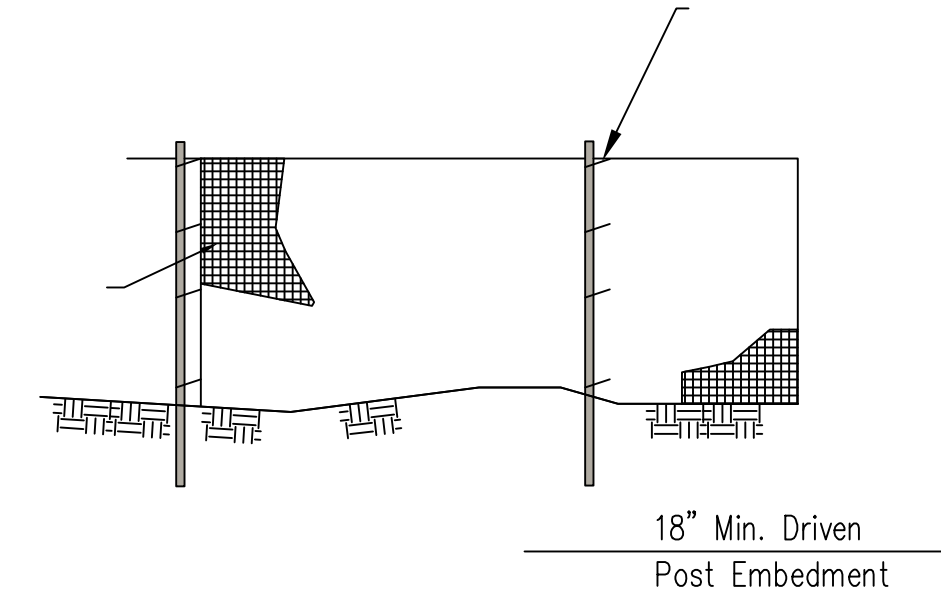
**STORMWATER PLAN**

DRAWN BY GWR	DWG. NO. <b>C201</b>
DATE 03/2021	PROJECT NO.

Test Pit #1 (44.242057 N; -73.569131 W)  
 Date: September 18, 2019  
 Mapped Soil Series: Champlain loamy sand  
 Distance to nearest jurisdictional wetland > 100'  
 Distance to nearest existing or proposed well > 100'  
 Distance to nearest water body > 100'  
 Depth to Seasonal High Groundwater Table > 48"  
 Depth to bedrock > 82"  
 Depth of test pit = 82"  
 Slope = 0%  
 Acceptable System: Conventional Standard Absorption

Horizon	Depth (Inches)	USDA Texture	Munsell Color	Redoxymorphic Features
C <sup>A</sup>	0-13	Sand	10yr 5/3, brown	No
Ab	13-17	Sand	10yr 4/4, dark yellowish	No
Bsb	17-30	Sand	10yr 5/8, yellowish brown	No
C	30-48+	Sand	10yr 6/3, pale brown	No

Basis of Design Stormwater  
 Proposed Sand Salt Storage building 12800 sq. ft.  
 Proposed impervious 12800 sq. ft.  
 Basis of Design Stormwater- Guide for Minor Projects- Stormwater Management- Lake George Park Commission  
 Proposed impervious 12800 sq. ft.  
 12800 sq. ft. \*1.5 gal. sq. ft. = 19200 gal./ 53 gal./ft. 3 ft. dia. perf. pipe = 362.3 lf of 3 ft. dia. perf. pipe required 350 lf of 3 ft. dia. perf. pipe provided.



SILT FENCE

**ATLANTIC TESTING LABORATORIES, Limited**  
 Subsurface Investigation

Client: Essex County  
 Project: Subsurface Investigation  
 Salt Storage Facility  
 Elizabethtown, New York

Report No.: CD10988E-01-03-21  
 Boring Location: See Boring Location Plan

Boring No.: B-1 Sheet 1 of 1

Start Date: 2/22/2021 Finish Date: 2/22/2021

Date: 2/22/2021 Time: PM Depth: 15.7' Casing: 18.0'

Coordinates: \_\_\_\_\_  
 Latitude: \_\_\_\_\_ Weight: 140 lbs.  
 Longitude: \_\_\_\_\_ Fall: 30 in.  
 Hammer Type: Automatic  
 Ground Elev.: \_\_\_\_\_ Boring Advance By: \_\_\_\_\_  
 3.75" Casing

DEPTH (Feet)	NUMBER OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE		SAMPLE TYPE	BLOWS ON SAMPLER PER 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (%)
			From	To					
1	C	1	0.0	2.0	SS	45 8 9 9	2.0	2" ASPHALT PAVEMENT	11
2	A	2	2.0	4.0	SS	10 9 12 9		Brown of SAND; some of GRAVEL; trace ASPHALT Fragments; trace SILT (most, non-plastic) w = 4.0%	14
3	I	3	4.0	6.0	SS	10 11 13 10		White and Brown of SAND; trace SILT; trace GRAVEL (most, non-plastic) w = 3.2%	17
4	N	4	6.0	8.0	SS	16 17 18 18		White-Brown of SAND; trace GRAVEL; trace SILT (most, non-plastic) w = 6.6%	19
5	G	5	8.0	10.0	SS	17 14 13 19		Similar Soil (most, non-plastic)	15
6		6	10.0	12.0	SS	25 20 18 17		Similar Soil (most, non-plastic)	18
7		7	14.0	16.0	SS	16 17 14 14		White-Brown of SAND; trace GRAVEL; trace SILT; trace CLAY (most, very slightly plastic)	16
16.0								Boring terminated at 16.0 feet.	

Notes:  
 1. Borehole backfilled with on-site soils and patched at the surface with asphalt cold patch.

Drillers: Ben Cray, Tony Jones  
 Inspector: \_\_\_\_\_

**ATLANTIC TESTING LABORATORIES, Limited**  
 Subsurface Investigation

Client: Essex County  
 Project: Subsurface Investigation  
 Salt Storage Facility  
 Elizabethtown, New York

Report No.: CD10988E-01-03-21  
 Boring Location: See Boring Location Plan

Boring No.: B-2 Sheet 1 of 1

Start Date: 2/22/2021 Finish Date: 2/22/2021

Date: 2/22/2021 Time: PM Depth: 15.7' Casing: 18.0'

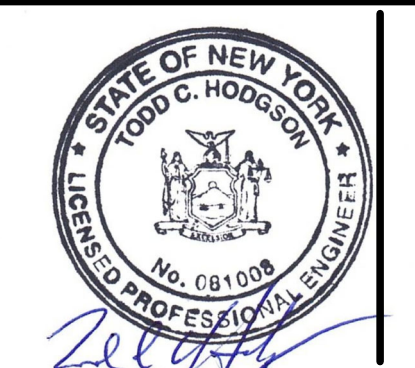
Coordinates: \_\_\_\_\_  
 Latitude: \_\_\_\_\_ Weight: 140 lbs.  
 Longitude: \_\_\_\_\_ Fall: 30 in.  
 Hammer Type: Automatic  
 Ground Elev.: \_\_\_\_\_ Boring Advance By: \_\_\_\_\_  
 3.75" Casing

DEPTH (Feet)	NUMBER OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE		SAMPLE TYPE	BLOWS ON SAMPLER PER 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (%)
			From	To					
1	C	1	0.0	2.0	SS	20 15 10 7 4 0	2.0	2" ASPHALT PAVEMENT	17
2	A	2	2.0	4.0	SS	25 15 50 32		Brown of SAND; some of GRAVEL; trace SILT (most, non-plastic) COBBLE Fragments w = 4.7%	19
3	I	3	4.0	6.0	SS	4 7 9 11		Brown of SAND; trace SILT (most, non-plastic) w = 4.6%	18
4	N	4	6.0	8.0	SS	14 13 15 19		White-Brown of SAND; trace GRAVEL; trace SILT (most, non-plastic) w = 7.0%	20
5	G	5	8.0	10.0	SS	19 16 15 17		Similar Soil (most, non-plastic)	14
6		6	10.0	12.0	SS	21 21 19 17		White-Brown of SAND; some SILT; trace GRAVEL (most, non-plastic)	22
7		7	14.0	16.0	SS	16 19 15 18		Similar Soil (most, non-plastic)	18
16.0								Boring terminated at 16.0 feet.	

Notes:  
 1. Borehole backfilled with on-site soils and patched at the surface with asphalt cold patch.

Drillers: Ben Cray, Tony Jones  
 Inspector: \_\_\_\_\_

ESSEX COUNTY DEPARTMENT OF PUBLIC WORKS  
 CONSTRUCTION WORK FOR  
 ESSEX COUNTY SALT STORAGE FACILITY  
 8053 US ROUTE 9, ELIZABETHTOWN, NY 12932

