

SECTION 133423

RECTANGULAR SALT STORAGE STRUCTURE

THIS IS A PERFORMANCE SPECIFICATION REQUIRING BOTH DESIGN AND CONSTRUCTION OF THE STRUCTURE.

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

USE SECTION 033001 IF THIS PROJECT IS A SALT STORAGE STRUCTURE ONLY. IF OTHER BUILDINGS ARE PART OF THE CONTRACT, USE SECTION 033000 (CONSULT WITH D&C PROJECT MANAGER).

- A. Cast-In-Place Concrete: Section 033000 or 033001

INSERT APPROPRIATE ROOFING SECTION NUMBER IN PARAGRAPH BELOW. DELETE UNDERLINES BEFORE INSERTING SECTION NUMBER.

- B. Roofing: Section _____.
- C. Earthwork: Section 310000.

DELETE PARAGRAPH BELOW IF SECTION 321216 IS NOT USED.

- D. Asphalt Concrete Paving: Section 321216.

1.02 REFERENCES

- A. Except where more stringent requirements are specified, comply with the applicable requirements of the following organizations and standards, for products, materials, and construction methods:
1. New York State Uniform Fire Prevention and Building Code; Latest.
 2. American Institute of Steel Construction (AISC).
 3. American Institute of Timber Construction (AITC).
 4. American Iron and Steel Institute (AISI).
 5. American Plywood Association (APA).
 6. American Softwood Lumber Standard PS 20 by the U.S. Dept. of Commerce.
 7. American Society of Civil Engineers (ASCE 7-10- Minimum Design Loads for Buildings and Other Structures).

1.03 DESCRIPTION

- A. Provide design and construction for a permanent salt resistant rectangular type structure suitable for the bulk storage of salt with minimum ground water contamination and capable of storing vehicles within one end of the structure. The structure shall meet or exceed the performance criteria of this specification and the New York State Uniform Fire Prevention and Building Code.

1.04 DEFINITIONS

- A. The term “salt” as used in this Section refers to sodium chloride or calcium chloride snow-melting salt.

EDIT BELOW IF DIFFERENT.

- B. The term “floor” as used in this Section refers to the portion of the asphalt concrete paved surface of the site within the perimeter of the structure.

FILL IN BLANK SPACE BELOW (CONSULT D&C PROJECT MANAGER) REVISE DESCRIPTION IF MORE THAN ONE PILE IS REQUIRED. MODIFY DESCRIPTION OF ENTRANCE BELOW IF MORE THAN ONE ENTRANCE IS REQUIRED. (MAKE SIMILAR CHANGES IN OTHER LOCATIONS THAT SPECIFY “ENTRANCEWAYS” OR “ENTRANCE OPENINGS”).

1.05 PROJECT REQUIREMENTS

- A. Size of Salt Storage Structure: Approximately ___ feet wide by ___ feet long by ___ feet high (maximum), permanent, rigid, wind and waterproof structure, exclusive of one end entrance way, suitable for the bulk storage of ___ rated tons (or ___ cubic yards) of salt total. Structure shall permit filling by tractor trailer delivery of materials directly into the building.

1. Rectangular Structure of Type VB Construction using the following:
 - a. Wood conventional frame or timber.
 - b. Concrete or other types of construction.

- B. Storage Method:

1. Enclose the specified salt capacity entirely within the structure, exclusive of the entrance ways, with pile sides sloped at an assumed 32 degree angle of repose.

- C. Interior Space: The salt pile storage floor area shall be entirely free of columns and roof supports of any type allowing unimpeded loading of truck-spreader vehicles with front-end loading equipment.

1. Minimum Interior Clearance:
 - a. 4 feet of unobstructed vertical clearance above the surface of the salt pile when stored at the specified storage capacity
 - b. Thirty feet minimum vertical clearance to the bottom of framing for at least one third the interior floor area of the structure and continuing for the full length

- D. Barrier Wall or Lining: Suitable interior protective base wall conforming to the following applicable criteria:

1. Barrier wall shall restrict the salt from contact with the primary building wall components or material subject to salt corrosion unless the primary building wall is specifically resistant to corrosion from salt contact.
2. Barrier wall shall be a minimum of 8 feet high and of sufficient strength to resist a horizontal impact of 250 pounds per linear foot at 7 feet above the floor, resist the horizontal load of a sand and salt

pile weighing 110 pounds per cubic foot and shall resist structural damage from abrasion by salt loading equipment.

