SPECIFICATIONS

FOR THE

INSTALLATION OF AN ABOVE GROUND FUEL STORAGE TANK

POMFRET COMMUNITY SCHOOL

THE TOWN OF POMFRET
5 HAVEN ROAD
POMFRET CENTER, CONNECTICUT

Issued for Bid
September 29, 2016

Town of Pomfret
Pomfret, Connecticut

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INVITATION TO BID

ABOVE GROUND STORAGE TANK INSTALLATION
POMFRET COMMUNITY SCHOOL
POMFRET CENTER, CT

Sealed bids for the installation of an Above Ground Storage Tank at the Pomfret Community School, 20 Pomfret Street, Pomfret Center, CT, are to be addressed to the Town of Pomfret , Office of the First Selectman, Pomfret Town Hall, Five Haven Road, Pomfret Center, CT 06259. The bids are to be received at the Office of the First Selectman no later than 12:00 p.m. local time on Monday, October 17, 2016, at which time they will be publicly opened and read aloud. Bids received later than that date and time will not be considered and will be returned unopened. Amendments to or withdrawals of bids received later than that date and time will not be considered.

In lieu of a pre-bid conference, should any prospective bidder desire clarification or interpretation of any item in the invitation to bid or bid specifications, he/she should request such in writing from the Office of the Superintendent on or before October 7, 2016. The question asked and the answer shall be in writing and shall be sent or given to all known bidders. The Board of Education shall not be responsible for any alleged oral instructions or contract interpretations given to the bidder.

Site reviews are available by contacting Gary Brock, Director of Facilities, at the Pomfret Community School at 860-928-2718. No Bidder may withdraw his/her bid for a period of forty-five (45) days after the actual date of Bid opening.

Copies of the Drawings and Specifications may be obtained at the Office of the First Selectman, Pomfret Town Hall, Five Haven Road, Pomfret Center, CT 06259 or on-line at www.pomfretct.gov.

Each bidder shall submit one (1) copy of its bid response in a sealed envelope and plainly marked "Proposal Pomfret Community School – Above Ground Storage Tank Installation." No bid will be accepted as valid unless submitted on official bid forms, as included in the bid specifications provided to all bidders and properly and completely executed.

The submission of the bid shall serve as conclusive evidence that the bidder has satisfied himself/herself as to all requirements outlined in the bid specifications and documents and to all conditions serving to control the execution of any contract that may ensue.

The Town of Pomfret reserves the right to waive all formalities or to reject any or all proposals. The Town of Pomfret reserves the right to determine the lowest responsible bidder who not only has the lowest bid which conforms with the specifications, but also is financially able and competent to complete the work as evidenced by prior performance in the best interest of the Town.

Dated at Pomfret, Connecticut
This 29th day of September, 2016

Craig W. Baldwin
First Selectman

FORM OF PROPOSAL

ABOVE GROUND FUEL STORAGE TANK INSTALLATION
at
POMFRET COMMUNITY SCHOOL
POMFRET CENTER, CT

TO: Craig W. Baldwin, First Selectmen
Pomfret Town Hall
5 Haven Road
Pomfret Center, CT 06259

Pursuant to and in compliance with your "Invitation to Bid" relating thereto, the undersigned,

_____
(Name of Firm)

having visited the site and carefully examined the Drawings, Bidding Documents and Complete Specifications dated September as prepared by the Town in cooperation with CME hereby offers and agrees as follows:

To provide all labor, materials, and all else whatsoever necessary to install and properly all work in connection with the

ABOVE GROUND FUEL STORAGE TANK INSTALLATION
at
POMFRET COMMUNITY SCHOOL
POMFRET CENTER, CT

to the satisfaction of the Owner for the sum of:

_____

to provide all labor, materials, and all else whatsoever necessary to construct all work described in the specifications. All charges should be included on this Form of Proposal which includes all associated costs.

If awarded this Contract, we will execute a Contract with the Pomfret Board of Education. All bond and insurance requirements will be included in the executed contract.

CONTRACT TIME

The Bidder hereby certifies that Final Completion will be achieved by December 31, 2016. If Bidder is unable to meet this date please submit an alternate timeline.

SIGNATURE

_____
Contractor Firm

_____
Authorized Signature

_____
Printed Name and Title

_____
Business Address

_____
City, State, Zip Code

_____
Telephone Number

_____
Fax Number

_____
E-mail Address

CONTRACTOR'S QUALIFICATION STATEMENT

Company Name: _____

Name: _____ Title: _____
(Type or Print)

Address: _____

City: _____ State: _____ Zip Code: _____

Telephone: _____ Fax: _____

E-Mail: _____

Business Designation: (Check One) Individual [ ] Partnership [ ] Corporation [ ]

Joint Venture [ ] Other [ ]

Number of Years Organization has been in business as a Contractor in Connecticut _____

List trade categories with applicable licenses organization is legally qualified to do business in Connecticut _____

_____

_____

On a separate sheet list Projects of a similar nature organization has in progress or completed in the past five years listing name of Project, Owner, Contract Amount and Date of Completion.

REFERENCE FORM

The bidder must supply references for the last five projects completed:

Name and Address of Entity: _____
_____
_____
_____
Contact Person: _____
Phone Number: _____
Date(s) of Work: _____
Description of Project: _____
_____
_____
_____
_____

Name and Address of Entity:_____
_____
_____
_____
Contact Person: _____
Phone Number: _____
Date(s) of Work: _____
Description of Project: _____
_____
_____
_____
_____

Name and Address of Entity: _____
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_____
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Contact Person: _____
Phone Number: _____
Date(s) of Work: _____
Description of Project: _____
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Name and Address of Entity: _____
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Contact Person: _____
Phone Number: _____
Date(s) of Work: _____
Description of Project: _____
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_____

Name and Address of Entity: _____
_____
_____
_____
Contact Person: _____
Phone Number: _____
Date(s) of Work: _____
Description of Project: _____
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_____
_____
_____

SIGNATURE

_____
Contractor Firm

_____
Authorized Signature

_____
Printed Name and Title

INSURANCE REQUIREMENTS

Bidder shall agree to maintain in force at all times during the contract the following minimum coverage and shall name the Town of Pomfret as an Additional Insured on a primary and non-contributory basis to all polices except Workers Compensation and Professional Liability. All polices except Professional Liability should also include a waiver of Subrogation. Insurance shall be written with carriers approved in the State of Connecticut and with a minimum AM Best's rating of "A-VIII". In addition, all carriers are subject to approval by the Town of Pomfret.

	(Minimum Limits)
General Liability Each Occurrence	$1,000,000
General Aggregate	$2,000,000
Professional Liability Each Claim or Each Occurrence	$1,000,000
Aggregate	$1,000,000
Umbrella Each Occurrence	$1,000,000
Aggregate	$1,000,000

If any policy is written on a "Claims Made" basis, the policy must be continually renewed for a minimum of two (2) years from the completion date of the contract. If the policy is replaced and/or the retroactive date is changed, then the expiring policy must be endorsed to extend the reporting period for claims for the policy in effect during the contract for two (2) years from the completion date.