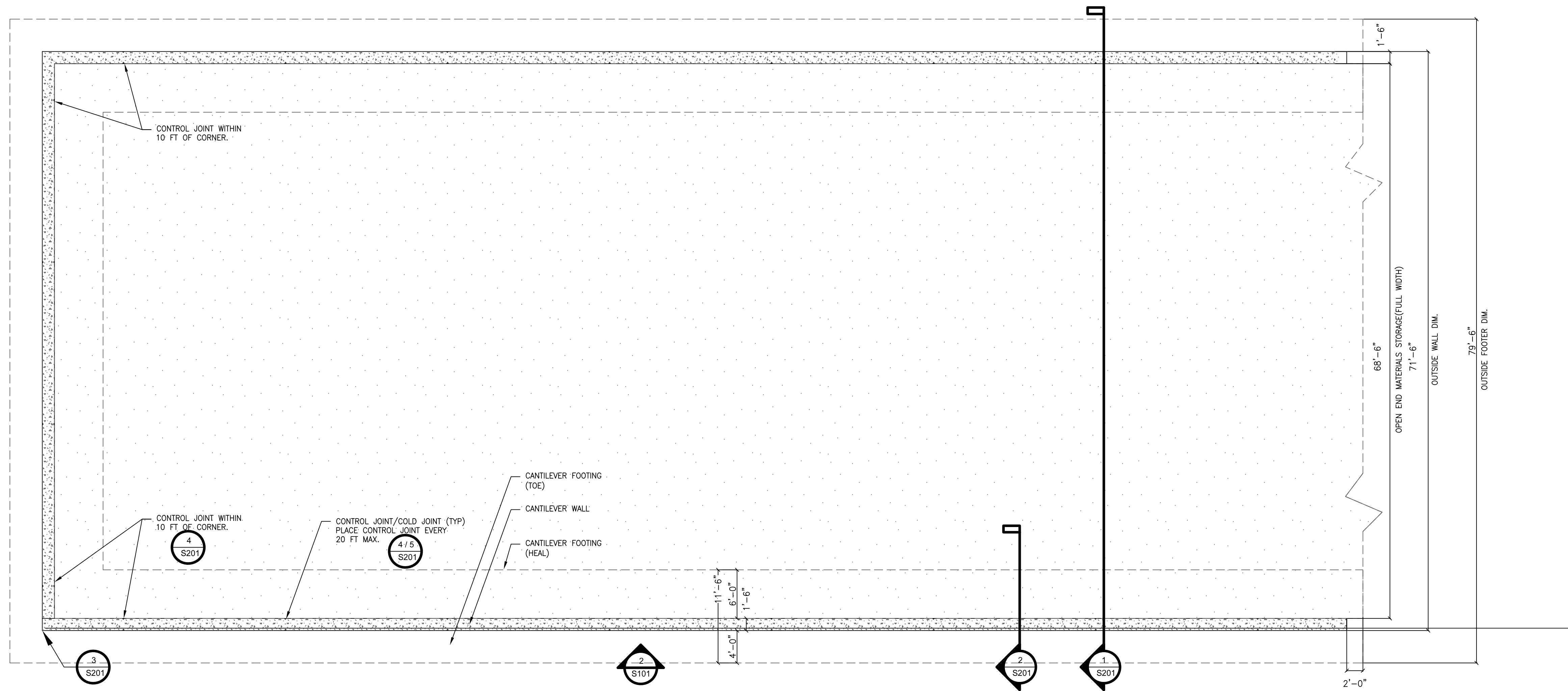


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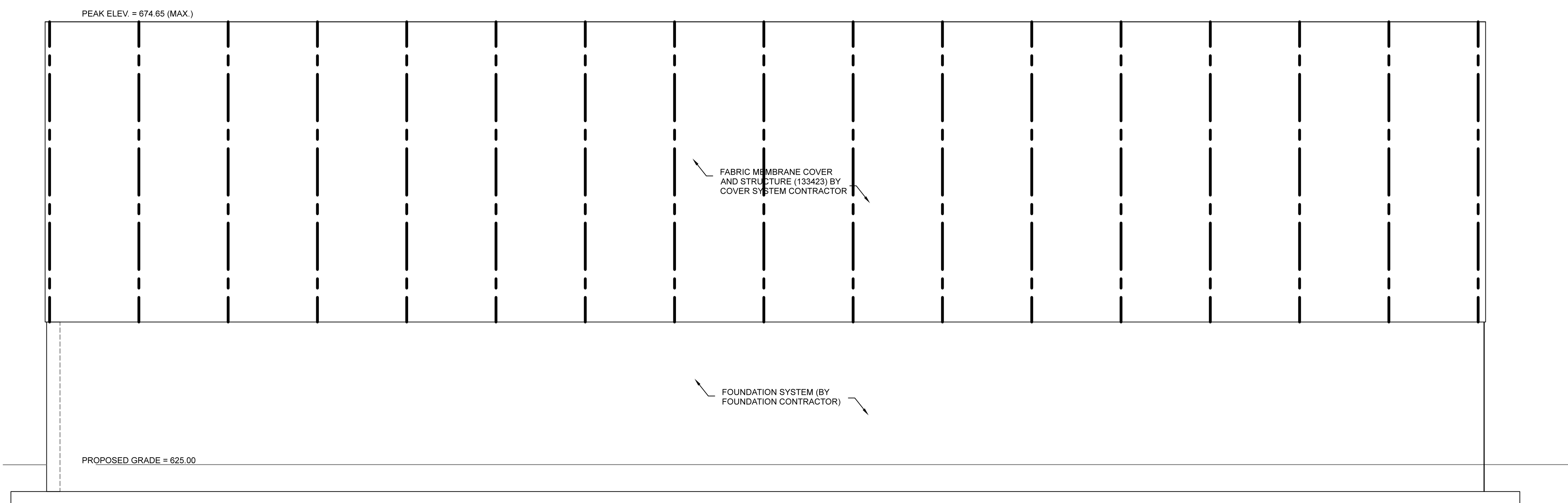
NO.	DATE	DESCRIPTION
1.	XX/XX/XX	XX/XX/XX
2.	07/09/21	FINAL

DRAWING TITLE  
 NOTES AND DETAILS

DATE \_\_\_\_\_ DWG. NO. C301  
 PROJECT NO. \_\_\_\_\_



**1 FOUNDATION PLAN**  
SCALE: 1/8" = 1'



**2 CANOPY STRUCTURE ELEVATION**  
SCALE: 1/8" = 1'

**CANTILEVERED WALL DESIGN:**  
FACTOR OF SAFETY AGAINST SLIDING AND OVERTURNING: 1.5  
UNIT WEIGHT OF SAND/SALT MIX: 110 LBS/CF  
INTERNAL FRICTION, ANGLE OF REPOSE: 32 DEGREES (MAX)  
ACTIVE EARTH PRESSURE: ASSUMES SAND/SALT EXTENDS TO TOP OF WALL WITH PILED SAND/SALT AT SPECIFIED ANGLE OF REPOSE.  
IMPACT LOAD: 250 LBS/FT AT 7 FT

**CONCRETE NOTES:**

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS, DIMENSIONS, AND OTHER CONSTRUCTION CONTRACTS PRIOR TO THE START OF CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE ENGINEER OF DISCREPANCIES UPON DISCOVERY.

THE CONTRACTOR SHALL SUBMIT COPIES OF SHOP DRAWINGS TO THE ENGINEER FOR REVIEW FOR CONCRETE MIX DESIGN AND STEEL REINFORCEMENT PLACEMENT DRAWINGS INCLUDING BAR LENGTHS, BENDS AND SPLICES IN ACCORDANCE WITH SPECIFICATIONS. SEE SPECIFICATIONS FOR ADDITIONAL SUBMITTAL REQUIREMENTS.

MEASURE, MIX, BATCH AND DELIVER CONCRETE IN ACCORDANCE WITH ASTM C94.

WHEN AIR TEMPERATURE IS BELOW 40 DEGREES F, OR IS EXPECTED TO FALL BELOW 40 DEGREES F, CONCRETE SHALL BE PLACED AND CURED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 306 (COLD WEATHER CONCRETE), AND THE SPECIFICATIONS.

ALL CONCRETE WORK SHALL COMPLY WITH THE PROVISIONS OF ACI 301, (SPECIFICATIONS FOR STRUCTURAL CONCRETE).

ALL CONCRETE SHALL BE PLACED IN ACCORDANCE WITH ACI 304 (GUIDE FOR MEASURING, MIXING, TRANSPORTING AND PLACING CONCRETE), CONSOLIDATE PLACED CONCRETE BY MECHANICAL VIBRATION.

SPECIAL INSPECTION REQUIREMENTS: 1705.3 CONCRETE CONSTRUCTION, BY OWNERS TERM CONTRACT FOR TESTING SERVICES. NOTIFY THE ENGINEER 24 HOURS IN ADVANCE OF SCHEDULED CONCRETE DELIVERY FOR COORDINATION.

**EARTHWORK NOTES:**

SUBGRADE SHALL BE PREPARED BY THE OWNER, INCLUDING EXCAVATION TO GRADE AND COMPACTION.

SUBBASE SHALL BE PREPARED BY THE OWNER INCLUDING COMPACTION.

FINE GRADE OF SUBBASE AND COMPACTION TO BE PROVIDED BY THE CONTRACTOR.

ALL CONTROLLED FILL WITHIN THE FOUNDATION FOOTPRINT SHALL BE PLACED IN 8" LIFTS AND COMPACTED TO A MINIMUM OF 95% OF MODIFIED PROCTOR DENSITY PER ASTM D-1557.

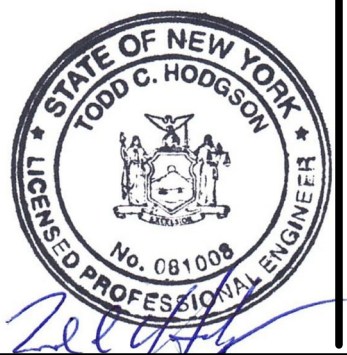
BACKFILL MATERIALS SHALL BE PROVIDED BY THE OWNER.

ESSEX COUNTY DEPARTMENT OF PUBLIC WORKS

CONSTRUCTION WORK FOR

ESSEX COUNTY SALT STORAGE FACILITY

8053 US ROUTE 9, ELIZABETHTOWN, NY 12932



DRAWING DATE: 07/09/21

NO.	DATE	DESCRIPTION
1.	xx/xx/xx	xx/xx/xx

DRAWING TITLE

FOUNDATION AND BUILDING PLAN

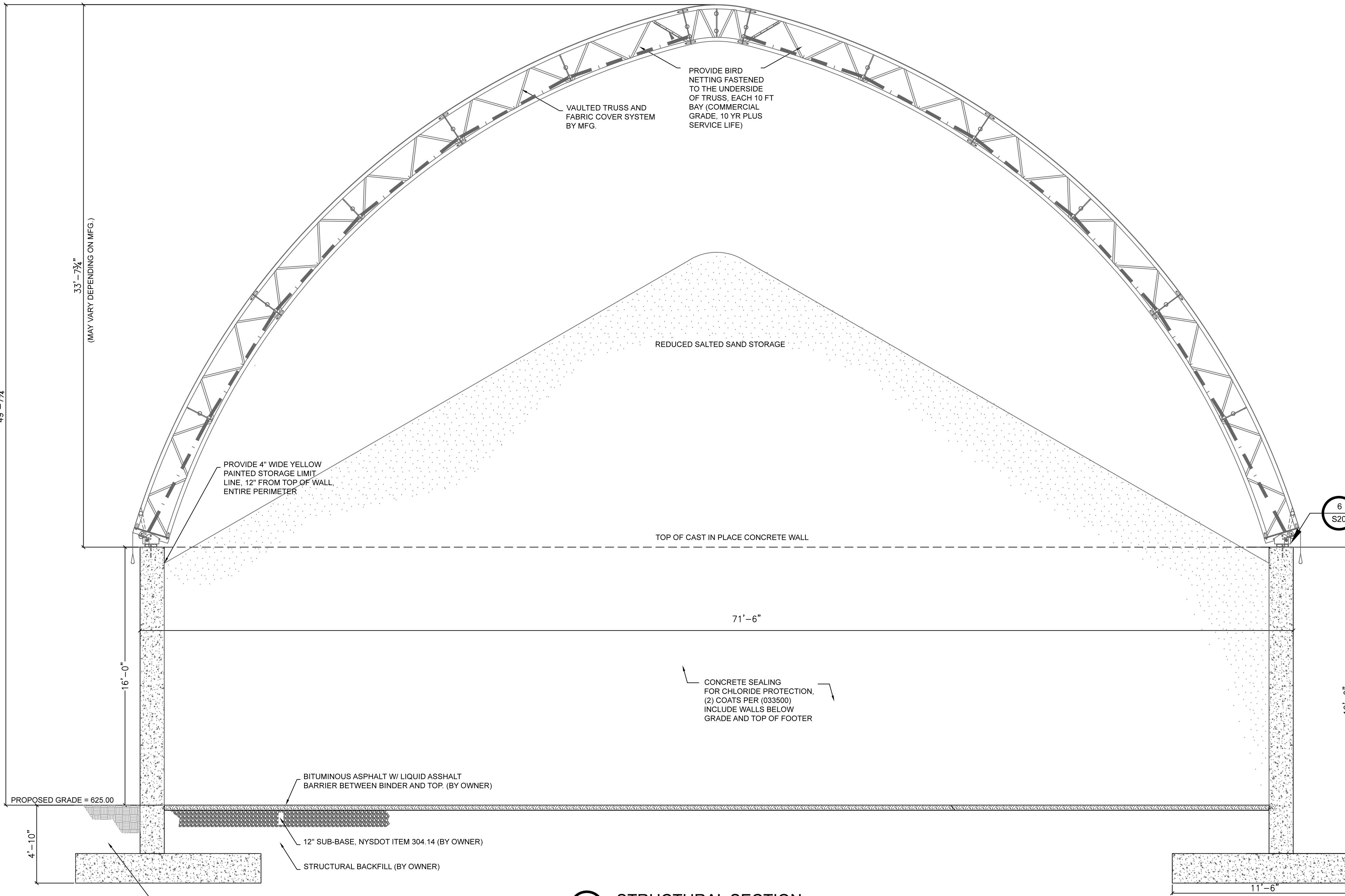
DATE

DWG. NO.