3. If the building layout partially restricts the salt pile with the building walls or with separate containing walls, extend the barrier walls a minimum of 2 feet above the toe of the salt pile. The extension of the barrier walls above the toe shall be of the same material used below the toe level.

4. Barrier wall materials, except poured in place concrete, shall require minimal maintenance and be arranged for easy replacement of components by maintenance personnel without required use of heavy equipment.

5. Provide a 4 inch wide yellow painted salt storage limit line around perimeter of interior barrier wall located at the toe of salt pile.

E. Entrance Ways: Roof of entrance ways shall be integral with the main structure and shall project out a minimum of one foot from the point where the salt, stored to capacity, meets the floor surface. Openings shall have protection for interior and exterior sidewall structural members fabricated to resist a horizontal impact of 250 pounds per linear foot at 7 feet above the structure floor and to resist abrasion damage to structural components from wheeled vehicles. Openings shall have roller curtain door protection against birds entering the structure.

MODIFY SUBPARAGRAPH BELOW FOR DOUBLE ENTRANCE STRUCTURES.

1. Number and Size: Unobstructed fully open end. See contract drawings for the door locations and sizes.

USE PARAGRAPH BELOW FOR SINGLE ENTRANCE.

F. Roof Ventilation: Suitable openings 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.

G. Foundation: See structural requirements for foundation design data. Specific foundation design shall be submitted with superstructure design using the referenced design data.

H. Exterior Wall Construction: Standard components or an integrated wall system, with the exterior surface constructed to provide a durable weather-resistant barrier with leak proof joints. Exterior surface shall be constructed of materials which may be easily maintained by maintenance personnel with unproprietary products readily available for such purpose.

I. Roofing System: Prefabricated or site-built, complete with all necessary accessories, fastening devices, trim, and flashings. Materials and surface finishes as required by the specified warranties, requiring minimum maintenance, and conforming with or exceeding the Underwriters Laboratories, Inc., ASTM E108, Class-A Rating requirements (labels are not required). Asphalt shingles, if used in the building design, shall be ____year warranty 3 tab

Architectural asphalt shingles. Unprotected aluminum, bare steel or galvanized surfaces are not acceptable.

1. Drainage: Positive slope; no standing water
2. Wind Uplift Resistance: Per ASTM D7158 Class-G 120-MPH Basic Wind Speed
3. Compatibility: Physical and chemical compatibility of all materials with each other and with adjacent building components

J. Building Products: The following minimum required standards shall be met for the products listed:

1. Concrete, if used in the building design, shall be as specified in Section 033000 or 033001. Provide 2 coats of penetrating sealer on the interior surface of the concrete base wall, full height of wall.
2. Wood if used in the building design shall be dressed timber, kiln dried to a maximum moisture content of 19 percent before treatment and grade stamped. Wood exposed to weather, shall be preservative treated with a water-borne preservative, where applicable, the treatment has to be compatible with the stain in item 3 below and for above ground use, complying with American Wood Preserver's Associations UI-04 book, Category (UC3-A) and below ground lumber shall be treated with Category (UC4-B).
3. If wood is used as an exposed exterior surface, minimum acceptable finish shall be 2 coats of protective wood stain meeting the requirements of the Building Codes of New York State Architectural Surface Coatings.
4. Metal, Metal Plates and Fasteners: If used in the building design, shall be designed to resist corrosion due to salt, salt spray or salt vapors.
 - a. All metal exposed on the interior, including truss bearing plates, nails, screws, lag bolts, anchor bolts, bolts and washers etc. in contact with preservative treated wood, shall be Type 304 or 316 stainless steel or hot dipped galvanized meeting ASTM A 153/A 153M, Class D.
 - b. Truss connector plates shall be G-185 hot dipped galvanized steel and epoxy coated in the field.
 - c. Joist hangers shall be G-185 hot dipped galvanized and epoxy coated in the field.
 - d. If metal is used as an exposed siding or roofing surface, the metal shall have a corrosion-resistant finish. Exposed galvanized metal or an interior surface of metal is not acceptable.
5. Penetrating Sealer for Concrete Walls: Non-toxic, breathable, clear penetrating sealer intended for 2 coat application, leaving no visible surface residue, color or gloss after curing.

