TOWN OF RIVERHEAD

HIGHWAY DEPARTMENT
METAL STORAGE BUILDING

TECHNICAL SPECIFICATIONS

1177 OSBORN AVENUE
RIVERHEAD, N.Y.
TOWN OF RIVERHEAD
SUFFOLK COUNTY, NEW YORK

PREPARED FOR:

RIVERHEAD HIGHWAY DEPARTMENT FACILITY
RIVERHEAD, NY 11901

PREPARED BY:

JEFFREY T. BUTLER, P.E., P.C.
206 LINCOLN STREET
RIVERHEAD NY 11901

DATED: October 6, 2016
REVISED: November 16, 2016

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SECTION 01 00 00
GENERAL REQUIREMENTS

1.1 SAFETY REQUIREMENTS

Refer to section 01 35 26, SAFETY REQUIREMENTS for safety requirements.

1.2 GENERAL INTENTION

A. Contractor shall completely prepare site for proposed building foundation and construction. Contractor shall furnish labor and materials for construction/assembly of the proposed metal building and all MEP work in Design Drawings and specifications created for 'Proposed Pre-fabricated Metal Building for Town of Riverhead Highway Department' prepared by Jeffrey T. Butler, P.E., P.C. dated 06.20.2016.

B. Contractor to purchase and arrange delivery of building and related elements. Storage and laydown area to be coordinated with the Town of Riverhead.

C. Contractor to install foundation per Project Drawings. Contractor to forward Engineer of Record the building reactions once a building has been selected. The Engineer of Record will revise Project Drawings with updated anchor bolt patterns and piers accordingly.

D. Offices of Jeffrey T. Butler, P.E., P.C., as Engineers, will render certain technical services during construction.

1.3 STATEMENT OF BID ITEM(S)

A. ITEM I, GENERAL CONSTRUCTION: Work includes excavation for foundation, installation of foundation, back filling, slab preparation and pouring of slab. Purchase, delivery and installation of metal building and all related elements, including but not limited to Structural Steel, Roofing, Siding, Soffits, Fascia, Vents and Hardware. Installation of Drainage System and connection of same to building leaders. Work includes all labor, materials, equipment and supervision to perform all general construction.

ITEM II, Electrical Work: Work includes all labor, material, equipment and supervision to perform the required electrical construction work on

this project including overhead interior lighting and switching, interior emergency lighting and switching, interior utility outlets, wiring of gas heaters, exterior building mounted lighting and switching, exterior utility outlets and main power panel. Provide power by way of overhead lines from street to building.

ITEM III, Mechanical Work: Work includes all labor, material, equipment and supervision to perform the required mechanical construction work on this project including installation of Gas Heaters and required venting.

1.4 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

A. Drawings and contract documents may be obtained from the T.O. Riverhead Planning Dept. Additional copies will be at Contractor's expense.

B. Document Control:

1. The General Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.

C. Motor Vehicle Restrictions

1. Vehicle authorization request shall be required for any vehicle entering the site and such request shall be submitted 24 hours before the date and time of access. Access shall be restricted to picking up and dropping off materials and supplies.

2. A limited number of (2 to 5) permits shall be issued for General Contractor and its employees for parking in designated areas only.

1.5 OPERATIONS AND STORAGE AREAS

A. The Contractor shall confine all operations (including storage of materials) on Town premises to areas authorized or approved by the Town Highway Superintendent.

B. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Town Highway Superintendent. When materials are transported in prosecuting

the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any

Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

C. Working space and space available for storing materials shall be determined by the Town Highway Superintendent.

D. Execute work in such a manner as to interfere as little as possible with work being done by others. Keep roads clear of construction materials, debris, standing construction equipment and vehicles at all times.

E. Execute work so as to interfere as little as possible with normal function of the site as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others.

1. Do not store materials and equipment in other than assigned areas.

2. Schedule delivery of materials and equipment to site that will be utilized within 1 week of arrival time. Provide unobstructed access to areas required to remain in operation.

3. Storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements.

F. Construction Fence: Before construction operations begin, Contractor shall provide construction fence around the construction area indicated on the drawings.

G. Utilities Services: Maintain existing utility services for neighboring buildings at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in

absence of such indication, where directed by the Town of Riverhead Engineer.

1. No utility service such as water, gas, steam, sewers or electricity,

   or fire protection systems and communications systems may be interrupted without prior approval of the Town of Riverhead Engineer.

2. Contractor shall submit a request to interrupt any such services to Town of Riverhead Engineer, in writing, 7 days in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.

H. To minimize interference of construction activities with flow of the Town of Riverhead Highway Yard traffic, comply with the following:

1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles.

I. Protection: Provide the following protective measures:

1. Temporary protection against damage for portions of existing structures and grounds where work is to be done, materials handled and equipment moved and/or relocated.

1.6 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS

A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract.