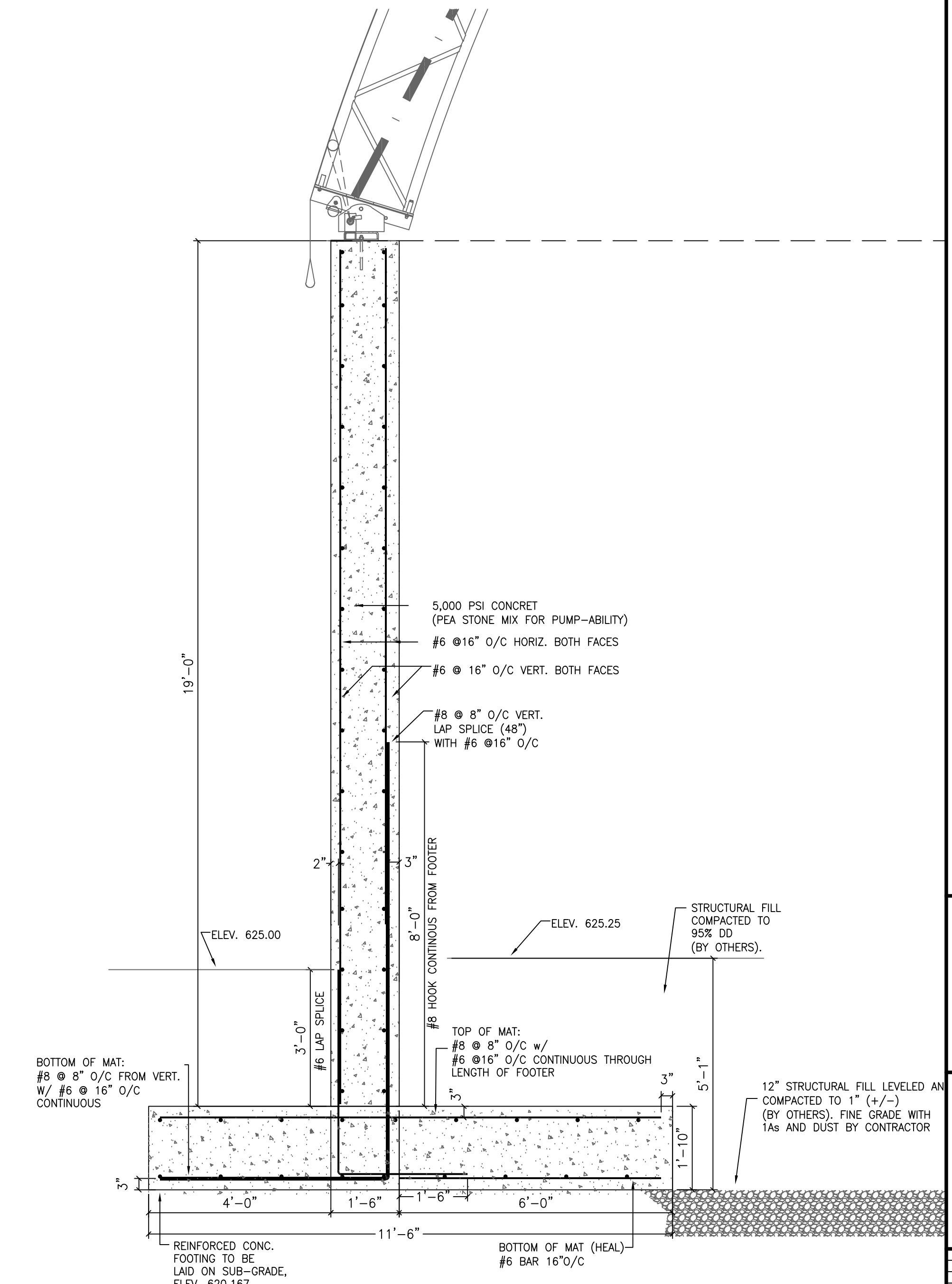
PROJECT NO.

S101

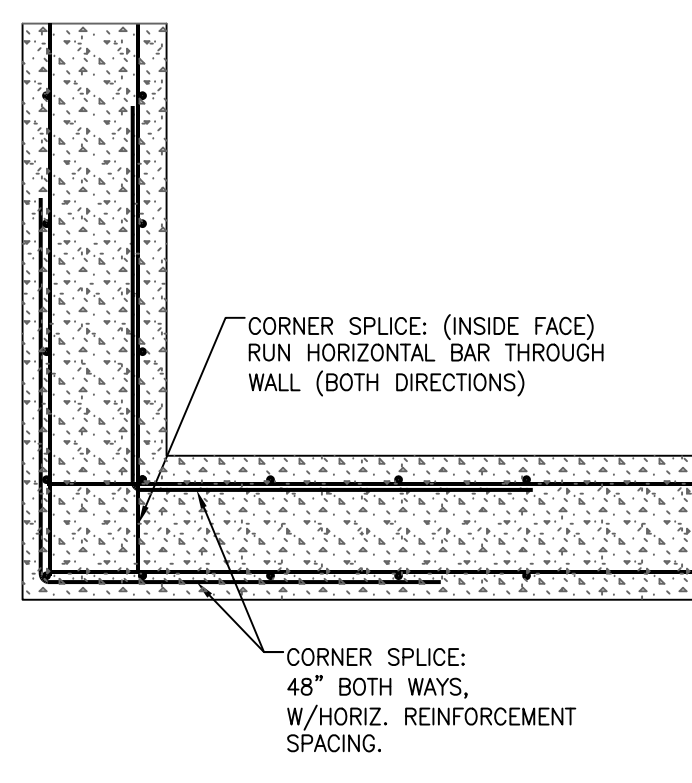
PEAK ELEV. = 674.65 (MAX.)



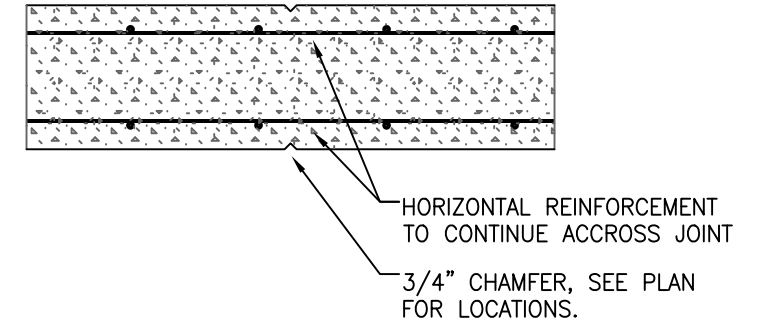
1 STRUCTURAL SECTION  
SCALE: 1/4" = 1'



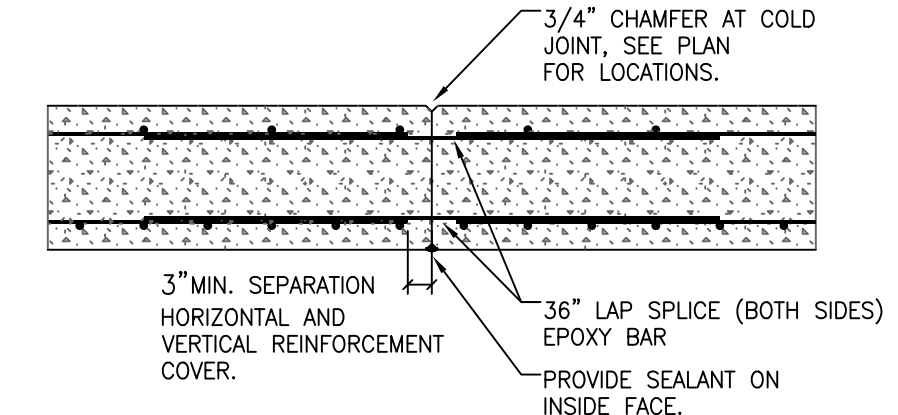
2 STRUCTURAL WALL SECTION (TYP.)  
SCALE: 1/2" = 1'



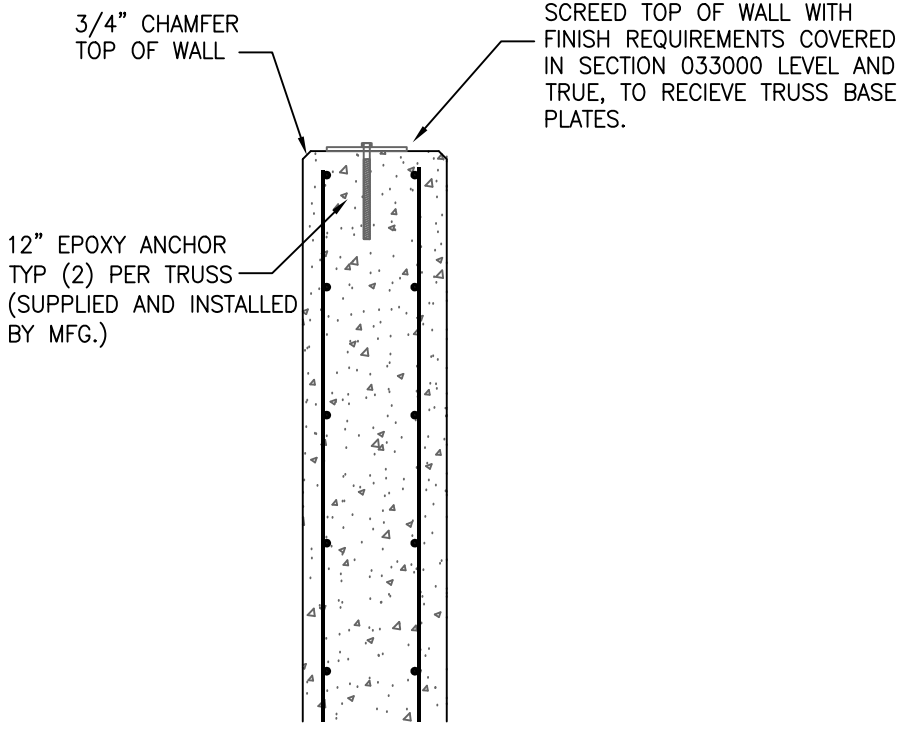
3 CORNER REINFORCING  
SCALE: 1/4" = 1'



4 CONTROL JOINT - WALL SECTION  
SCALE: 1/4" = 1'



5 COLD JOINT - WALL SECTION  
SCALE: 1/4" = 1'



6 TOP OF WALL - PLATE CONNECTION  
SCALE: 1/4" = 1'

ESSEX COUNTY DEPARTMENT OF PUBLIC WORKS  
CONSTRUCTION WORK FOR  
ESSEX COUNTY SALT STORAGE FACILITY  
8053 US ROUTE 9, ELIZABETHTOWN, NY 12932