Acceptable Products:

 - a. Airdox 40 by Anti Hydro International, Inc., Newark, NJ
 - b. Klereseal 940-S by Pecora Corporation, Harleysville, PA

- c. Masterseal SL 40 by Master Builders, Inc., Streetsboro, OH
- d. Sil-act ATS 100 by Advanced Chemical Technologies, Oklahoma City, OK

1.06 STRUCTURAL REQUIREMENTS

INSERT VALUE IN PARAGRAPH BELOW FOR SPECIFIC REGION OF THE STATE. CONSULT STRUCTURAL ENGINEER.

- A. Static Snow Load: _____ psf
- B. Lateral Wind Load: 120 mph (3 second wind gust) Exposure-C

CONSULT WITH SOILS ENGINEER TO CONFIRM VALUES BELOW ARE CORRECT.

- C. Foundation/Cantilevered Retaining Wall Design:
 - 1. Refer to the Drawings for the Contract Geotechnical Notes for the necessary foundation design parameters.
 - 2. The force acting against the Cantilevered Retaining Wall shall be calculated using the following parameters:
 - a. Factors of Safety against Sliding and Overturning: 1.5.
 - b. Moist Unit Weight of Retained Sand/Salt Mixture: 110 pounds per cubic foot.
 - c. Internal Friction angle of retained Sand/Salt Mixture: 32 Degrees.
 - d. Active Earth Pressure Coefficient (KA): Calculate assuming that the retained sand/salt mixture will extend to the retaining wall's top and be laid back at a 32 degree angle of repose above the retained portion as specified by NYSDOT.
 - e. A minimum horizontal impact load of 250 lb/ft acting at 7 feet above the structure's floor.
- D. Design the main structure of the Salt Storage Building to accommodate the additional loads applied on the structure by the side sheds regardless of when the side sheds are to be constructed.

INCLUDE DOCUMENT SECTION 002217 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS - CONDITIONS OF AWARD, IN THE PROJECT MANUAL FOR ARTICLE BELOW.

1.07 SUBMITTALS

- A. Pre-award Submittal: Submit 8 copies of the following information, stamped and signed by a NYS licensed Professional Engineer, as proof of conformity to the performance requirements of this Section.
 - 1. Drawings:
 - a. Design drawings indicating in detail all features of the proposed structure including, but not limited to, the following:
 - 1. Foundation and anchor bolt plans and details.

2. Base wall details.
 3. Entranceway details.
 4. Roofing and ventilation details.
 5. Roof and wall bracing details.
 6. Anchorage and splice details.
 7. Door Details
 8. Roller Curtain Door and Connections to adjacent Structure
2. Complete set of specifications specifying all materials to be provided in the proposed structure and the installation of all the materials.
 3. 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 will 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 footings
 - g. Unbalanced horizontal load of partial sand and salt pile on base wall.
 4. Quality Assurance Qualifications: Names and proof of conformity for preparer, fabricator, and erector including but not limited to the following:
 - a. Preparer: Names and addresses of 5 previous design projects of preparing construction documents of similar or greater difficulty.
 - b. Fabricator: Names and addresses of 5 previously fabricated structures and records on past performance.