B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site. The Contractor shall repair any damage to those facilities, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

C. Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Articles, "Alterations", "Restoration", and "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.

1.7 PHYSICAL DATA

A. Data and information furnished or referred to below is for the Contractor's information. The Town shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

1. The indications of physical conditions on the drawings and in the specifications are the result of site investigations by F.C. Watson Land Surveyor, P.C.

B. The Engineer of Record does not guarantee that other materials will not be encountered nor that proportions, conditions or character of several materials will not vary from those indicated by explorations. Bidders are expected to examine site of work and after investigation, decide for themselves character of materials and make their bids accordingly.

C. Subsurface conditions are unknown, no soil boring results are available. Therefore, regarding leaching structures, the installer shall be prepared to remove unsuitable soils and replace with approved soils for leaching. Acceptable soils include sand and gravel designated as SW and SP for a diameter of 6’ beyond to structure (3’ collar) and extending down 6’ below the structure.

1.8 PROFESSIONAL SURVEYING SERVICES

A registered professional land surveyor whose services are retained and paid for by the Contractor shall perform services specified herein and in other specification sections. The Contractor shall certify that the land surveyor is not one who is a regular employee of the Contractor, and that the land surveyor has no financial interest in this contract.

1.9 LAYOUT OF WORK

A. The Contractor shall lay out the work from dimensions provide on design drawings, and shall be responsible for all measurements in connection

with the layout. The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades provided on design drawings.

B. Establish and plainly mark center lines for proposed building and corner of column lines and such other lines and grades that are reasonably necessary to properly assure that location, orientation, and elevations that are established for proposed structure are in accordance with lines and elevations shown on contract drawings.

C. Following completion of general mass excavation and before any other permanent work is performed, establish and plainly mark (through use of appropriate batter boards or other means) sufficient additional survey control points or system of points as may be necessary to assure proper alignment, orientation, and grade of all major features of work. Survey shall include, but not be limited to, location of lines and grades of footings, exterior walls, center lines of columns in both directions, major utilities and elevations of floor slabs:

1. Such additional survey control points or system of points thus established shall be checked and certified by a registered land surveyor. Furnish such certification to the Engineer of Record before any work (such as footings, floor slabs, columns, walls, utilities and other major controlling features) are placed.

D. The Contractor shall perform the surveying and layout work of this and other articles and specifications in accordance with the provisions of Article "Professional Surveying Services".

1.10 AS-BUILT DRAWINGS

A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.

B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the Engineer's review, as often as requested.

C. Contractor shall deliver two approved completed sets of as-built drawings in the electronic version (scanned PDF) to the Town of Riverhead Engineer within 15 calendar days after completion.

D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.11 USE OF ROADWAYS

A. For hauling, use only established public roads and roadways on site property.

1.12 TEMPORARY TOILETS

A. Provide where directed, (for use of all Contractor's workmen) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by Town Highway Superintendent, provide suitable dry closets where directed. Keep such places clean and free from flies, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

1.13 AVAILABILITY AND USE OF UTILITY SERVICES

A. The Town Highway Superintendent shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Town of Riverhead. The Contractor shall carefully conserve any utilities furnished without charge.

UTILITY SOURCES

A. Suffolk County Water Authority
Route 112
Coram, New York

B. Long Island Power Authority
1650 Islip Avenue
Brentwood, New York 11717

C. Keyspan
1393 Veterans Memorial Highway
Hauppauge, New York 11788

D. Verizon Telephone
501 North Ocean Avenue
Patchogue, NY 11772

B. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted.

C. Electricity (for Construction and Testing): Furnish all temporary electric services.

1. Obtain electricity by connecting to the electrical distribution system. The Contractor shall meter and pay for electricity required for electric cranes and hoisting devices, electrical welding devices and any electrical heating devices providing temporary heat. Electricity for all other uses is available at no cost to the Contractor.

D. Water (for Construction and Testing): Furnish temporary water service.

1. Obtain water by connecting to the water distribution system. Provide reduced pressure backflow preventer at each connection as per code. Water is available at no cost to the Contractor.

2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes will be cause for revocation at Town Highway Superintendents discretion of use of water from system.

1.14 TESTS

A. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final test will not be conducted unless pre-tested.

B. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.

C. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire system which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc.

D. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonably period of time during which operating and environmental conditions remain reasonably constant and are typical of the design conditions.

E. Individual test result of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

1.15 INSTRUCTIONS

A. Contractor shall furnish Maintenance and Operating manuals (hard copies and electronic) and verbal instructions when required by the various sections of the specifications and as hereinafter specified.

B. Manuals: Maintenance and operating manuals and one compact disc (four hard copies and one electronic copy each) for each separate piece of equipment shall be delivered to the Town of Riverhead Engineer and Town Highway Superintendant coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary

precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.