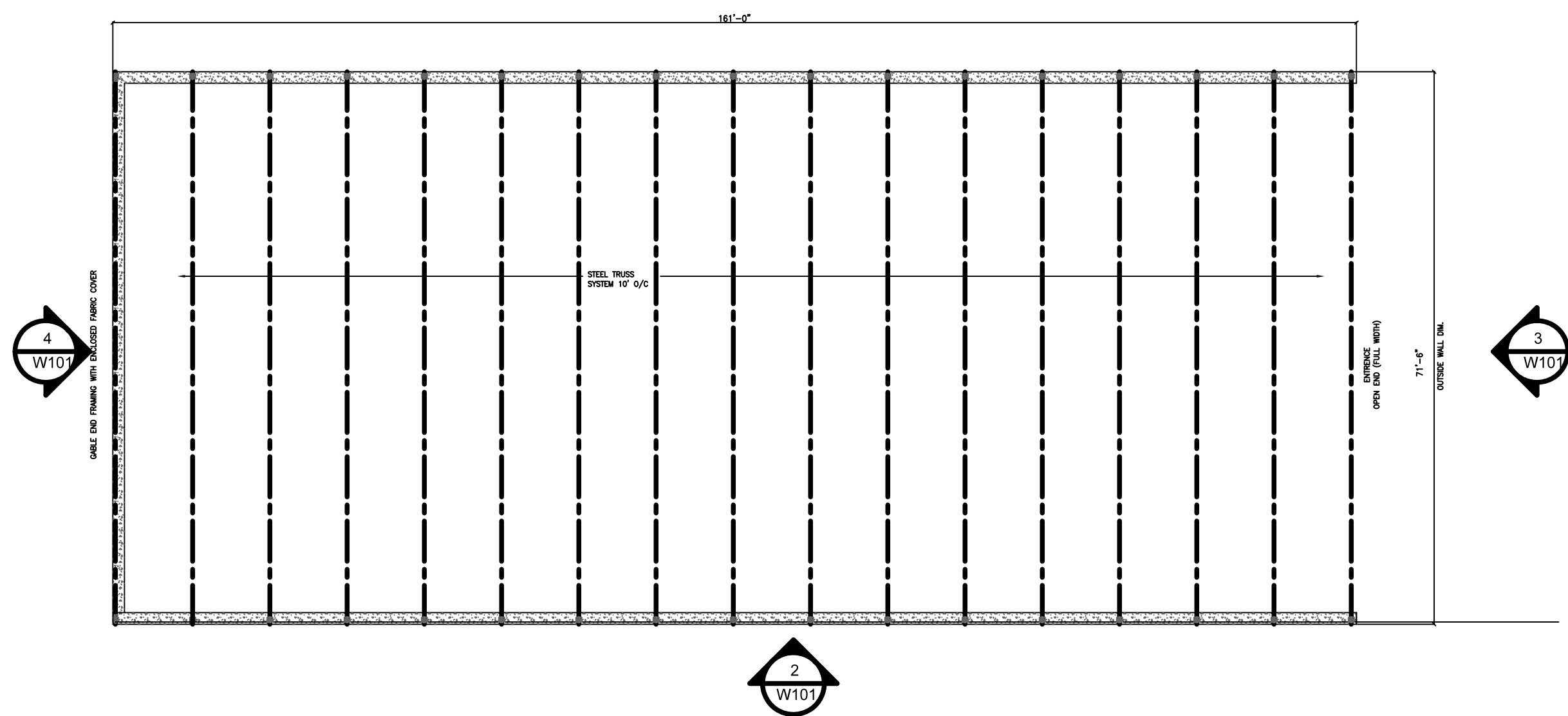


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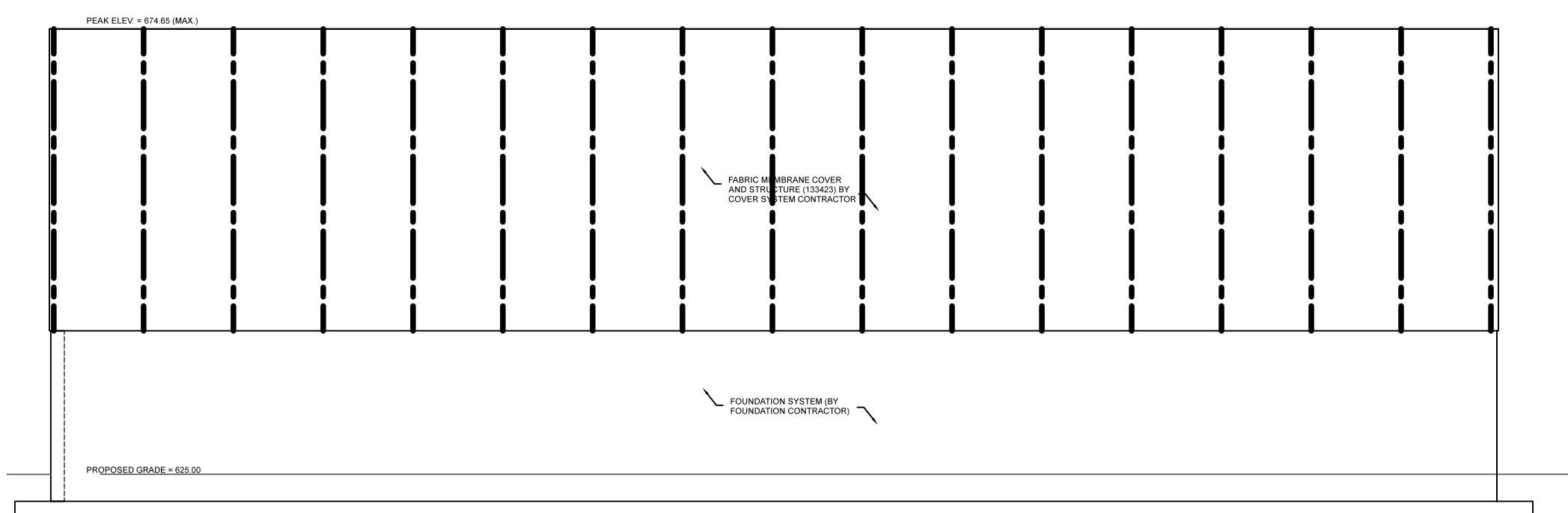
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1.	xx/xx/xx	xx/xx/xx

DRAWING TITLE  
FOUNDATION SECTIONS AND DETAILS

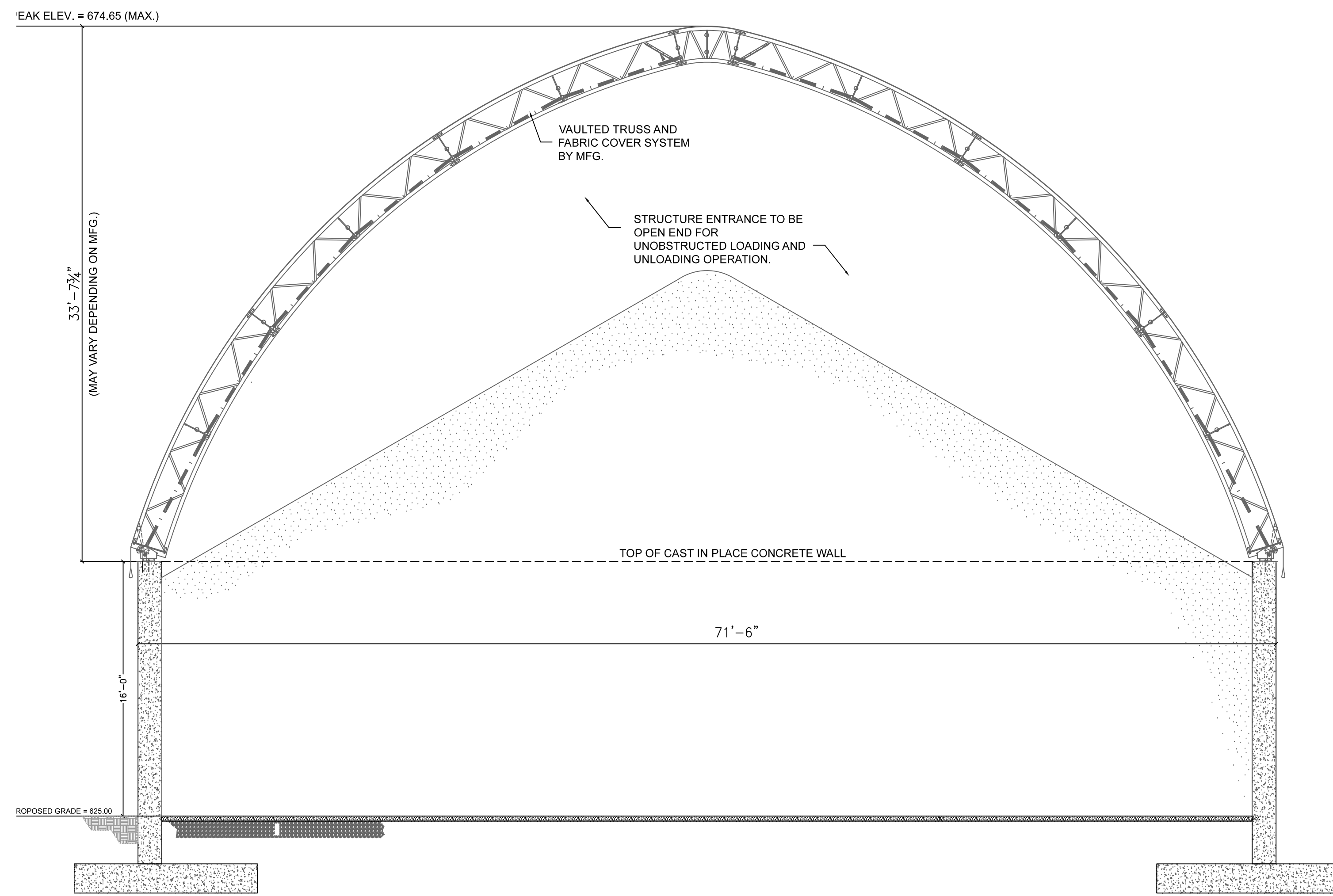
DATE \_\_\_\_\_ DWG. NO. S201  
PROJECT NO. \_\_\_\_\_