Workers' Compensation and W.C. Statutory Limits		$500,000
Employers' Liability:	E.L. Each Accident	$500,000
	E.L. Disease Policy Limit	$500,000

Original completed Certificates of Insurance must be presented to the Town of Pomfret prior to contract issuance. Bidder agrees to provide replacement/renewal certificates at least 60 days prior to the expiration of the policies.

SECTION 01100

SUMMARY OF THE WORK

PART 1 - GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, material, and equipment necessary to install a new 4,000 gallon above ground double-wall heating oil storage tank and associated monitoring system. The Contractor shall provide such as a complete working system including:

1. Furnishing and installing reinforced concrete base pad for tank, including associated earthwork. Both precast and poured in place pads are acceptable.

2. Furnishing and installing new double wall 4,000 gallon above ground fuel storage tank. Basis of design is a ConVault, 12’2” x 8’9 ¾” x 8’-0” 4,000 gallon tank; equivalent concrete and double wall steel tanks which can meet the required dimensional setbacks are acceptable substitutes for this product.

3. Furnishing and installing new galvanized stairway to provide access to fuel storage tank fill location.

4. Furnishing and installing fuel distribution and vent piping, including new building penetrations and painting of piping as specified.

5. Furnishing and installing tank level and interstitial space monitoring probes.

6. Reprogramming of the existing Veeder Root TLS 300C to accept data from new probes and provide alarms as directed by owner.

7. Furnishing and installing new visual and audible alarm with exterior acknowledge and interior reset.

8. Furnishing and installing all necessary electrical equipment, conduit, fittings, and wiring.

9. Electrical grounding of all system components.

10. Draining, cutting, and capping of existing fuel lines at inside face of building, including disposal of any waste fuel oil.

11. Submission of operation and maintenance manuals and warranties as specified.

12. All other required labor, material, and equipment required to provide a complete working system.

B. The following work is **EXCLUDED** from the contract:

1. Excavation for and installation of segmental concrete block retaining wall.
2. Removal & disposal of existing fuel tank and piping within parking lot.
3. Final ground cover between tank pad, retaining wall, and building.
4. Rerouting of existing exterior drain lines.
5. Environmental testing.

C. The Contractor shall coordinate with Pomfret Community School and their appointed representative as required to complete the project as specified herein.

D. The Contractor shall provide to Pomfret Community School an as-built drawing of all utilities constructed as part of this project, as well as operation and maintenance manuals.

E. All work shall comply with Federal, State, and Local Laws and Regulations.

1.02 SITE SECURITY

The Contractor shall be required to isolate any excavation, trench, or dangerous conditions with the use of temporary construction fencing and/or barriers. These protective measures shall be maintained throughout construction and checked on a daily basis.

1.03 QUALITY ASSURANCE

All work shall be completed in accordance with all local, State and Federal laws, ordinances, rules, and regulations and within the guidelines of these specifications.

END OF SECTION

SECTION 01740

SITE CLEANUP

1. Description

A. The Contractor must employ at all times during the progress of his work adequate cleanup measures and safety precautions to prevent injuries to persons or damage to property. The Contractor shall immediately, upon direction by the Director of Facilities provide adequate material, equipment and labor to cleanup and make safe any and all areas deemed necessary, by the Director of Facilities.

2. Daily Cleanup

A. The Contractor shall clean up, at least daily, all refuse, rubbish, scrap and surplus material, debris and unneeded construction equipment resulting from the construction operations and sweep the area. The site of the work and the adjacent areas affected thereby shall at all times present a neat, orderly and workmanlike appearance.

B. Upon written notification by the Director of Facilities, the Contractor shall within 24 hours clean up those areas, which in the Director of Facilities' opinion are in violation of this section and the above referenced sections of the specifications.

C. If in the opinion of the Director of Facilities, the referenced areas are not satisfactorily cleaned up, all other work on the project shall stop until the cleanup is satisfactory.

3. Material or Debris in Drainage Facilities

Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, gutters, drains, pipes, structures, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the work, and the ditches, channels, drains, pipes, structures, and work shall, upon completion of the work, be left in a clean and neat condition.

4. Removal of Temporary Buildings, Structures, and Equipment

On or before completion of the work, the Contractor shall, unless otherwise specifically directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools and machinery or other construction equipment furnished by him; shall remove all rubbish from any grounds which he has occupied; shall remove silt fences and hay bales used for trapping sediment; and shall leave the roads and all parts of the property and adjacent property affected by his operations in a neat and satisfactory condition.

5. Restoration of Damaged Property

The Contractor shall restore or replace, when and as directed, any property damaged by his work, equipment or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end, the Contractor shall do as required all necessary highway or driveway, walk and landscaping work. Materials, equipment, and methods for such restoration shall be as approved by the Director of Facilities.

6. Final Cleanup

Before acceptance by the Owner, the Contractor shall perform a final cleanup to bring the construction site to its original or specified condition. This cleanup shall include removing all trash and debris of the premises. Before acceptance, the condition of the site shall be approved by the Director of Facilities.

END OF SECTION

SECTION 01782

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

A. Operation and maintenance documentation directory.

B. Emergency manuals and contact numbers.

C. Operation manuals for systems, subsystems, and equipment.

D. Maintenance manuals for the care and maintenance of systems and equipment.

1.2 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.3 SUBMITTALS

A. Initial Submittal: Submit two draft copies of each manual at least fifteen days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Director of Facilities will return 1 copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit two copies of each manual in final form at least fifteen days before final inspection. Director of Facilities will return one copy with comments within fifteen days after final inspection.

Correct or modify each manual to comply with Director of Facilities' comments. Submit two copies of each corrected manual within fifteen days of receipt of Director of Facilities' comments.

1.4 COORDINATION

Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.

2. List of systems.

3. List of equipment.

4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with the same designation used in the Contract Documents.

2.2 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.

2. Table of contents.

3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.

2. Name and address of Project.

3. Name and address of Owner.

4. Date of submittal.

5. Name, address, and telephone number of Contractor.

6. Name and address of Engineer.

7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

   b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.

4. Supplementary Text: Prepared on 8-1/2-by-11-inch, 20-lb/sq. ft. white bond paper.

5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.

2. Emergency instructions.

3. Emergency procedures.

4. Emergency contact numbers.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Power failure.

2. Water outage.

3. System, subsystem, or equipment failure.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.

2. Shutdown instructions for each type of emergency.

3. Operating instructions for conditions outside normal operating limits.

4. Required sequences for electric or electronic systems.

5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions.

2. Performance and design criteria if Contractor is delegated design responsibility.

3. Operating standards.

4. Operating procedures.

5. Operating logs.

6. Wiring diagrams.

7. Control diagrams.

8. Piped system diagrams.

9. Precautions against improper use.

10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.

2. Manufacturer's name.

3. Equipment identification with serial number of each component.

4. Equipment function.

5. Operating characteristics.

6. Limiting conditions.

7. Performance curves.

8. Engineering data and tests.

9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.