- c. Fabricator's Facility and Equipment: Name and location of the facility including storage capability, heating controls and quality control equipment.
 - d. Erector: Names and addresses of 5 previously erected structures.
 - 5. Quality Control Qualifications: Copy of the Quality Control (QC) program including name and experience of fabricator and erector.
 - B. Quality Control Submittals:
 - 1. Test Reports; submit 3 copies of each of the following:
 - a. Moisture, temperature and fabrication inspection reports, for all main material.
 - b. Test reports shall be submitted no later than the end of the week covered by the reports.
 - C. The Director reserves the right to consider submittals for a structure varying in minor respects from specific requirements.
 - D. The submittal will be reviewed and 2 stamped copies returned. If returned copies are stamped "DISAPPROVED" or "RETURNED FOR CORRECTION", promptly resubmit 8 copies of documentation meeting Contract requirements.

1.08 QUALITY ASSURANCE

- A. Preparer's Qualifications: The person who prepares the drawings, calculations and specifications data for the work of this Section shall have successful experience, during the past 5 years, in preparing construction drawings that are similar to the requirements of this Section and shall have prepared drawings for at least 5 structures of equivalent or greater difficulty as required by this Section.
 - 1. The person preparing drawings, calculations and specifications data shall be a NYS licensed Professional Engineer or Registered Architect.
- B. Fabricator's Qualification: The fabricator of the building or building components shall have successful experience, during the past 5 years, and be regularly engaged in the fabrication of the type building meeting the requirements of this Section and shall show evidence of having a adequate manufacturing facility, equipment, and quality control equipment. The fabricator shall be subject to the Director's approval.
- C. Erector's Qualification: The building erector shall be regularly engaged in the erection of the type building meeting the requirements of this Section and shall be subject to the approval of the Director.

1.09 INSPECTION

- A. Quality Control Inspection: Maintain Quality Control (QC) inspection during the fabrication and erection of the building.

1. Submit for approval a copy of the QC Programs of the proposed fabricator and erector, including a list of their QC personnel and respective duties. QC program shall include construction tolerances and methods of constructing to the tolerances.

B. Quality Assurance (QA) inspection of building component fabrication may be made at the discretion of the Director's Representatives. The Director's Representative shall be given free and easy access to fabrication shop and field at all times that work is in progress. QA inspections will be made without cost to the contractor.

INCLUDE 007306 SUPPLEMENTARY CONDITIONS - WARRANTY EXTENSION. MODIFY THE STANDARD 007306 DOCUMENT AS NECESSARY FOR BELOW AND ANY OTHER ROOFS IN THE PROJECT.

1.10 WARRANTY

A. Special Warranty: The one year period required by Paragraph 9.8 of the General Conditions is extended to 2 years for the salt storage structure. Refer to Supplementary Conditions.

B. Manufacturer's Warranty: In addition to the 2 year period specified in the Supplementary Conditions, furnish the roofing manufacturer's _____ year material warranty for the roofing of the salt storage structure.

1. Material warranty shall include warranty against leakage due to material defects, including corrosion and rust.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Bulk Storage Inc., 28101 South Yates Ave., Bleecheer, IL 60401-3603, (708) 946-9595, www.bulkstorageinc.com.

B. Advanced Storage Technology Inc., 200 William Street, Suite 207, Elmira, NY, 14901-3125, (607) 734-2868, www.saltstorage.com.

2.02 MATERIALS

A. Materials provided shall have a minimum life expectancy of 25 years and shall have been used for its intended purpose for a minimum of 10 years.

B. As required by the approved construction drawings and specifications and complying with the requirements of this section and applicable references.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine the site area and conditions upon which the storage structure will be constructed. Notify the Director in writing of conditions that will adversely affect the execution and quality of the work of this Section. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION AND ERECTION

- A. Install required wall foundations and substructures or supports at the required elevations on properly prepared sub grade, as required for the erection of the complete storage structure.
- B. Erect the rectangular salt storage structure and required appurtenances on prepared foundations, conforming to the requirements of this Section, complete and ready for the storage of salt.
- C. Install asphalt shingles, and accessories in accordance with the manufacturer's printed instructions, except as otherwise specified or shown.
- D. Install Roller Curtain Doors, and accessories in accordance with the manufacturer's printed instructions, except as otherwise specified or shown.

END OF SECTION