1 COVER SYSTEM - PLAN  
SCALE: 1/16" = 1'



2 COVER SYSTEM - SECTION  
SCALE: 1/16" = 1'



3 COVER SYSTEM - FRONT ELEVATION  
SCALE: 3/16" = 1'

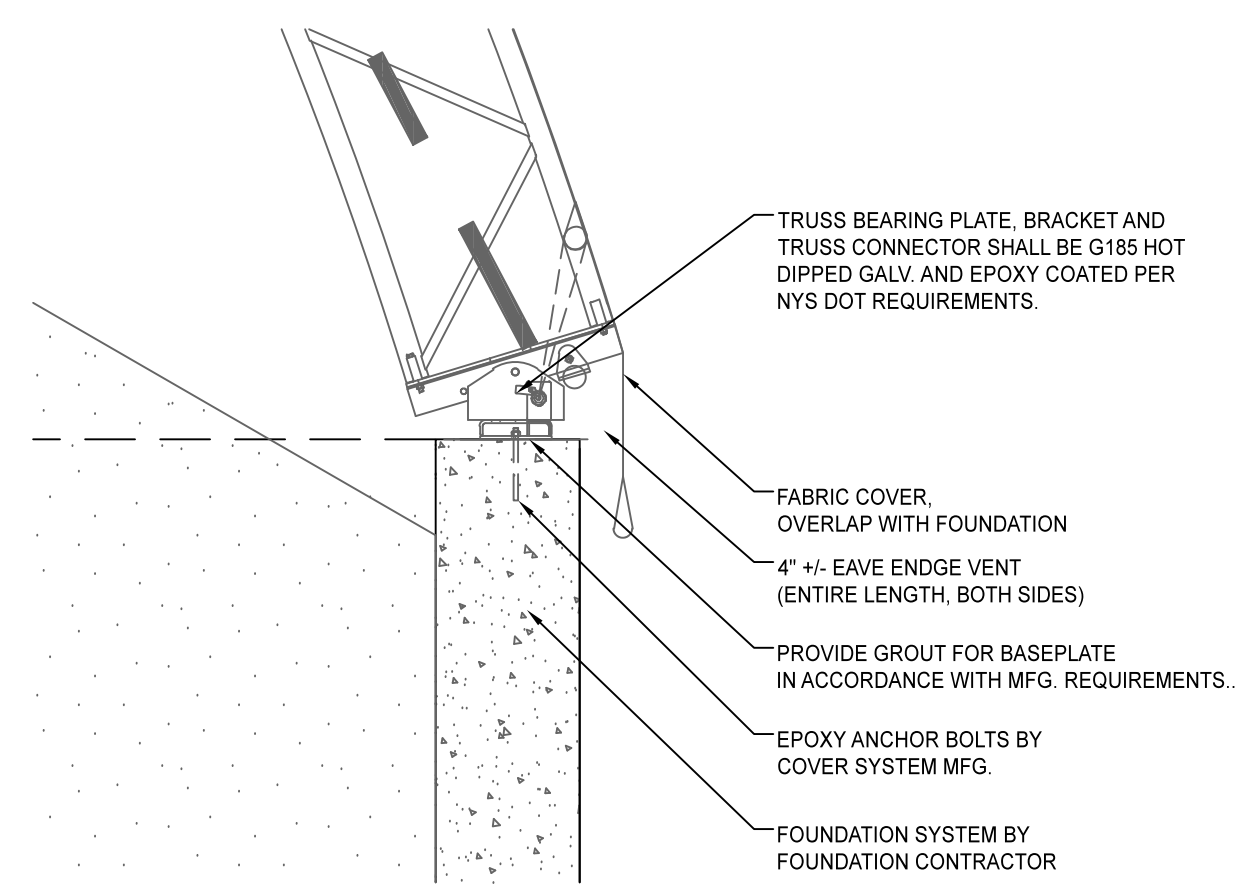
**DESIGN CRITERIA: NYS BUILDING CODE (MOST RECENT ADDITIONS OR ADOPTIONS)**

**TRUSS LOAD COMBINATIONS ACCORDING TO NYS BUILDING CODE:**  
USE AND OCCUPANCY: COMMERCIAL - LOW HAZARD  
IMPORTANCE FACTOR: 0.8

CT = 1.2  
CE = 0.9  
GROUND SNOW LOAD = 70 PSF

**WIND DESIGN**  
WIND LOAD: 120 MPH, 3 SEC. GUST  
WIND EXPOSURE: C  
IMPORTANCE FACTOR: 1  
ROOF HT: 43' 3"  
DESIGN ENCLOSURE: PARTIALLY ENCLOSED

**SEISMIC DESIGN:**  
SS = 0.391 (FOR 0.2 SEC. PERIOD)  
S1 = 0.09 (FOR 0.1 SEC. PERIOD)  
RISK CATEGORY = 2  
SITE CLASS: D  
DESIGN CATEGORY: C  
S1D: 0.6 (FACTORED DETERMINISTIC ACCELERATION, 1.0 SEC.)  
PGA<sub>d</sub>: 0.5 (PEAK GROUND ACCELERATION, FACTORED DETERMINISTIC)



5 COVER SYSTEM SOFFIT - DETAIL  
SCALE: 1/2" = 1'

**GENERAL NOTES:**

IT IS THE INTENT OF THIS (W) CONTRACT FOR THE FABRIC MEMBRANE COVER AND STRUCTURE. PLANS AND SPECIFICATIONS TO PROVIDE A COMPLETE SYSTEM, PLACED ON THE PROPOSED FOUNDATION BY THE FOUNDATION (S) CONTRACT. (W) CONTRACT IS RESPONSIBLE TO REVIEW ALL CONTRACT DRAWINGS AND SPECIFICATIONS, INCLUDING BUT NOT LIMITED TO ALL DIMENSIONS, STRUCTURE CONNECTIONS AND DESIGN CONDITIONS TO ENSURE STRUCTURE PERFORMS AS AN INTEGRATED SYSTEM.

TRUSS WEIGHT IS TO BE ADDED TO THE DESIGN DEAD LOAD BY THE TRUSS MANUFACTURER. PROVIDE SUBMITTALS FOR TRUSSES INCORPORATING ALL LOADS AND CONNECTION DETAILS WITH NYS PE STAMP PER SPECIFICATION 133423. PROVIDE BRACING FOR TRUSSES IN ACCORDANCE WITH MANUFACTURERS INFORMATION.

VENTILATION OPENINGS SHALL BE LOCATED AT OR NEAR THE HIGHEST AND LOWEST POINT OF THE ROOF PROVIDING A RATIO OF ONE SQUARE INCH OF FREE AIR AREA FOR EACH 55 SQ FT OF STRUCTURE FLOOR AREA. EACH VENTILATION OPENING SHALL BE WEATHERPROOF.

FABRIC MEMBRANE COVER AND STRUCTURE SHALL BE DESIGNED AS A 3 SIDED STRUCTURE WITH THE LOADING AREA AS AN OPEN END.

ERRECTION OF THE COVER SYSTEM SHALL BE CONDUCTED BY AN EXPERIENCED LICENSED CONTRACTOR WITH A WORKING KNOWLEDGE OF APPLICABLE CODES AND INDUSTRY ACCEPTABLE STANDARD PRACTICES.

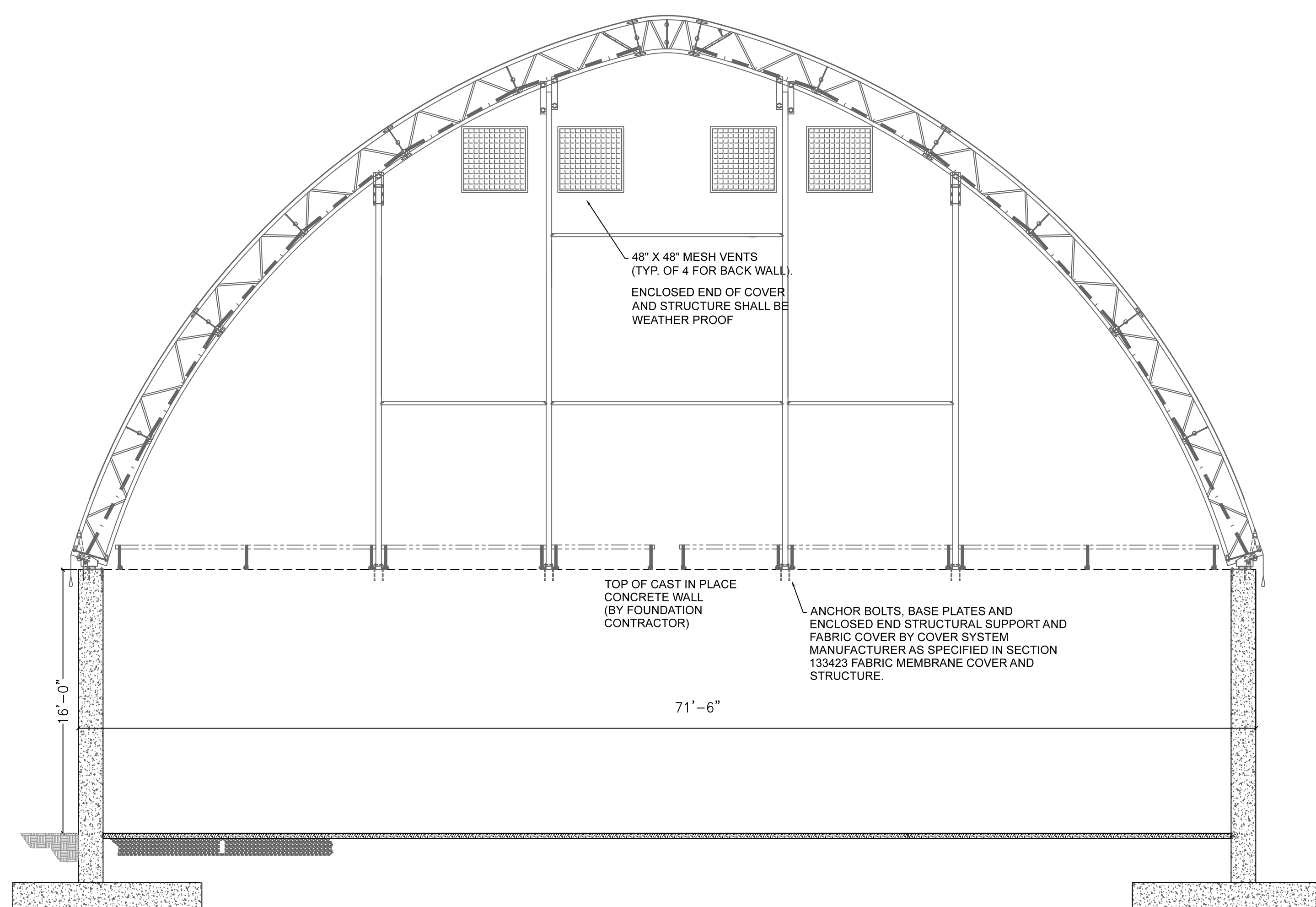
ALL WORK SHALL CONFORM, AT A MINIMUM, TO STATE AND LOCAL BUILDING CODES, SPECIFIED BASIS OF DESIGN, AND REGULATORY AGENCY REQUIREMENTS. WORK NOT EXPLICITLY SHOW ON THESE CONTRACT DRAWINGS SHALL CONFORM TO ALL APPLICABLE CODES AND ACCEPTABLE STANDARDS.

CONTRACTOR (W) SHALL VERIFY ALL DIMENSIONS, ELEVATIONS AND CONDITIONS ON THESE DRAWINGS WITH ALL OTHER RELEVANT CONSTRUCTION DRAWINGS PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE OWNER/ENGINEER OF ANY DISCREPANCIES PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ADEQUATE SHORING, BRACING, FRAMEWORK AND SAFETY REQUIREMENTS FOR THE PROTECTION OF LIFE AND PROPERTY DURING CONSTRUCTION.

CONTRACTOR/COVER SYSTEM MANUFACTURER SHALL PROVIDE THE NECESSARY INSPECTION OF THE STRUCTURAL SYSTEM AND PROVIDE CERTIFICATION THAT THE COVER SYSTEM WAS INSTALLED ACCORDING TO THE CONSTRUCTION DRAWINGS AND MANUFACTURERS SUBMITTALS.

CONTRACTOR/MANUFACTURER SHALL PROVIDE INSPECTION OF ALL STEEL, BOLTED CONNECTIONS, AND WELDED CONNECTIONS IN ACCORDANCE WITH NYS BUILDING CODE. ALL CONNECTIONS SHALL MAINTAIN THE SAME CORROSION RESISTANCE REQUIREMENTS OF THE TYPE 316 STAINLESS STEEL FASTENERS, OR THE G90 GALVANIZED STRUCTURAL STEEL REQUIREMENTS OF THE STRUCTURAL MEMBERS.

FRAMING IS SHOWN FOR REFERENCE PURPOSES. ALL FRAMING AND COVER DESIGN IS THE RESPONSIBILITY OF THE MANUFACTURER UNDER THE CONTRACTOR.



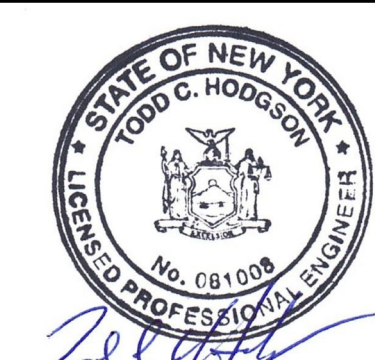
4 COVER SYSTEM - REAR ELEVATION  
SCALE: 3/16" = 1'

ESSEX COUNTY DEPARTMENT OF PUBLIC WORKS

CONSTRUCTION WORK FOR

ESSEX COUNTY SALT STORAGE FACILITY

8053 US ROUTE 9, ELIZABETHTOWN, NY 12932



DRAWING DATE: 07/09/21

NO. DATE DESCRIPTION

1. xx/xx/xx xx/xx/xx

DRAWING TITLE

FABRIC MEMBRANE COVER AND STRUCTURE

DATE DWG. NO.