C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed training to assigned Town of Riverhead personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the Engineer and shall be considered concluded only when the Engineer is satisfied in regard to complete and thorough coverage.

1.16 TOWN OF RIVERHEAD HIGHWAY DEPARTMENT YARD - FURNISHED PROPERTY

A. Storage space for equipment will be provided by the Town of Riverhead and the Contractor shall be prepared to unload and store such equipment therein upon its receipt at the Town Highway Department Yard.

1. Immediately upon delivery of equipment, Contractor shall arrange for a joint inspection thereof with the Town Highway Superintendent. At such time the Contractor shall acknowledge receipt of equipment described, make notations, and immediately furnish the Town Highway Superintendent with a written statement as to its condition or shortages.

2. Contractor thereafter is responsible for such equipment.

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SECTION 010310
PROJECT MEETINGS

PART 1— GENERAL

1.01 PRECONSTRUCTION MEETINGS

A. A preconstruction conference will be held between the Contractor, the Engineer and the Owner to review the Contractor's proposed methods of complying with the requirements of the Contract Documents.

B. An additional preconstruction conference will be held, if required, between the Contractor, the Engineer, the Owner, and the Town of Riverhead for the purposes of discussing any of their concerns or needs.

C. The Contractor will be notified three business days in advance of the time, date and place where the preconstruction meetings will be held.

1.02 PROGRESS MEETINGS

A. In addition to other project meetings outlined in the Contract Documents, general progress meetings shall be held once each month with the time coordinated with properties of payment requests. Every entity involved in the planning, coordination or performance of work at the time of the scheduled meeting shall be properly represented. Included at the meeting (when applicable) the Owner, Engineer, consultants, separate contractors (if any), principal subcontractors, suppliers/manufacturers/fabricators, governing authorities, insurers, special supervisory personnel and others with an interest or expertise in the progress of the work. At each meeting the following items shall be discussed:

1. Present and future needs of each subcontractor.

2. Whether each element of current work is ahead of schedule, on time, or behind schedule.

3. Determine how behind schedule work will be expedited to bring it to an on-time status.

4. Review everything of significance which could affect the progress of the work.

B. Immediately following each progress meeting where it was determined that revisions to the progress schedule have been made or problems identified, the schedule shall be revised. Within ten (10) days after the meeting, the revised schedule shall be issued to all parties.

C. The contractor shall, within five (5) days after each progress meeting date, distribute copies of the minutes-of-the-meeting to all parties who were or should have been present.

PART 2 – PRODUCT

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

NAME OF CONTRACTOR
CONTRACTOR'S ADDRESS
TOWN, STATE, ZIP CODE
Phone: (___) ___-____
Fax: (___) ___-____

Project Name: T.O. Riverhead Highway Department Metal Storage Building

Project Engineer: Jeffrey T. Butler, P.E., P.C.

Jeffrey T. Butler, P.E., P.C. Submittal Number: _____

Jeffrey T. Butler, P.E., P.C. Project No.: 160041

Contractor's Project No.: _____

S.C.D.P.W. Project No.: _____

S.C.D.H.S. Reference No.: _____

Name of Subcontractor. _____

Date of Submission: _____

Number of Times Submitted: _____

Date of Previous Submission: _____

Supplier: _____

Manufacturer: _____

Specification Section Number: _____

Specification Paragraph Number: _____

Drawing Sheet Number: _____

Detail Reference Number: _____

Applicable Standards: _____

Remarks/Deviations _____

Contractor's Certification Statement

By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have reviewed and approved this submittal and checked and coordinated each item with other applicable approved Shop Drawings and all Contract requirements.

Hereby certified by _____

SIGNATURE, NAME OF CONTRACTOR

Jeffrey T. Butler, P.E., P.C. Shop Drawing Stamp	SCDPW Shop Drawing Stamp

P.E. CERTIFICATION FORM

The undersigned hereby certifies that he/she is a Professional Engineer registered in the State of_____and that he/she has been employed by (Name of Contractor_____) to design in accordance with Specification Section for the (Name of Project_____). The undersigned further certifies that he/she has performed the design of the_____, that said design is in conformance with all applicable local, state and federal codes, rules, and regulations, and that his/her signature and P.E. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the (Name of Owner_____) or Owner's representative with seven days following written request therefore by the Owner.

_____
P.E. Name

_____
Signature

_____
Address

_____
Contractor's Name

_____
Signature

_____
Title

SECTION 01 33 23
SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1-1. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:

A. Satisfactory written evidence is presented to, and approved by Engineer of Record, that manufacturer cannot make scheduled delivery of approved item or;

B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;

C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of The Town of Riverhead.

1-2. Forward submittals in sufficient time to permit proper consideration and approval action by the Engineer of Record. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals including any laboratory samples to be tested will not serve as a basis for extending contract time for completion.