2. Equipment or system break-in procedures.

3. Routine and normal operating instructions.

4. Regulation and control procedures.

5. Instructions on stopping.

6. Normal shutdown instructions.

7. Seasonal and weekend operating instructions.

8. Required sequences for electric or electronic systems.

9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.

2. Manufacturer's name.

3. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.

2. Types of cleaning agents to be used and methods of cleaning.

3. List of cleaning agents and methods of cleaning detrimental to product.

4. Schedule for routine cleaning and maintenance.

5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in the manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard printed maintenance instructions and bulletins.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.

3. Identification and nomenclature of parts and components.

4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.

2. Troubleshooting guide.

3. Precautions against improper maintenance.

4. Disassembly; component removal, repair, and replacement; and reassembly instructions.

5. Aligning, adjusting, and checking instructions.

6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.

2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

Include procedures to follow and required notifications for warranty claims.

PART 3- EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.

2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data includes more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

Do not use original Project Record Documents as part of operation and maintenance manuals.

END OF SECTION

SECTION 02300

EARTHWORK

PART 1 – GENERAL

1.1 WORK INCLUDED

The Contractor shall make excavations of normal depth in earth for trenches and structures, shall backfill and compact such excavations to the extent necessary, shall furnish the necessary material and construct embankments and fills, and shall make miscellaneous earth excavations and do miscellaneous grading.

1.2 REFERENCES

American Society for Testing and Materials (ASTM)

ASTM	C131	Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM	C136	Method for Sieve Analysis of Fine and Coarse Aggregates.
ASTM	C330	Specification for lightweight Aggregate for Structural Concrete.
ASTM	D1556	Test Method for Density of Soil in Place by the Sand Cone Method.
ASTM	D1557	Test Methods for Moisture-density Relations of Soils and Soil Aggregate Mixtures Using Ten-pound (10 lb.) Hammer and eighteen-inch (18") Drop.
ASTM	D2922	Test Methods for Density of Soil and Soil-aggregate in Place by Nuclear Methods (Shallow Depth).

State of Connecticut Department of Transportation (CTDOT)
Standard Specifications for Roads, Bridges and Incidental Construction, Form 817.

1.3 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING

Samples of all materials proposed for the project shall be submitted to the Director of Facilities for review. Size of the samples shall be as approved by the Director of Facilities.

1.4 PROTECTION OF EXISTING PROPERTY

A. The work shall be executed in such manner as to prevent any damage to facilities at the site and adjacent property and existing improvements, such as but not limited to streets, curbs, paving, service utility lines, structures, monuments, bench marks, observation wells, and other public or private property. Protect existing improvements from damage caused by settlement, lateral movements, undermining, washout and other hazards created by earthwork operations.

B. In case of any damage or injury caused in the performance of the work, the Contractor shall, at its own expense, make good such damage or injury to the satisfaction of, and without cost to, the Owner. Existing roads, sidewalks, and curbs damaged during the project work shall be repaired or replaced to at least the condition that existed at the start of operations. The Contractor shall replace, at his own cost, existing benchmarks, observation wells, monuments, and other reference points which are disturbed or destroyed.

C. Buried drainage structures and pipes, observation wells and piezometers, including those which project less than eighteen inches (18”) above grade, which are subject to damage from construction equipment shall be clearly marked to indicate the hazard. Markers shall indicate limits of danger areas, by means which will be clearly visible to operators of trucks and other construction equipment, and shall be maintained at all times until completion of project.

1.5 DRAINAGE

The Contractor shall provide, at its own expense, adequate drainage facilities to complete all work items in an acceptable manner. Drainage shall be done in a manner so that runoff will not adversely affect construction procedures nor cause excessive disturbance of underlying natural ground or abutting properties.

1.6 FROST PROTECTION AND SNOW REMOVAL

A. The Contractor shall, at its own expense, keep earthwork operations clear and free of accumulations of snow as required to carry out the work.

B. The Contractor shall protect the subgrade beneath new structures and pipes from frost penetration when freezing temperatures are expected.

PART 2 – PRODUCTS

2.1 MATERIAL

A. GRANULAR FILL

Granular fill shall consist of any or a mixture of the following:

1. BROKEN OR CRUSHED STONE

Broken or crushed stone shall consist of sound, tough, durable stone, reasonably free from soft, thin, elongated, laminated, friable, micaceous, or disintegrated pieces, mud, dirt or other deleterious material and shall be sized to meet the requirements of gradation “A” of Form 817.

2. BANK OR CRUSHED GRAVEL

Bank or crushed gravel shall consist of sound, tough, durable particles of crushed or uncrushed gravel, free from soft, thin, elongated or laminated pieces and vegetable or other deleterious substances. It shall meet Grading “A” and the requirements for plasticity and resistance to abrasion indicated in Article M.02.06.

3. RECLAIMED MISCELLANEOUS AGGREGATE

Reclaimed miscellaneous aggregate material shall consist of sound, tough, durable particles of crushed reclaimed waste. It shall be free of soft disintegrated pieces, mud, dirt, glass or other injurious materials and contain no more than 15% by weight of bituminous concrete. It shall meet Grading “A” and the requirements for plasticity and resistance to abrasion indicated in Article M.02.06.

B. SUBBASE

Sub-base shall consist of bank or crushed gravel, crusher run stone or reclaimed miscellaneous aggregate.

C. PROCESSED AGGREGATE BASE

Coarse and fine aggregates shall be combined by approved methods so that the resulting materials shall conform to the following gradation requirements:

Square Mesh Sieves	Percent Passing by Weight
Pass 2 ¼”	100
Pass 2”	95-100
Pass ¾”	50-75
Pass ¼”	25-45
Pass #40	5-20
Pass #100	2-12

Coarse and fine aggregates shall meet the requirements of Article 3.04 and M.05.01.

D. CRUSHER RUN STONE

Crusher run stone shall consist of sound tough durable broken stone. It shall be reasonably free from soft, thin, elongated laminated, friable, micaceous, or disintegrated pieces, dirt, mud or other deleterious material. It shall meet Grading “A” and the requirements for plasticity and resistance to abrasion indicated in Article M.02.06.

E. GRANULAR BASE AND SURFACES

Granular base and surface materials shall conform to the requirements as outlined in Article M.02.03 for Granular Base, Rolled Bank Gravel Surface and Traffic Bound Gravel Surface.

F. PERVIOUS STRUCTURE BACKFILL

Pervious structure backfill shall consist of broken or crushed stone, bank or crushed gravel or reclaimed miscellaneous aggregate. It shall meet Grading "B" and the requirements for plasticity and resistance to abrasion indicated in Article M.02.06.

G. FREE DRAINING MATERIAL

Free draining material shall consist of sand, gravel, rock fragments, quarry run stone, or reclaimed miscellaneous aggregate. This material shall not have more than 70% by weight passing the #40 mesh sieve and not more than 10% by weight passing the #200 mesh sieve.

H. SAND

Sand shall consist of clean, inert, hard, durable grains of quartz or other hard, durable rock, free from loam or clay, surface coatings and deleterious materials. The allowable amount of material passing a No. 200 sieve as determined by ASSHTO-T11 shall not exceed 10% by weight. The maximum particle size for sand shall be 3/8 inch.