PROJECT NO. W101



**1 ELECTRICAL - PLAN**  
SCALE: 1/16" = 1'

- HIGH BAY LED LIGHT FIXTURE: LITHONIA JHBL, MODEL JHBL-4000LM-PCL-WD-MVOLT-GZ10-40K-80CRI-WGX-HCX-DL, SHOWN IN PLAN AND SECTION VIEW.
- POWER PANEL, (NEMA 4X)
- JUNCTION BOX
- GROUND FAULT INTERRUPT, QUADRAPLEX OUTLET.

**ELECTRICAL NOTES:**

ELECTRICAL PANEL GROUNDING SHALL BE IN ACCORDANCE WITH NEC, INCLUDING ALL FIXTURES, ENCLOSURES, RECEPTALS AND ELECTRICAL EQUIPMENT.

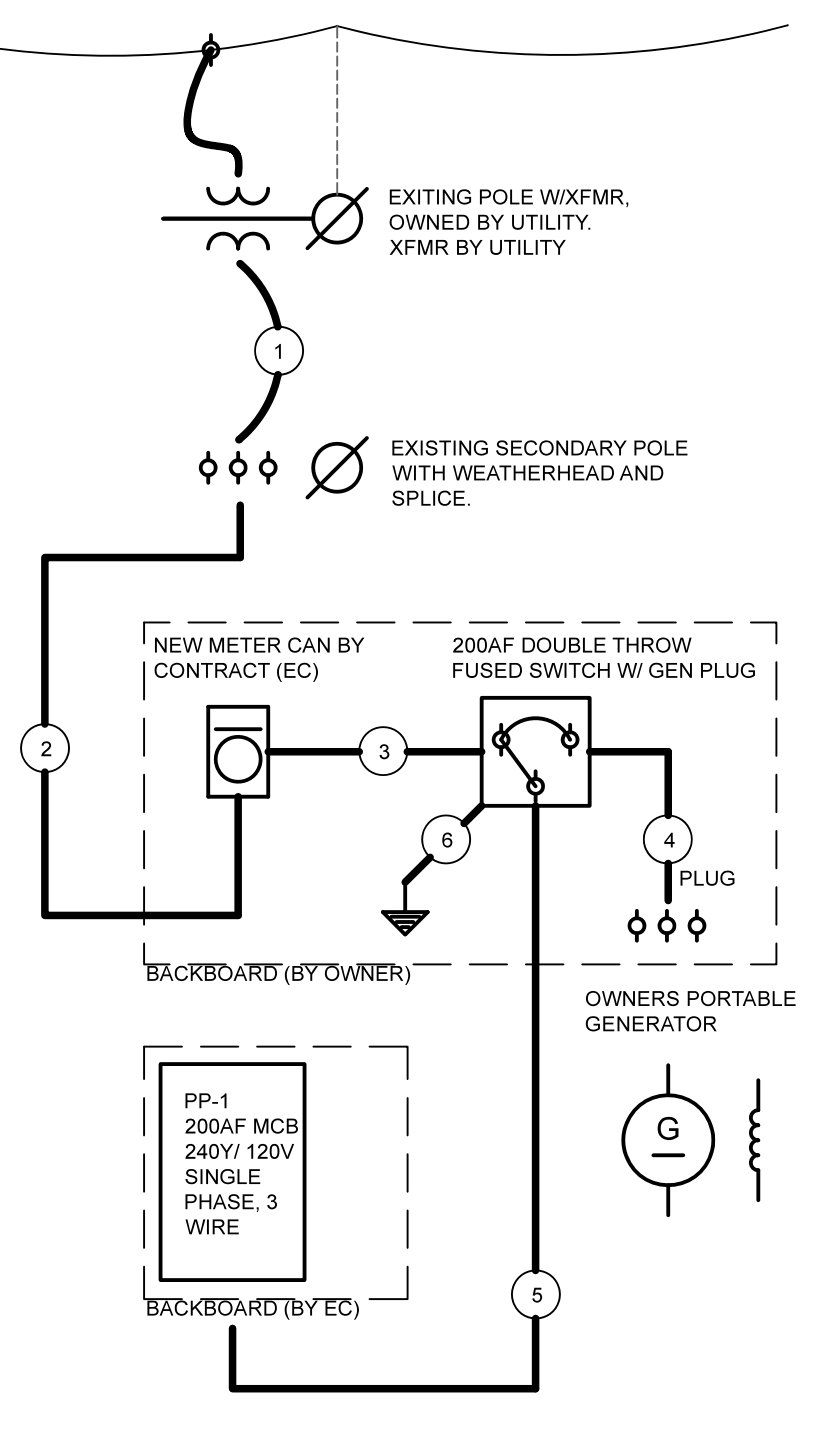
ELECTRICAL EQUIPMENT INSTALLATION SHALL HAVE THE PROPER CLEARANCES FOR OPERATION AND SERVICE ACCORDING TO THE NEC.

SURFACE MOUNT ALL ELECTRICAL CONDUITS AND BOXES. ALL CONDUITS AND BOXES SHALL BE NEMA 3R, CORROSION RESISTANT.

ALL FASTNER HARDWARE FOR ELECTRICAL EQUIPMENT SHALL BE TYPE 316 STAINLESS STEEL.

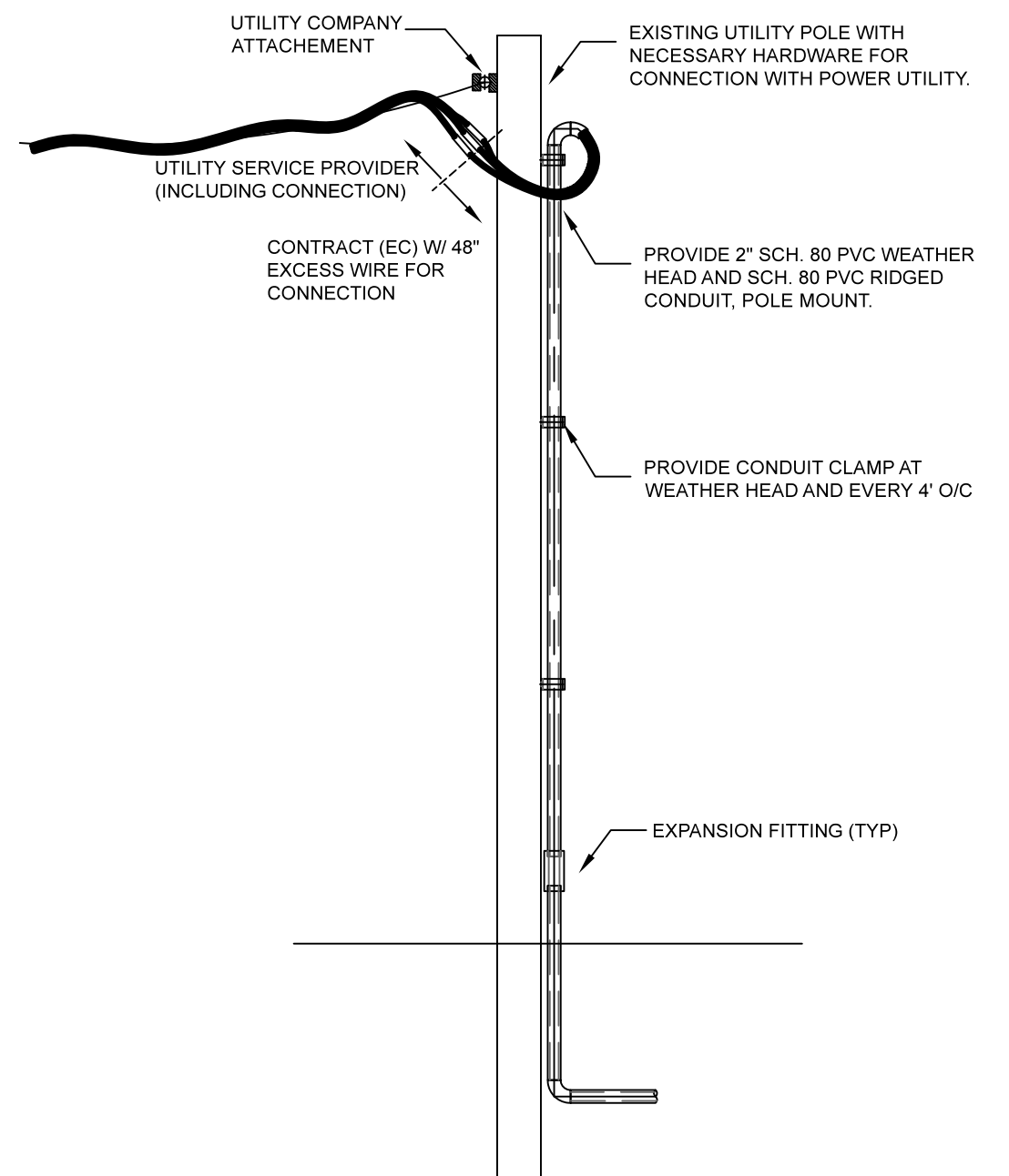
**ELECTRICAL DESIGN:**

4000LM, GLASS, MED BEAM, 3500K SPECTRUM, 36158 LUMENS, 294 WATTS, 2.45 AMP/FIXTURE @120 VAC, (6) FIXTURES PER CIRCUIT, 14.7 AMPS. USE 20 AMP BREAKER WITH #10 (2) AND GROUND.