1-3. Submittals will be reviewed for compliance with contract requirements by Engineer of Record, and action thereon will be taken by the Engineer of Record on behalf of the Town of Riverhead.

1-4. Upon receipt of submittals, the Engineer of Record will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.

1-5. The Town of Riverhead reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.

1-6. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of the Engineer of Record. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Engineer of Record assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.

1-7. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.

A. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail and shall contain the list of items, name of Job, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.
   1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
   2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Job, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
   3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.

B. In addition to complying with the applicable requirements specified in preceding Article 1.9, samples which are required to have Laboratory Tests those preceded by symbol "LT" under the separate sections of the specification shall be tested, at the expense of Contractor, in a commercial laboratory approved by Contracting Officer.
   1. Laboratory shall furnish Contracting Officer with a certificate stating that it is fully equipped and qualified to perform intended work, is fully acquainted with specification requirements and

intended use of materials and is an independent establishment in no way connected with organization of Contractor or with manufacturer or supplier of materials to be tested.

2. Certificates shall also set forth a list of comparable projects upon which laboratory has performed similar functions during past five years.
3. Samples and laboratory tests shall be sent directly to approved commercial testing laboratory.
4. Contractor shall send a copy of transmittal letter to Engineer of Record with submission of material to a commercial testing laboratory.
5. Laboratory test reports shall be sent directly to Engineer of Record for appropriate action.
6. Laboratory reports shall list contract specification test requirements and a comparative list of the laboratory test results. When tests show that the material meets specification requirements, the laboratory shall so certify on test report.
7. Laboratory test reports shall also include a recommendation for approval or disapproval of tested item.

C. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.

D. Approved samples will be kept on file by the Engineer of Record at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.

E. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings

and schedules shall be stamped and signed by Contractor certifying to such check.

1. Drawings shall be full size.
2. Each drawing shall have marked thereon, proper descriptive title, including Name of Job, location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
3. A space 4-3/4 by 5 inches shall be reserved on each drawing to accommodate approval or disapproval stamp.
4. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
5. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
6. When work is directly related and involves more than one trade, shop drawings shall be submitted to Engineer of Record under one cover.

1-8. Samples (except laboratory samples), shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to the Engineer of Record:

Jeffrey T. Butler, P.E., P.C.

206 Lincoln Street

Riverhead, N.Y. 11901

1-9. At the time of transmittal to the Engineer of Record, the Contractor shall also send a copy of the complete submittal directly to the Town of Riverhead Engineer.

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SECTION 01 35 26
SAFETY REQUIREMENTS

1.1 APPLICABLE PUBLICATIONS:

A. Latest publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.

B. American Society of Safety Engineers (ASSE):

A10.1-2011.....Pre-Project & Pre-Task Safety and Health Planning

A10.34-2012.....Protection of the Public on or Adjacent to Construction Sites

A10.38-2013.....Basic Elements of an Employer's Program to Provide a Safe and Healthful Work Environment American National Standard Construction and Demolition Operations

C. American Society for Testing and Materials (ASTM):

E84-2013.....Surface Burning Characteristics of Building Materials

D. The Facilities Guidelines Institute (FGI):

FGI Guidelines-2010 Guidelines for Design and Construction of Healthcare Facilities

E. National Fire Protection Association (NFPA):

10-2013.....Standard for Portable Fire Extinguishers

30-2012.....Flammable and Combustible Liquids Code

51B-2014.....Standard for Fire Prevention during Welding, Cutting and Other Hot Work

70-2014.....National Electrical Code

70B-2013.....Recommended Practice for Electrical Equipment Maintenance

70E-2012 .....Standard for Electrical Safety in the Workplace

99-2012.....Health Care Facilities Code

241-2013.....Standard for Safeguarding Construction, Alteration, and Demolition Operations

F. The Joint Commission (TJC)

TJC Manual .....Comprehensive Accreditation and Certification Manual

G. U.S. Nuclear Regulatory Commission

10 CFR 20 .....Standards for Protection Against Radiation

H. U.S. Occupational Safety and Health Administration (OSHA):

29 CFR 1904 .....Reporting and Recording Injuries & Illnesses

29 CFR 1910 .....Safety and Health Regulations for General Industry

29 CFR 1926 .....Safety and Health Regulations for Construction Industry

CPL 2-0.124.....Multi-Employer Citation Policy

I. VHA Directive 2005-007

1.2 DEFINITIONS:

A. OSHA “Competent Person” (CP). One who is capable of identifying existing and predictable hazards in the surroundings and working conditions which are unsanitary, hazardous or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them (see 29 CFR 1926.32(f)).