PART 3 – EXECUTION

3.1 DISTURBANCE OF EXCAVATED AND FILLED AREAS DURING CONSTRUCTION

A. Contractor shall take the necessary steps to avoid disturbance of subgrade during excavation and filling operations, including restricting the use of certain types of construction equipment and their movement over sensitive or unstable materials, dewatering and other acceptable control measures.

B. All excavated or filled areas disturbed during construction, all loose or saturated soil, and other areas that will not meet compaction requirements as specified herein shall be removed and replaced with a minimum 12-inch layer of compacted crushed stone wrapped all around in non-woven filter fabric. Costs of removal and replacement shall be borne by the Contractor.

C. The Contractor shall place a minimum of 12-inch layer of special bedding materials or crushed stone wrapped in filter fabric over the natural underlying soil to stabilize areas which may become disturbed as a result of rain, surface water runoff or groundwater seepage pressures, all at no additional cost to the Owner. The Contractor also has the option of drying materials in-place and compacting to specified densities.

3.2 EXCAVATION

A. GENERAL

1. The Contractor shall perform all work of any nature and description required to accomplish the work as shown on the Drawings and as specified.

2. Excavations, unless otherwise required by the Director of Facilities, shall be carried only to the depths and limits shown on the Drawings. If unauthorized excavation is carried out below required subgrade and/or beyond minimum lateral limits shown on Drawings, it shall be backfilled with gravel borrow and compacted at the Contractor's expense as specified below, except as otherwise indicated. Excavations shall be kept in dry and good condition at all times, and all voids shall be filled to the satisfaction of the Director of Facilities.

3. In all excavation areas, the Contractor shall strip the surficial topsoil layer and underlying subsoil layer separate from underlying soils. In paved areas, the Contractor shall first cut pavement as specified in paragraph 3.2 B.1 of this specification, strip pavement and pavement subbase separately from underlying soils. All excavated materials shall be stockpiled separately from each other within the limits of work.

4. The Contractor shall follow a construction procedure, which permits visual identification of stable natural ground. Where groundwater is encountered, the size of the open excavation shall be limited to that which can be handled by the Contractor's chosen method of dewatering and which will allow visual observation of the bottom and backfill in the dry.

5. The Contractor shall excavate unsuitable materials to stable natural ground where encountered at proposed excavation subgrade, as directed by the

Director of Facilities. Unsuitable material includes topsoil, loam, peat, other organic materials, snow, ice, and trash. Unless specified elsewhere or otherwise directed by the Director of Facilities, areas where unsuitable materials have been excavated to stable ground shall be backfilled with compacted special bedding materials or crushed stone wrapped all around in non-woven filter fabric.

B. TRENCHES

1. Prior to excavation, trenches in pavement shall have the traveled way surface cut in a straight line by a concrete saw or equivalent method, to the full depth of pavement. Excavation shall only be between these cuts. Excavation support shall be provided as required to avoid undermining of pavement. Cutting operations shall not be done by ripping equipment.

2. The Contractor shall satisfy all dewatering requirements specified in Section 02240 DEWATERING, before performing trench excavations.

3. Trenches shall be excavated to such depths as will permit the pipe to be laid at the elevations, slopes and depths of cover indicated on the Drawings. Trench widths shall be as shown on the Drawings or as specified.

4. Where pipe is to be laid in bedding material, the trench may be excavated by machinery to, or just below the designated subgrade provided that the material remaining in the bottom of the trench is not disturbed.

5. If pipe is to be laid in embankments or other recently filled areas, the fill material shall first be placed to a height of at least 12-inches above the top of the pipe before excavation.

6. Pipe trenches shall be made as narrow as practicable and shall not be widened by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed.

7. If, in the opinion of the Director of Facilities, the subgrade, during trench excavation, has been disturbed as a result of rain, surface water runoff or groundwater seepage pressures, the Contractor shall remove such

disturbed subgrade to a minimum of 12 inches and replace with crushed stone wrapped in filter fabric. Cost of removal and replacement shall be borne by the Contractor.

C. EXCAVATION NEAR EXISTING STRUCTURES

1. Attention is directed to the fact that there are pipes, manholes, drains, and other utilities in certain locations. An attempt has been made to locate all utilities on the drawings, but the completeness or accuracy of the given information is not guaranteed.

2. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and excavation shall be done by means of hand tools, as required. Such manual excavation, when incidental to normal excavation, shall be included in the work to be done under items involving normal excavation.

3. Where determination of the exact location of a pipe or other underground structure is necessary for properly performing the work, the Contractor shall excavate test pits to determine the locations.

3.3 BACKFILL PLACEMENT AND COMPACTION

A. GENERAL

1. Prior to backfilling, the Contractor shall compact the exposed natural subgrade to the densities as specified herein.

2. After approval of a subgrade by the Director of Facilities, the Contractor shall backfill areas to required contours and elevations with specified materials.

3. The Contractor shall place and compact materials to the specified density in continuous horizontal layers. The degree of compaction shall be based on maximum dry density as determined by ASTM Test D1557, Method C. The minimum degree of compaction for fill placed shall be as follows:

Location	Percent Maximum Density
Below pipe centerline	95
Above pipe centerline	92
Below pavement (upper 3 ft.)	95
Embankments	95
Below pipe in embankments	95
Adjacent to structures	92
Below structures	95

4. The Director of Facilities reserves the right to test backfill for conformance to the specifications and Contractor shall assist as required to obtain the information. Compaction testing will be performed by the Director of Facilities or by an inspection laboratory designated by the Director of Facilities, engaged and paid for by the Owner. If test results indicate work does not conform to specification requirements, the Contractor shall remove or correct the defective Work by recompacting where appropriate or replacing as necessary and approved by the Director of Facilities, to bring the work into compliance, at no additional cost to the Owner. All backfilled materials under structures and buildings shall be field tested for compliance with the requirements of this specification.

5. Where horizontal layers meet a rising slope, the Contractor shall key each layer by benching into the slope.

6. If the material removed from the excavation is suitable for backfill with the exception that it contains stones larger than permitted, the Contractor has the option to remove the oversized stones and use the material for backfill or to provide replacement backfill at no additional cost to the Owner.

7. The Contractor shall remove loam and topsoil, loose vegetation, stumps, large roots, etc., from areas upon which embankments will be built or

areas where material will be placed for grading. The subgrade shall be shaped as indicated on the Drawings and shall be prepared by forking, furrowing, or plowing so that the first layer of the fill material placed on the subgrade will be well bonded to the subgrade.

B. TRENCHES

1. Bedding as detailed and specified shall be furnished and installed beneath the pipeline prior to placement of the pipeline. A minimum bedding thickness shall be maintained between the pipe and undisturbed material, as shown on the Drawings.

2. As soon as practicable after pipes have been laid, backfilling shall be started.

3. Unless otherwise indicated on the Drawings, crushed stone or sand shall be placed by hand shovel in 6-inch thick lifts up to a minimum level of 12-inches above the top of pipe. This area of backfill is considered the zone around the pipe and shall be thoroughly compacted before the remainder of the trench is backfilled. Compaction of each lift in the zone around the pipe shall be done by use of power-driven tampers weighing at least 20 pounds or by vibratory compactors. Care shall be taken that material close to the bank, as well as in all other portions of the trench, is thoroughly compacted to densities required.