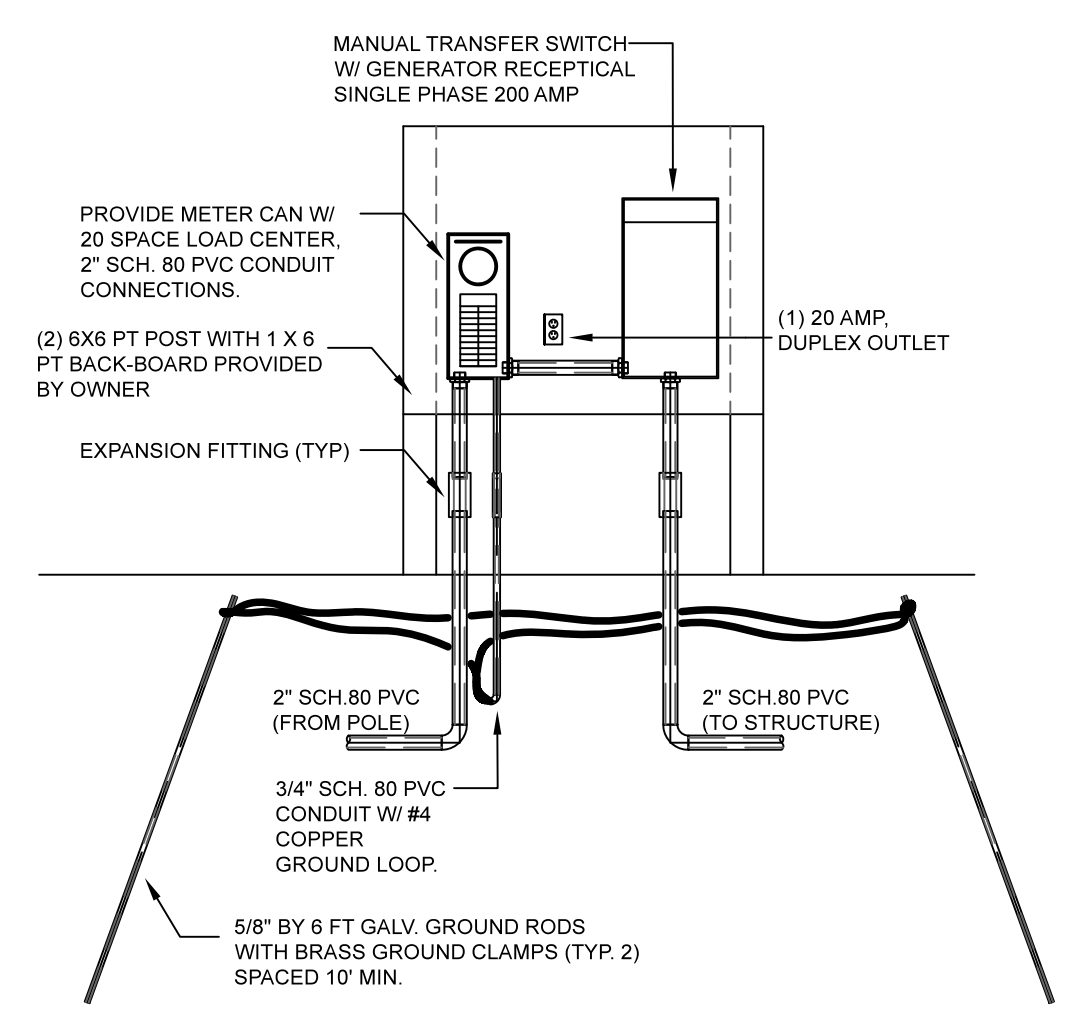


- 1 PROVIDED BY UTILITY
- 2 (2) 4/O POWER, (1) 4/O N
- 3 (2) 4/O POWER, (1) 4/O N
- 4 (2) 4/O POWER, (1) 4/O N, (1) #2 GROUND
- 5 (2) 4/O POWER, (1) 4/O N, (1) #2 GROUND
- 6 (2) #4 POWER, (1) 4/O N, (1) #2 GROUND

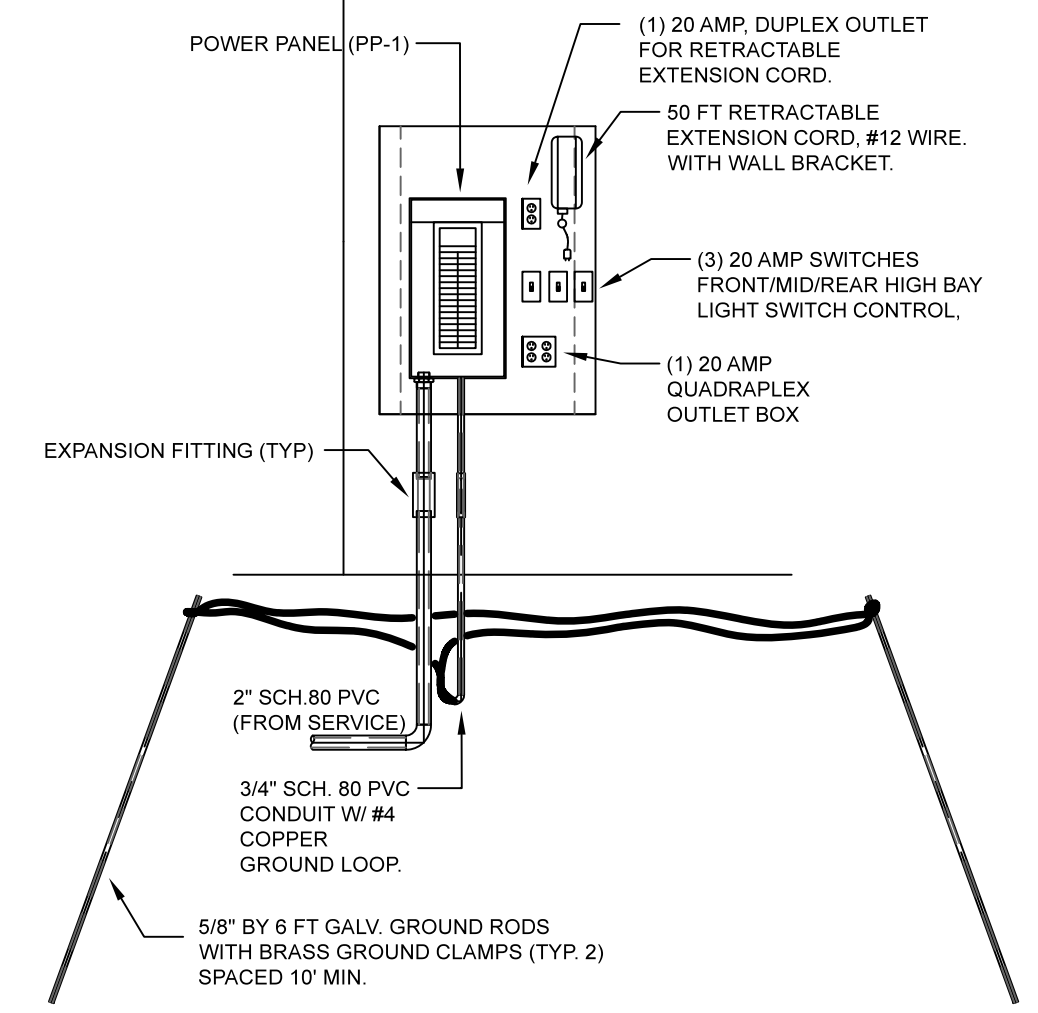
**2 ELECTRICAL - SCHEM**  
SCALE: 3/8" = 1'



**3 ELECTRICAL - POLE**  
SCALE: 3/8" = 1'



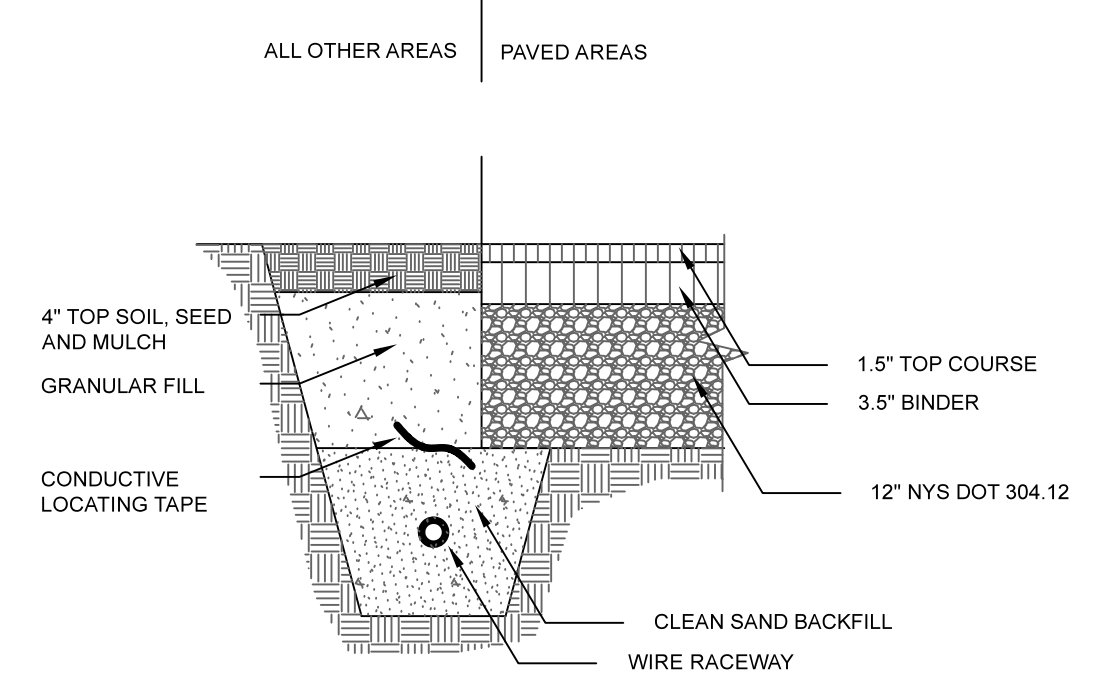
**4 ELECTRICAL - SERVICE**  
SCALE: 3/8" = 1'



**5 ELECTRICAL - PANEL**  
SCALE: 3/8" = 1'

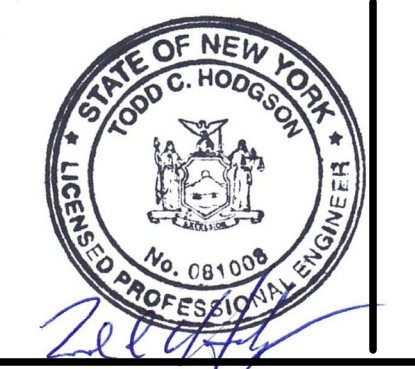
PANEL SCHEDULE, 200 AMP MAIN

1 20 AMP LIGHTING CIRCUIT - (3) #10 THWN COPPER	1 20 AMP SERVICE OUTLET QUADPLEX - (3) #12 THWN COPPER
2 20 AMP LIGHTING CIRCUIT - (3) #10 THWN COPPER	3 20 AMP SERVICE OUTLET DUPLEX - (3) #12 THWN COPPER
3 20 AMP LIGHTING CIRCUIT - (3) #10 THWN COPPER	5 SPARE
5 20 AMP LIGHTING CIRCUIT - (3) #10 THWN COPPER	7 SPARE
7 SPARE	9 SPARE
9 SPARE	ETC SPARE



- NOTES:**
- EXCAVATION, BACKFILL AND BACKFILL MATERIALS PROVIDED BY OWNER.
  - ELECTRICAL CONDUIT, INSTALLATION, LOCATING TAPE BY CONTRACT (E).