B. "Qualified Person" means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.

C. High Visibility Accident. Any mishap which may generate publicity or high visibility.

D. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a

physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

E. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:

1. Death, regardless of the time between the injury and death, or the length of the illness;

2. Days away from work (any time lost after day of injury/illness onset);

3. Restricted work;

4. Transfer to another job;

5. Medical treatment beyond first aid;

6. Loss of consciousness; or

7. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

1.3 REGULATORY REQUIREMENTS:

A. In addition to the detailed requirements included in the provisions of this contract, comply with 29 CFR 1926, comply with 29 CFR 1910 as incorporated by reference within 29 CFR 1926, comply with ASSE A10.34, and all applicable [federal, state, and local] laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern except with specific approval and acceptance by the Town of Riverhead Engineer and Engineer of Record.

1.4 ACCIDENT PREVENTION PLAN (APP):

A. The APP (aka Construction Safety & Health Plan) shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and ensure it is site-specific. The Town of Riverhead considers the Prime Contractor to be the "controlling authority" for all worksite safety and health of

each subcontractor(s). Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out.

B. The APP shall be prepared as follows:

1. Written in English by a qualified person who is employed by the Prime Contractor articulating the specific work and hazards pertaining to the contract. Specifically articulating the safety requirements found within these safety specifications.

2. Address both the Prime Contractors and the subcontractors work operations.

3. State measures to be taken to control hazards associated with materials, services, or equipment provided by suppliers.

4. Address all the elements/sub-elements and in order as follows:

a. **SIGNATURE SHEET.** Title, signature, and phone number of the following:

1) Plan preparer (Qualified Person such as corporate safety staff person or contracted Certified Safety Professional with construction safety experience);

b. **BACKGROUND INFORMATION.** List the following:

1) Contractor;

2) Contract number;

3) Project name;

4) Brief project description, description of work to be performed, and location; phases of work anticipated.

c. ACCIDENT INVESTIGATION & REPORTING. The Contractor shall conduct mishap investigations of all OSHA Recordable Incidents. The APP shall include accident/incident investigation procedure & identify person(s) responsible to provide the following to the Engineer of Record or Contracting Officer Representative

1) Exposure data (man-hours worked);

2) Accident investigations, reports, and logs.

d. PLANS (PROGRAMS, PROCEDURES) REQUIRED. Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational risks in site-specific compliance and accident prevention plans. These Plans shall include but are not be limited to procedures for addressing the risks associates with the following:

1) Emergency response;

2) Fire Prevention;

3) Medical Support;

4) Posting of emergency telephone numbers;

5) Site sanitation (housekeeping, drinking water, toilets);

6) Hazard communication program;

7) Welding/Cutting “Hot” work;

8) Electrical Safe Work Practices (Electrical LOTO/NFPA 70E);

9) General Electrical Safety

10) Hazardous energy control (Machine LOTO);

11) Site-Specific Fall Protection & Prevention;

12) Excavation/trenching;

13) Crane Critical lift;

14) Respiratory protection;

C. Submit the APP to the Engineer of Record for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.

D. Once accepted by the Engineer of Record, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Town of Riverhead Engineer, until the matter has been rectified.

E. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Engineer of Record and the Town of Riverhead's Engineer. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34) and the environment.

1.5 ACCIDENTS, OSHA 300 LOGS, AND MAN-HOURS:

A. Notify the Engineer of Record as soon as practical, but no more than four hours after any accident meeting the definition of OSHA Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than $5,000, or any weight handling equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Engineer of Record and the Town of Riverhead Engineer determine whether a Town of Riverhead investigation will be conducted.

B. Conduct an accident investigation for recordable injuries and illnesses, for Medical Treatment defined in paragraph DEFINITIONS, and property damage accidents resulting in at least $20,000 in damages, to establish the root cause(s) of the accident. Complete and provide the report to the Project Manager and Engineer of Record within 5 calendar days of the accident. The Engineer of Record will provide copies of any required or special forms.

C. A summation of all OSHA recordable accidents experienced on site by the contractor and associated sub-contractors for each month will be provided to the Engineer of Record monthly. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the Project Manager as requested.

1.6 PERSONAL PROTECTIVE EQUIPMENT (PPE):

A. PPE is governed in all areas by the nature of the work the employee is performing. For example, specific PPE required for performing work on electrical equipment is identified in NFPA 70E, Standard for Electrical Safety in the Workplace.

B. Mandatory PPE includes:

1. Hard Hats – unless written authorization is given by the Project Manager and Engineer of Record in circumstances of work operations that have limited potential for falling object hazards such as during finishing work or minor remodeling. With authorization to relax the requirement of hard hats, if a worker becomes exposed to an overhead falling object hazard, then hard hats would be required in accordance with the OSHA regulations.

2. Safety glasses - unless written authorization is given by the Project Manager and Engineer of Record appropriate safety glasses meeting the ANSI Z.87.1 standard must be worn by each person on site.