4. Free draining material shall be placed from the top of the select backfill to the specified material at grade (loam, pavement subbase, etc.). Fill compaction shall meet the density requirements of this specification.

5. Water Jetting:

   a. Water jetting may be used when the backfill material contains less than 10 percent passing the number 200 sieve, but shall be used only if approved by the Director of Facilities.

   b. Compaction of backfill placed by water jetting shall conform to the requirements of this specification.

6. If the materials above the trench bottom are unsuitable for backfill, the Contractor shall furnish and place backfill materials meeting the

requirements for trench backfill, as shown on the drawings or specified herein.

7. Should the Director of Facilities order crushed stone for utility supports or for other purposes, the Contractor shall furnish and install the crushed stone as directed.

8. In shoulders of streets and road, the top 12-inch layer of trench backfill shall consist of processed gravel for sub-base, satisfying the requirements listed in CTDOT Form 817 granular base M.02.03.

C. BACKFILLING UNDER BUILDINGS AND FOUNDATIONS

Material to be used as structural fill under structures shall be Pervious Structure Backfill or Granular Fill, as shown on the Drawings or as directed by the Director of Facilities. Where granular fill is required to support proposed footings, walls, slabs, and other structures, the material shall be placed in a manner accepted by the Director of Facilities. Compaction of each lift shall meet the density requirements of this specification.

D. BACKFILLING ADJACENT TO STRUCTURES

1. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads to which they will be subjected. Excavated material approved by the Director of Facilities may be used in backfilling around structures. Backfill material shall be thoroughly compacted to meet the requirements of this specification.

2. Contractor shall use extra care when compacting adjacent to pipes and drainage structures. Backfill and compaction shall proceed along sides of drainage structures so that the difference in top of fill level on any side of the structure shall not exceed two feet (2’) at any stage of construction.

3. Where backfill is to be placed on only one side of a structural wall, only hand-operated roller or plate compactors shall be used within a lateral distance of five feet (5’) of the wall for walls less than fifteen feet (15’) high and within ten feet (10’) of the wall for walls more than fifteen feet (15’) high.

3.4 DISPOSAL OF SURPLUS MATERIALS

A. No excavated material shall be removed from the site of the work or disposed of by the Contractor unless approved by the Director of Facilities.

B. Surplus excavated materials, which are acceptable to the Director of Facilities, shall be used to backfill or to replace other materials unacceptable for use as backfill. Upon written approval of the Director of Facilities, surplus excavated materials shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes as indicated by the Owner, within its jurisdictional limits; all at no additional cost to the Owner.

C. Surplus excavated material not needed as specified above shall be hauled away and disposed of by the Contractor at no additional cost to the Owner, at appropriate locations, and in accordance with arrangements made by him. Disposal of all rubble shall be in accordance with all applicable local, state and federal regulations.

END OF SECTION

SECTION 03302

FIELD CONCRETE

PART 1 - GENERAL

1.1 SUMMARY:

A. This Section specifies cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 SUBMITTALS:

A. Product Data: For proprietary materials and items, including reinforcement and forming accessories, admixtures, joint systems, curing compounds, colored hardener and others if requested by the Designer.

B. Statement of materials constituting the design of mixes for each size aggregate as required by ASTM C94 shall be submitted to the Director of Facilities within one week following award of the Contract.

C. Shop Drawings: For reinforcement detailing fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 Detailing Manual – SP-66(94) showing bar schedules and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures. For slabs with mechanically-connected steel reinforcement, indicate anchors and inserts locations, proposed locations of all control, expansion and construction joints not otherwise shown on the plans.

1.3 DELIVERY, STORAGE, AND HANDLING:

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement. Repair damaged epoxy coatings on steel reinforcement according to ASTM D 3963.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS:

A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel type material that will provide continuous, true, and smooth, exposed concrete surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on the plans.

1. Use overlaid plywood complying with DOC PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I or better.

2. Use plywood complying with DOC PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

B. Forms for Unexposed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces. Comply with local regulations controlling use of volatile organic compounds (VOC's).

2.2 STEEL REINFORCEMENT:

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES:

A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or pre-cast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS:

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type 1 or II, gray. Do not use air entraining cement.
2. Fly Ash: ASTM C618, Type C or F.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S. Provide aggregates from a single source for exposed concrete.

1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
2. Provide evidence that all aggregates are non-reactive with alkaline when tested in accordance with ASTM C 289 and C 227.
3. Local aggregates not complying with ASTM C 33 but have shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to the Director of Facilities.

C. Water: ASTM C 94, clean and potable.

2.5 ADMIXTURES:

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
3. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

C. Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

2.6 CURING MATERIALS:

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry. No curing membranes can be used on slabs-on grade and slab above the basement.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Clean and potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1,

Class B, non-dissipating**,** certified by curing compound manufacturer to not interfere with bonding of floor covering.

2.7 RELATED MATERIALS:

A. Expansion and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Semi-rigid Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with a Type A Shore Durometer hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

A. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

B. Compacted Granular Fill: Refer to Form 816, Section 2.14 “Compacted Granular Fill” for material and construction methods required.

2.8 CONCRETE MIXTURES, GENERAL:

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash: 15 percent. Not allowed in cement mixes for slab-on-grade.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions and only when approved by the Director of Facilities.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, except footings, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use non-chlorine accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F.
5. Corrosion-inhibiting admixture for salt shed stems and piers shall contain calcium nitrite at 4 gal. per cubic yard of a 30 percent solid solution.
6. No admixtures containing calcium chloride shall be permitted in slabs-on-grade and other concrete floors.

2.9 CONCRETE MIXTURES FOR SLABS:

A. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 5000 psi at 28 days.
2. Minimum Cementitious Materials Content: 540 lb/cu. yd.
3. Slump Limit: 3 inches , plus or minus 1 inch
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

2.10 FABRICATING REINFORCEMENT:

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING:

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
2. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
3. For mixer capacity of 1 cu. yd or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixer capacity larger than 1 cu. yd, increase mixing time by 15 seconds for each additional 1 cu. yd.
4. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK:

A. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

B. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch for concrete surfaces exposed to view.
2. Class B, 1/4 inch for other concrete surfaces.

C. Construct forms tight enough to prevent loss of concrete mortar.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

F. Chamfer exterior corners and edges of permanently exposed concrete.

G. Form openings, chases, offsets, sinkages, keyways, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

H. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

I. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

J. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 STEEL REINFORCEMENT:

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.3 JOINTS:

E. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

F. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Director of Facilities.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

G. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

3.4 CONCRETE PLACEMENT:

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project Site, or during placement unless approved by the Director of Facilities.

C. Before test sampling and placing concrete, water may be added at Project Site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleed-water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

B. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen sub-grade or on sub-grade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

C. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and sub-grade just before placing concrete. Keep sub-grade uniformly moist without standing water, soft spots, or dry areas.