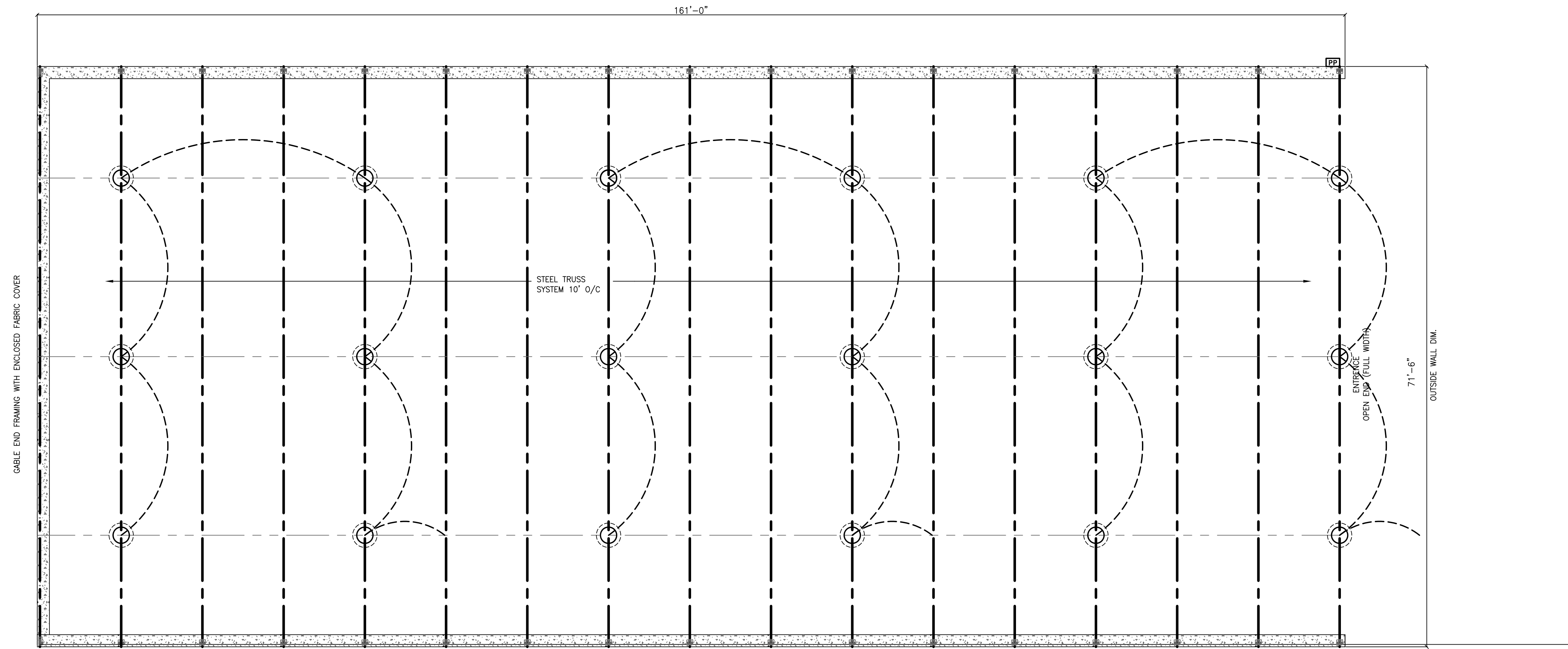
**6 ELECTRICAL - TRENCH**  
SCALE: 3/4" = 1'



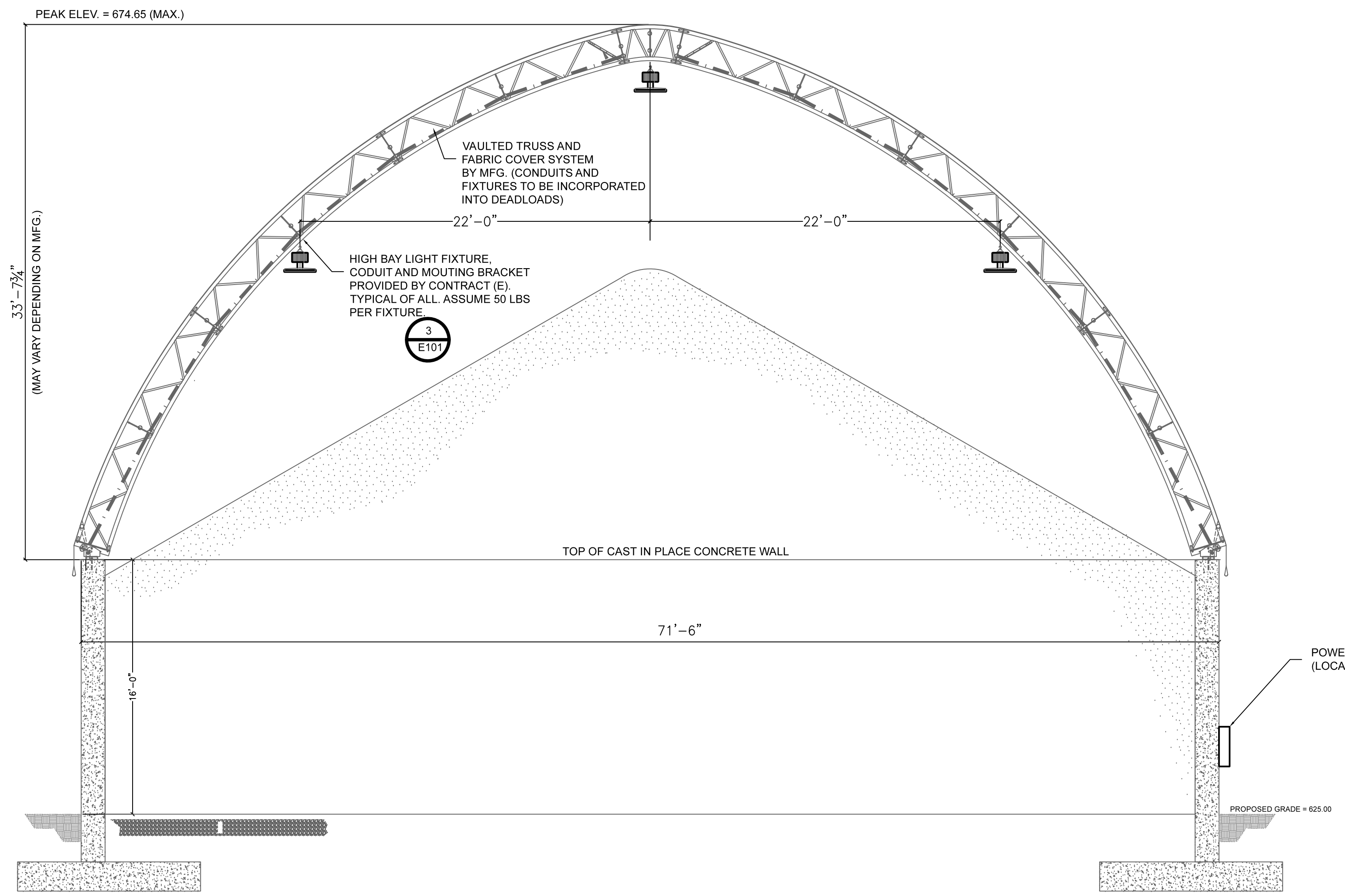
DRAWING DATE: 07/09/21

NO.	DATE	DESCRIPTION
1.	XX/XX/XX	XX/XX/XX

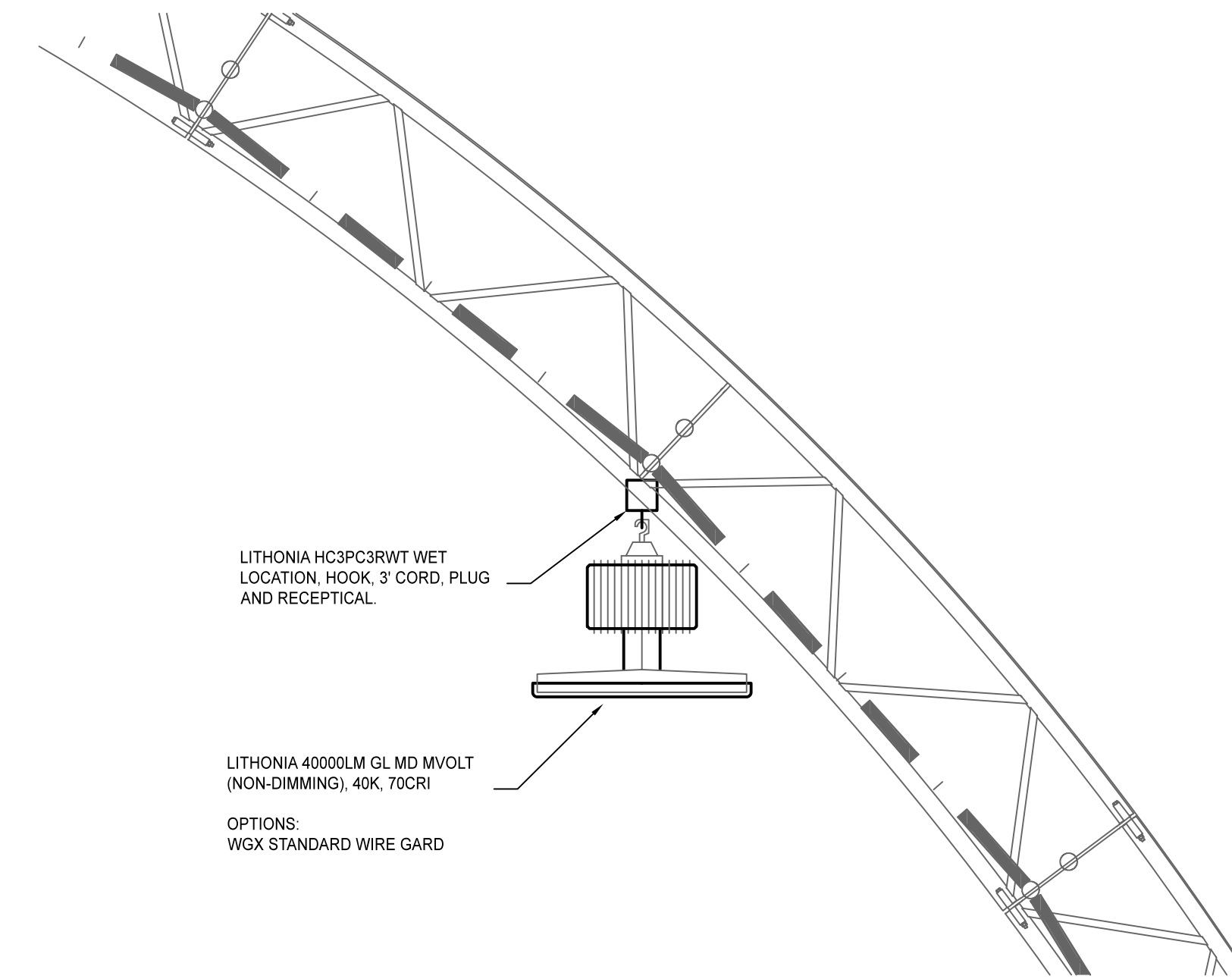
DRAWING TITLE  
**ELECTRICAL NOTES AND DETAILS**



**1**  
E101 **ELECTRICAL - PLAN**  
SCALE: 1/8" = 1'



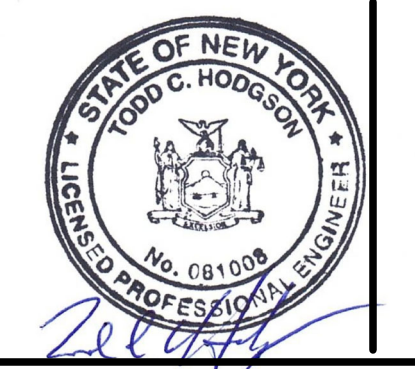
**2**  
E101 **ELECTRICAL - SECTION**  
SCALE: 3/16" = 1'



**3**  
E101 **HIGH BAY LIGHTING - SECTION**  
SCALE: 1/2" = 1'

- HB** HIGH BAY LED LIGHT FIXTURE: LITHONIA JHBL, MODEL JHBL-40000LM-PCL-WD-MVOLT-GZ10-40K-80CRI-WGX-HCX-DL, SHOWN IN PLAN AND SECTION VIEW.
- PP** POWER PANEL, (NEMA 4X)
- JB** JUNCTION BOX
- GF** GROUND FAULT INTERRUPT, QUADRAPLEX OUTLET.

ESSEX COUNTY DEPARTMENT OF PUBLIC WORKS  
CONSTRUCTION WORK FOR  
**ESSEX COUNTY SALT STORAGE FACILITY**  
8053 US ROUTE 9, ELIZABETHTOWN, NY 12932



DRAWING DATE: 07/09/21		
NO.	DATE	DESCRIPTION
1.	xx/xx/xx	xx/xx/xx

DRAWING TITLE  
**ELECTRICAL PLAN AND ELEVATION**

DATE \_\_\_\_\_ DWG. NO. **E101**  
PROJECT NO. \_\_\_\_\_