3. Appropriate Safety Shoes – based on the hazards present, safety shoes meeting the requirements of ASTM F2413-11 shall be worn by each person on site unless written authorization is given by the Engineer of Record.

4. Hearing protection - Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks.

1.7 FIRE SAFETY

A. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.

B. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.

C. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads.

D. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily.

E. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.

F. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.

G. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B.

H. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Engineer of Record.

I. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.

J. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.

1.8 ELECTRICAL

A. All electrical work shall comply with NFPA 70 (NEC), NFPA 70B, NFPA 70E, 29 CFR Part 1910 Subpart J – General Environmental Controls, 29 CFR Part 1910 Subpart S – Electrical, and 29 CFR 1926 Subpart K in addition to other references required by contract.

B. All qualified persons performing electrical work under this contract shall be licensed journeyman or master electricians. All apprentice electricians performing under this contract shall be deemed unqualified persons unless they are working under the immediate supervision of a licensed electrician or master electrician.

C. All electrical work will be accomplished de-energized and in the Electrically Safe Work Condition (refer to NFPA 70E for Work Involving Electrical Hazards, including Exemptions to Work Permit). Any Contractor, subcontractor or temporary worker who fails to fully comply with this requirement is subject to immediate termination in accordance with FAR clause 52.236-5(c). Only in rare circumstance where achieving an electrically safe work condition prior to beginning work would increase or cause additional hazards, or is infeasible due to equipment design or operational limitations is energized work permitted. The Engineer of Record will make the determination if the circumstances would meet the exception outlined above. An AHA specific to energized work activities will be developed, reviewed, and accepted prior to the start of that work.

1. Development of a Hazardous Electrical Energy Control Procedure is required prior to de-energization. A single Simple Lockout/Tagout Procedure for multiple work operations can only be used for work involving qualified person(s) de-energizing one set of conductors or circuit part source. Task specific Complex Lockout/Tagout Procedures are required at all other times.

2. Verification of the absence of voltage after de-energization and lockout/tagout is considered "energized electrical work" (live work) under NFPA 70E, and shall only be performed by qualified persons wearing appropriate shock protective (voltage rated) gloves and arc rate personal protective clothing and equipment, using Underwriters Laboratories (UL) tested and appropriately rated contact electrical testing instruments or equipment appropriate for the environment in which they will be used.

3. Personal Protective Equipment (PPE) and electrical testing instruments will be readily available for inspection by the Engineer of Record.

A. Before beginning any electrical work, an Activity Hazard Analysis (AHA) will be conducted to include Shock Hazard and Arc Flash Hazard analyses. Work shall not begin until the AHA for the work activity has been accepted by Project and Engineer of Record and is discussed with all engaged in the activity, including the Contractor,

subcontractor(s), and Town on-site representatives at preparatory and initial control phase meetings.

B. Ground-fault circuit interrupters. All 120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites shall have approved ground-fault circuit interrupters for personnel protection. "Assured Equipment Grounding Conductor Program" only is not allowed.

1.9 FALL PROTECTION

A. The fall protection (FP) threshold height requirement is 6 ft for ALL WORK, unless specified differently or the OSHA 29 CFR 1926 requirements are more stringent, to include steel erection activities, systems-engineered activities (prefabricated) metal buildings, residential (wood) construction and scaffolding work.

1. Fall protection while using a ladder will be governed by the OSHA requirements.

1.10 SCAFFOLDS AND OTHER WORK PLATFORMS

A. All scaffolds and other work platforms construction activities shall comply with 29 CFR 1926 Subpart L.

B. The fall protection (FP) threshold height requirement is 6 ft as stated in Section 1.16.

C. The following hierarchy and prohibitions shall be followed in selecting appropriate work platforms.

1. Scaffolds, platforms, or temporary floors shall be provided for all work except that can be performed safely from the ground or similar footing.

2. Ladders less than 20 feet may be used as work platforms only when use of small hand tools or handling of light material is involved.

3. Ladder jacks, lean-to, and prop-scaffolds are prohibited.

4. Emergency descent devices shall not be used as working platforms.

D. Contractors shall use a scaffold tagging system in which all scaffolds are tagged by the Competent Person. Tags shall be color-coded: green indicates the scaffold has been inspected and is safe to use; red indicates the scaffold is unsafe to use. Tags shall be readily visible,

made of materials that will withstand the environment in which they are used, be legible and shall include:

1. The Competent Person's name and signature;

2. Dates of initial and last inspections.

E. Mast Climbing work platforms: When access ladders, including masts designed as ladders, exceed 20 ft in height, positive fall protection shall be used.

1.11 EXCAVATION AND TRENCHES

A. All excavation and trenching work shall comply with 29 CFR 1926 Subpart P.

B. All excavations and trenches 5 feet in depth or greater shall require a written trenching and excavation permit.

1. Indication that utilities have been located and identified. If utilities could not be located after all reasonable attempt, then excavating operations will proceed cautiously.