3.5 FINISHING SLABS:

A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

1. Edge, Float and Groove the Slab, when all traces of the water are gone and the concrete starts to harden. Start by running the edger around the perimeter to round and compact the corner. After finishing edging start slab Float and Trowel the Surface to Smooth and Compact; Floating removes the marks left by edging and brings the surface one-step closer to a final finish. After finishing slab-floating, start the grooving process at the slab surrounding the pump island. Construct positive limiting barrier as per Plans. Use a straightedge and proper groove tool.

B. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. The slab shall be uniform in appearance. The broom finish shall not dislodge aggregate nor leave large particles of cement paste which not conform to the broom finish. Coordinate required final finish with Director of Facilities before application.

3.6 MISCELLANEOUS CONCRETE ITEMS:

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete

filling indicated or required to complete the Work.

3.7 CONCRETE PROTECTING AND CURING:

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing. Do not use curing membranes on slabs-on-grade and concrete floors generally in areas of etched floors.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces

to receive floor coverings.

b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

   a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.8 FIELD QUALITY CONTROL:

A. Testing and Inspecting: The Town will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms.

END OF SECTION

SECTION 13120

FUEL FACILITY

PART 1 - GENERAL

1.1 SUMMARY:

A. The Contractor shall install a complete fuel facility, except as otherwise noted, in conformity with the lines, grades, dimensions and details shown on the plans and as described herein.

B. The tank nipple arrangement described herein and shown on the plans is based upon the aboveground storage tank identified herein. “Or Equal” submissions will address the need for an alternative tank nipple arrangement, if necessary, that is acceptable to the Designer. Alternative tank nipple arrangements will also be at no additional cost to the Owner.

1.2 DEFINITIONS:

A. AST: Aboveground storage tank.

1.3 SUBMITTALS:

A. Product Data: For each type of product indicated. Include construction details, material descriptions, and dimensions of individual components and profiles. Also include, where applicable, rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For storage tanks, include details of supports and anchors. Indicate all critical dimensions, locations of all nipples, and accessories, etc.

1.4 INFORMATIONAL SUBMITTALS:

A. Quality Assurance Submittals:

1. Certification that tank test equipment conforms to State and Federal

requirements and that the persons performing the tests are qualified on said test equipment.

2. Field quality control test reports.

1.5 CLOSEOUT SUBMITTALS:

A. Operation and Maintenance Data: For fuel facility equipment and accessories to include in the operation and maintenance manuals. Include the following:

1. Interconnection as-built wiring diagrams with identified system components and devices for the entire fuel management center.

1.6 QUALITY ASSURANCE:

A. Electrical Installer Qualifications: An experienced electrician capable of wiring, installing, and troubleshooting all related portions of a fuel facility as specified in this Section.

1.7 DELIVERY, STORAGE, AND HANDLING:

A. Lift tanks in accordance with manufacturer’s instructions and with the proper equipment. Do not use chain or cables around tanks at any time. If tanks have to be moved, set on smooth ground free of rocks and foreign objects. Do not drop or roll tanks. Do not allow tanks to be impacted.

B. Other Tank Materials: Store material in a clean dry area protected from damage. Materials may be stored outside only with the written approval of the Director of Facilities.

1.8 WARRANTY:

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace storage tanks that fail in materials or workmanship within specified warranty period.

1. Storage Tanks:

a. Failures include, but are not limited to, the following when used for storage of fuel at temperatures not exceeding 150 deg F:

1) Structural failures including cracking, breakup, and collapse.
2) Corrosion failure including external and internal corrosion of tanks.

b. Warranty Period: 30 years from the issuance of the Certificate of Compliance.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS:

A. Black Steel Pipe: Schedule 40, conforming to ASTM A53 with malleable iron fittings conforming to ANSI B16.3.

2.2 JOINING MATERIALS:

A. Per manufacturer recommendations unless otherwise noted.

2.3 MANUAL SHUTOFF VALVES:

A. General Requirements for Metallic Valves, NPS 2 and Smaller for Liquid Service: Comply with UL 842.

1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in the valve schedule.
5. Service Mark: Initials "WOG" shall be permanently marked on valve body.

B. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work

include, but are not limited to, the following:

a. BrassCraft Manufacturing Company; a Masco company.
b. Conbraco Industries, Inc.; Apollo Div.
c. Lyall, R. W. & Company, Inc.
d. McDonald, A. Y. Mfg. Co.
e. Perfection Corporation; A Subsidiary of American Meter Company.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in the valve schedule.
8. CWP Rating: 600 psig.
9. Service Mark: Initials "WOG" shall be permanently marked on valve body.

2.4 CONCRETE-VAULTED, STEEL, AST:

A. Basis-of-Design Product: Subject to compliance with requirements, provide ConVault aboveground storage tanks manufactured by United Concrete Products Inc., or an approved equal.

B. Description: The AST shall consist of a primary steel tank covered by a minimum of ¼" thick extruded polystyrene foam insulation panels. The secondary containment shall consist of a 30 mil thick high-density polyethylene membrane enclosing the steel tank and insulation material. The primary steel tank and the secondary containment shall be encased in six inches of monolithic reinforced concrete, with minimum design strength of 5,000 psi at 28 days.

C. Construction: The concrete design shall include the following for long-term durability: air entrainment, water reducing admixture, and steel reinforcement. Concrete encasements with seams will not be approved. The protected and insulated AST systems shall contain no cold joints or heat sinks (heat transfer points). The AST must be shop fabricated and tested in accordance with UL 2085. No steel or insulating material shall come in contact with the concrete or other corrosive material.

D. Protection: The AST's shall be suitable for operation at atmospheric pressure; fabricated to meet the following criteria:

1. Provide two (2) hour fire protection in accordance with UL 2085.
2. Vehicle Impact Resistance: Tanks shall be designed to have a low center of gravity that can withstand vehicle impact and tipping during earthquakes and other natural disasters.
3. Ballistic Resistance: Tanks shall withstand bullet resistance tests in compliance with UL 2085.
4. Lightning Protection: The protected and insulated AST systems shall have two (2) bolts for connecting grounding conductors for lightning protection. Grounding conductor and grounding rod materials and installation shall be in accordance with NFPA 780.

E. The primary steel tanks shall include an atmospheric vent and emergency venting in accordance with NFPA 30 Code requirements.

F. Support legs shall be monolithically cast with the concrete vault.

2.5 AST ACCESSORIES:

A. Threaded pipe connection nipples on top of tank for fill, vapor recovery, submersible pump, vent, in-tank probe, and gauging, in locations and of sizes indicated on the Plans.

B. 24" Manway Assembly for access to inside the tank with 8" Emergency Vent. The emergency vent relief system shall relieve the pressure of the primary tank if the tank pressure exceeds 1/2 psig.

C. Tank Fill Assembly: 7-gallon powder coated, UL listed spill containment. The assembly shall include a normally closed drain valve to release spilled product into the primary tank and a stick port for manual gauging.

D. Tank Charts: Provide (3) copies. Mount 1 copy in a glass frame secured to the wall with 4 screws as directed by Owner. Charts shall be calibrated to show tank capacity in gallons from feet and inches, graduated by eighths.

E. Gauge Stick: Wooden, manufacturer's recommended length, treated after graduating to prevent swelling and damage from fuel. Gauge stick shall be graduated in feet, inches, and eighths.

F. Stair Assembly: Tank manufacturer's standard galvanized steel stairway for access to

the top of the tank. Stairs and railings shall comply with OSHA Standards.

G. Tie-Down Straps: Tank manufacturer's standard 3-1/2" x 3/8" galvanized steel tie-down straps.

H. Seismic Restraints: Tank manufacturer's standard galvanized steel tank leg restraints.

I. Emergency Response Identification: Hazard sign that meets the requirements of NFPA 704. Hazard rating numerals shall be a minimum of 3 inches high. Sign shall be vinyl with self adhesive backing, intended for outdoor use.

2.6 TANK INSTALLATION MATERIALS:

A. Grout: Non-shrink type.

B. Compacted Granular Fill: Refer to Form 817, Section 2.14 "Compacted Granular Fill" for material and construction methods required.

C. Concrete Pads: Comply with the requirements in CSI Division 03 Section 033000, "Cast-in-Place Concrete."

2.7 STORAGE TANK SPECIALTIES:

A. Overfill Prevention:

1. Overfill Prevention Valve: Suitable for installation in aboveground fuel storage tanks, provide Model No. 61fSTOP- 100M as manufactured by OPW, or an approved equal.
2. Lower Drop Tube: Fiberglass, compatible with overfill prevention valve, as manufactured by NOV Fiber Glass Systems, or an approved equal. Drop tube shall terminate 6-inches above the bottom of the tank, with the end of drop tube cut off at a 45-degree angle.

B. Fill Adaptor and Cap: 2-inch Tank Inlet Spout Adaptor Model No. 633AST with 2-inch locking dust cap, Model No. 634BK as manufactured by OPW, or an approved equal.

C. Vent Cap:

1. Open atmospheric type, corrosion-resistant, internal wire screen designed to protect vent lines from water, debris, and insects, Model No. 23 as manufactured by OPW, or an approved equal.

D. Ball Valves: Full Port Two-Way as manufactured by OPW, or an approved equal.

E. Tank Monitoring Assemblies:

1. Probe Cap and Adaptor: Bronze, side-sealing adaptor, side sealing cap (tapped), wire grommet to secure cables, Model No. 62M as manufactured by OPW, or an approved equal.

2.8 SOURCE QUALITY CONTROL:

A. Pressure test and inspect fuel storage tanks, after fabrication and before shipment, according to ASME and the following:

1. Horizontal, Concrete-Vaulted and Insulated, Steel ASTs: UL 142 and UL 2085.

B. Affix standards organization's code stamp.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILL:

A. Compacted Granular Fill shall be installed in accordance with Form 817 Article 2.14 beneath the concrete pads and apron as indicated on the plans. Protect buried items during compaction.

1. Concrete Pads: Provide a minimum of 8-inches of compacted granular fill for concrete pads, compacted to support the concrete pad installation.

B. No backfilling over any underground piping or electrical connections may take place until the work is inspected by the Director of Facilities and the authorities having

jurisdiction. Failure to have work inspected will result in the Contractor uncovering work to allow for inspection.

3.2 OUTDOOR PIPING INSTALLATION:

A. Install metal pipes and tubes, fittings, valves, and flexible connectors at piping connections to AST.

B. Install flexible connectors at the dispensers as necessary.

C. Install fittings for changes in direction in rigid pipe.

D. Install system components with pressure rating equal to or greater than system operating pressure.

3.3 VALVE INSTALLATION:

A. Install valves in accessible locations.

B. Protect valves from physical damage.

3.4 PIPING JOINT CONSTRUCTION:

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.5 AST INSTALLATION:

A. Excavate as described herein and as shown on the Plans.

B. Set tank on concrete pad and grout legs in accordance with manufacturer's instructions. Install seismic restraints on legs as shown on the Plans and in accordance with manufacturer recommendations.

C. Each component of the storage tank system shall be installed as shown on the Plans and in accordance with manufacturer recommendations. Additional installation requirements of the storage tank system are described in subsequent portions of this Section where applicable.

D. Install tank tie-down straps as shown on the Plans and in accordance with manufacturer recommendations.

E. Connect piping.

F. Pressure Testing of Tank and Piping.

G. Coordinate with Owner for Filling of Tank

H. Apply Hazard Sign directly to tank in a visible location.

1. Hazard ratings for Heating Oil:

a. Health (Blue): 0
b. Fire (Red): 2
c. Instability (Yellow): 0
d. Special Hazard (White): None

3.6 FIELD QUALITY CONTROL:

A. Perform tests and inspections.

1. Tanks: Hydrostatic or compressed-air test pressures for horizontal, shop-fabricated, aboveground storage tanks: Isolate product piping from the tanks during testing. In-tank probes shall not be installed in the tanks during testing. Maintain the test pressure for one hour.

    a. Primary Tanks: Minimum 3 psig and maximum 5 psig.

2. Piping: Minimum hydrostatic or pneumatic test-pressures measured at highest point in system. Soap pipe fittings.

    a. Product Piping: Minimum 1.5 times the designed working pressure but not less than 50 psig nor more than the manufacturer's recommended pressure rating for minimum 3 hours.
    b. Isolate storage tanks if test pressure in piping will cause pressure in storage tanks to exceed 10 psig.

B. Piping and equipment will be considered defective if it does not pass tests and inspections. Defective piping and equipment shall be repaired or replaced, and then retested.
C. Prepare test and inspection reports.

3.7 PIPING SCHEDULE:

A. Product Piping, Aboveground: 1-inch black steel pipe and pipe fittings.

B. Thermal Pressure Relief Piping: 1/2-inch black steel pipe and pipe fittings.

C. AST Pipe Risers: 4-inch galvanized steel pipe and fittings.

D. AST Vent Pipe and Fittings, Aboveground: 2-inch galvanized steel pipe and pipe fittings.

END OF SECTION

SECTION 13121

TANK MONITORING

PART 1 - GENERAL

1.1 SUMMARY:

A. This Section includes the complete tank monitoring system for aboveground storage tanks as indicated on the Plans.

1. Furnish and install complete tank monitoring system as described herein.

B. The following contain requirements that relate to this Section:

1. 13120 “Fuel Facility”

1.2 ACTION SUBMITTALS:

A. Product Data: Include rated capacities of selected model clearly indicated, furnished specialties and accessories; wiring diagrams; and installation and start-up instructions.

1. Spare Parts: Include name, address, and telephone number of in-state supplier of spare parts. No out-of-state suppliers shall be permitted.

1.3 CLOSEOUT SUBMITTALS:

A. Operation and Maintenance Manuals

1.4 QUALITY ASSURANCE:

A. The Tank Monitoring System Installer shall be a factory certified Veeder-Root Installer and shall provide the engineering, installation, calibration, software programming and check-out necessary for a complete and fully operational tank monitoring system.