1.12 CRANES

A. All crane work shall comply with 29 CFR 1926 Subpart CC.

B. Prior to operating a crane, the operator must be licensed, qualified or certified to operate the crane. Thus, all the provisions contained with Subpart CC are effective and there is no "Phase In" date of November 10, 2014.

C. A detailed lift permit shall be submitted 14 days prior to the scheduled lift complete with route for truck carrying load, crane load analysis, siting of crane and path of swing. The lift will not be allowed without approval of this document.

D. Crane operators shall not carry loads

1. over the general public or VAMC personnel

2. over any occupied building unless

a. the top two floors are vacated

b. or overhead protection with a design live load of 300 psf is provided

1.13 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

A. All installation, maintenance, and servicing of equipment or machinery shall comply with 29 CFR 1910.147 except for specifically referenced operations in 29 CFR 1926 such as concrete & masonry equipment [1926.702(j)], heavy machinery & equipment [1926.600(a)(3)(i)], and process safety management of highly hazardous chemicals (1926.64). Control of hazardous electrical energy during the installation, maintenance, or servicing of electrical equipment shall comply with Section 1.15 to include NFPA 70E and other VA specific requirements discussed in the section.

1.14 CONFINED SPACE ENTRY

A. All confined space entry shall comply with 29 CFR 1910.146 except for specifically referenced operations in 29 CFR 1926 such as excavations/trenches [1926.651(g)].

1.15 WELDING AND CUTTING

As specified in section 1.14, Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Engineer of Record. Contractor to obtain required permits. Designate contractor's responsible project-site fire prevention program manager to permit hot work.

1.16 LADDERS

A. All Ladder use shall comply with 29 CFR 1926 Subpart X.

B. All portable ladders shall be of sufficient length and shall be placed so that workers will not stretch or assume a hazardous position.

C. Manufacturer safety labels shall be in place on ladders

D. Step Ladders shall not be used in the closed position

E. Top steps or cap of step ladders shall not be used as a step

C. Portable ladders, used as temporary access, shall extend at least 3 ft above the upper landing surface.

1. When a 3’ extension is not possible, a grasping device (such as a grab rail) shall be provided to assist workers in mounting and dismounting the ladder.

2. In no case shall the length of the ladder be such that ladder deflection under a load would, by itself, cause the ladder to slip from its support.

G. Ladders shall be inspected for visible defects on a daily basis and after any occurrence that could affect their safe use. Broken or damaged ladders shall be immediately tagged "DO NOT USE," or with similar wording, and withdrawn from service until restored to a condition meeting their original design.

1.17 FLOOR & WALL OPENINGS

A. All floor and wall openings shall comply with 29 CFR 1926 Subpart M.

B. Floor and roof holes/openings are any that measure over 2 in in any direction of a walking/working surface which persons may trip or fall into or where objects may fall to the level below. See 21.F for covering and labeling requirements. Skylights located in floors or roofs are considered floor or roof hole/openings.

C. All floor, roof openings or hole into which a person can accidentally walk or fall through shall be guarded either by a railing system with toeboards along all exposed sides or a load-bearing cover. When the cover is not in place, the opening or hole shall be protected by a removable guardrail system or shall be attended when the guarding system has been removed, or other fall protection system.

1. Covers shall be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.

2. Covers shall be secured when installed, clearly marked with the word “HOLE”, “COVER” or “Danger, Roof Opening-Do Not Remove” or color-coded or equivalent methods (e.g., red or orange “X”). Workers must be made aware of the meaning for color coding and equivalent methods.

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SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the availability and source of references and standards specified in the project manual under paragraphs APPLICABLE PUBLICATIONS and/or shown on the drawings.

1.2 AVAILABILITY OF SPECIFICATIONS LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS FPMR PART 101-29 (FAR 52.211-1) (AUG 1998)

A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to – GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.

B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

1.3 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-3) (JUN 1988)

The specifications cited in this solicitation may be obtained from the associations or organizations listed below.

AA Aluminum Association Inc.
http://www.aluminum.org

AABC Associated Air Balance Council
http://www.aabchq.com

AAMA American Architectural Manufacturer's Association
http://www.aamanet.org

AAN	American Nursery and Landscape Association http://www.anla.org
AASHTO	American Association of State Highway and Transportation Officials http://www.aashto.org
AATCC	American Association of Textile Chemists and Colorists http://www.aatcc.org
ACGIH	American Conference of Governmental Industrial Hygienists http://www.acgih.org
ACI	American Concrete Institute http://www.aci-int.net
ACPA	American Concrete Pipe Association http://www.concrete-pipe.org
ACPPA	American Concrete Pressure Pipe Association http://www.acppa.org
ADC	Air Diffusion Council http://flexibleduct.org
AGA	American Gas Association http://www.aga.org
AGC	Associated General Contractors of America http://www.agc.org
AGMA	American Gear Manufacturers Association, Inc. http://www.agma.org
AHAM	Association of Home Appliance Manufacturers http://www.aham.org
AIA	American Institute of Architects http://www.aia.org
AISC	American Institute of Steel Construction http://www.aisc.org
AISI	American Iron and Steel Institute http://www.steel.org