B. The Tank Monitoring System Installer shall be a certified to program and start-up the system.

C. The Tank Monitoring System Installer shall have:

1. Adequate experience and verifiable history in the installation of tank monitoring systems matching the criteria defined in this Specification.
2. Proven expertise and experience in dealing with coordination of installing tank monitoring systems for municipal fuel storage facilities.

PART 2 - PRODUCTS

2.1 EXISTING SYSTEM:

A. The existing Tank Monitoring System includes a Veeder-Root TLS 300C. All products incorporated into the proposed work must be compatible with this system, and all existing monitoring must be maintained throughout construction.

2.2 IN-TANK PROBES:

A. The probes shall be magnetostrictive type suitable for leak detection and inventory management in both underground and aboveground storage tanks. Unless otherwise noted, probes shall include 2 floats (product and water), and shall also include a minimum of 5 temperature sensors along its length to allow product temperature averaging.

1. Temperature measurement accuracy of +/- 0.5.
2. Level measurement accuracy of +/- .0005-inch.

B. The probes shall be gasoline, ethanol, benzene, and oil-resistant. The probes shall be UL-listed as intrinsically safe and shall utilize digital or time-based transmission techniques for high noise immunity and fault detection.

C. Leak Detection: Capable of manually or automatically performing a static tank tightness test to an accuracy of 0.1-gph, with a 99% probability of detection [P(D)] and a 1% probability of false alarm [P(FA)].

1. System shall be third-party certified to be in accordance with EPA standards for 0.1-gph annual tightness test and for 0.2-gph monthly monitoring.

D. The probes shall be capable of continuously gauging the water level from within 0.75- inch off of the bottom of the tank to a depth of at least 10-inches for riser pipe installations.

E. For oil-water separator applications, the probes shall be capable of continuously gauging the product and water levels from within 3-inches off the bottom of the tank. The system shall automatically calculate and output the volume (gallons) and level (inches) of product and of water in the oil-water separator.

F. The probes shall be supplied with the manufacturer's standard probe installation kits and wiring.

2.3 INTERSTITIAL SENSORS:

A. Wet Monitoring:

1. The hydrostatic sensors shall perform automatic, continuous leak sensing by monitoring the liquid level in the reservoir of a brine-filled interstitial space (annulus) of double-wall tanks, to detect a breach in the inner or outer shell. Single float sensors shall include a float and reed switch assembly. The contact shall be a normally closed dry contact.
2. The sensors shall be unaffected by hydrocarbon vapors, and shall be easily installed and removed without damage. Sensors shall be field replaceable, reusable, and testable for regulatory purposes.
3. The sensors shall be supplied with a lockable, watertight riser cap to prevent accidental spills into the tank reservoir. The cap shall be equipped with a vent tube to vent air out of the reservoir area and prevent liquids from entering into the reservoir.
4. The sensors shall be supplied with the manufacturer's standard sensor installation kits and wiring.

B. Dry Monitoring:

1. The sensors shall perform automatic, continuous leak sensing by monitoring the dry interstitial space (annulus) of double wall tanks. Sensors shall be a non-discriminating type, sensing only wet or dry conditions.
2. The sensors shall be unaffected by hydrocarbon vapors, and shall be easily installed and removed without damage. Sensors shall be field replaceable, reusable, and testable for regulatory purposes.
3. The sensors shall be supplied with the manufacturer's standard sensor

installation kits and wiring.

2.4 TANK OVERFILL ALARM:

A. Remote external audible and visual overfill alarm annunciator shall be housed in a weatherproof enclosure. The overfill alarm shall activate if a tank product level reaches the overfill alarm setpoint of 90% capacity.

B. Remote alarm acknowledges unit shall be housed in a weatherproof enclosure. Acknowledge unit shall silence audible and visual overfill alarms.

2.5 PROGRAMMING:

A. Re-program and/or Update Existing Veeder-Root TLS 300C as required to accept additional tank monitoring probes and to provide Alarms and Reports as specified by Owner.

2.6 RELATED ELECTRICAL WORK:

A. Explosionproof Fittings: Threaded, recessed-type, close-up plugs, Model No. EYSF75 as manufactured by Appleton, or an approved equal. Screwdriver slotted close-up plugs shall not be accepted.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine areas and conditions under which the tank monitoring system is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to the Tank Monitoring Installer.

3.2 INSTALLATION REQUIREMENTS:

A. All probe and leak sensor inputs shall be protected against damage from short circuit conditions due to inadvertent field wiring errors.

B. In-tank Probes.

1. Probes, probe installation kits, and wiring shall be installed according to manufacturer-supplied installation manuals and Plans.
2. Probe assemblies for monitoring product and water levels are required for all storage tanks as indicated on the Plans.
3. Probe assemblies in underground storage tanks shall top-mount from a 4-inch diameter probe riser pipe. Riser installation is not work of this Section; risers shall be installed by the applicable CSI Section and as indicated on the Plans.
4. Probe leader cables to connect inside watertight junction box, sealed off with an explosion proof fitting, for connection to console.

C. Interstitial Sensors.

1. Sensors and wiring shall be installed according to manufacturer-supplied installation manuals and plans.
2. Sensors for monitoring the interstitial spaces are required for all double-wall underground storage tanks as indicated on the Plans.
3. Sensor assemblies in underground storage tanks shall top-mount in a 4-inch diameter sensor riser pipe installed in the annulus of the tank. Riser installation is not work of this Section; risers shall be installed by the applicable CSI Section and as indicated on the Plans.
4. Sensor leader cables to connect inside watertight junction box, sealed off with an explosion proof fitting, for connection to console.

D. Tank Overfill Alarm:

1. Remote alarm annunciator and acknowledge unit wiring shall be installed according to manufacturer-supplied installation manuals.
2. The alarm light shall be visible and the alarm horn shall be audible within the fuel tank filling area.
3. The acknowledge unit shall be accessible to the tank filling attendant.
4. Remote alarm annunciator and acknowledge unit shall be mounted near the tank filling site as indicated on the Plans.

E. Related Electrical Work: Install conduit. Seal E.Y. fittings. Leave close-up plugs hand tight after sealing to provide for inspection of these fittings.

3.3 FIELD QUALITY CONTROL:

A. Engage a factory-authorized service representative to inspect and test the system and to perform start-up service. Power shall not be applied to the system prior to start-up.

B. Perform all necessary testing and run diagnostic tests to ensure proper operation. Test equipment as recommended by manufacturer. Generate all software and enter all database information necessary to perform the sequence of control and specified software routines.

1. An acceptance test shall be performed in the presence of the Director of Facilities.

C. The manufacturer shall provide a written certification of installation, start-up, and calibration of the complete system.

D. The manufacturer shall supply third-party documentation for all products certifying that the performance meets or exceeds EPA requirements.

3.4 TRAINING:

A. Engage a factory-authorized service representative for an 8-hour on-site class to train Owner's maintenance personnel on all installation, programming, troubleshooting, operating, routine maintenance, and service procedures.

END OF SECTION
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