AITC	American Institute of Timber Construction http://www.aitc-glulam.org
AMCA	Air Movement and Control Association, Inc. http://www.amca.org
ANLA	American Nursery & Landscape Association http://www.anla.org
ANSI	American National Standards Institute, Inc. http://www.ansi.org
APA	The Engineered Wood Association http://www.apawood.org
ARI	Air-Conditioning and Refrigeration Institute http://www.ari.org
ASAE	American Society of Agricultural Engineers http://www.asae.org
ASCE	American Society of Civil Engineers http://www.asce.org
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers http://www.ashrae.org
ASME	American Society of Mechanical Engineers http://www.asme.org
ASSE	American Society of Sanitary Engineering http://www.asse-plumbing.org
ASTM	American Society for Testing and Materials http://www.astm.org
AWI	Architectural Woodwork Institute http://www.awinet.org
AWS	American Welding Society http://www.aws.org
AWWA	American Water Works Association http://www.awwa.org

BHMA	Builders Hardware Manufacturers Association http://www.buildershardware.com
BIA	Brick Institute of America http://www.bia.org
CAGI	Compressed Air and Gas Institute http://www.cagi.org
CGA	Compressed Gas Association, Inc. http://www.cganet.com
CI	The Chlorine Institute, Inc. http://www.chlorineinstitute.org
CISCA	Ceilings and Interior Systems Construction Association http://www.cisca.org
CISPI	Cast Iron Soil Pipe Institute http://www.cispi.org
CLFMI	Chain Link Fence Manufacturers Institute http://www.chainlinkinfo.org
CPMB	Concrete Plant Manufacturers Bureau http://www.cpmb.org
CRA	California Redwood Association http://www.calredwood.org
CRSI	Concrete Reinforcing Steel Institute http://www.crsi.org
CTI	Cooling Technology Institute http://www.cti.org
DHI	Door and Hardware Institute http://www.dhi.org
EGSA	Electrical Generating Systems Association http://www.egsa.org
EEI	Edison Electric Institute http://www.eei.org

EPA	Environmental Protection Agency http://www.epa.gov
ETL	ETL Testing Laboratories, Inc. http://www.et1.com
FAA	Federal Aviation Administration http://www.faa.gov
FCC	Federal Communications Commission http://www.fcc.gov
FPS	The Forest Products Society http://www.forestprod.org
GANA	Glass Association of North America http://www.cssinfo.com/info/gana.html/
FM	Factory Mutual Insurance http://www.fmglobal.com
GA	Gypsum Association http://www.gypsum.org
GSA	General Services Administration http://www.gsa.gov
HI	Hydraulic Institute http://www.pumps.org
HPVA	Hardwood Plywood & Veneer Association http://www.hpva.org
ICBO	International Conference of Building Officials http://www.icbo.org
ICEA	Insulated Cable Engineers Association Inc. http://www.icea.net
\ICAC	Institute of Clean Air Companies http://www.icac.com
IEEE	Institute of Electrical and Electronics Engineers http://www.ieee.org\

IMSA	International Municipal Signal Association http://www.imsasafety.org
IPCEA	Insulated Power Cable Engineers Association
NBMA	Metal Buildings Manufacturers Association http://www.mbma.com
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry Inc. http://www.mss-hq.com
NAAMM	National Association of Architectural Metal Manufacturers http://www.naamm.org
NAPHCC	Plumbing-Heating-Cooling Contractors Association http://www.phccweb.org.org
NBS	National Bureau of Standards See - NIST
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors http://www.nationboard.org
NEC	National Electric Code See - NFPA National Fire Protection Association
NEMA	National Electrical Manufacturers Association http://www.nema.org
NFPA	National Fire Protection Association http://www.nfpa.org
NHLA	National Hardwood Lumber Association http://www.natlhardwood.org
NIH	National Institute of Health http://www.nih.gov
NIST	National Institute of Standards and Technology http://www.nist.gov
NLMA	Northeastern Lumber Manufacturers Association, Inc. http://www.nelma.org

NPA National Particleboard Association
18928 Premiere Court
Gaithersburg, MD 20879
(301) 670-0604

NSF National Sanitation Foundation
http://www.nsf.org

NWWDA Window and Door Manufacturers Association
http://www.nwwda.org

OSHA Occupational Safety and Health Administration
Department of Labor
http://www.osha.gov

PCA Portland Cement Association
http://www.portcement.org

PCI Precast Prestressed Concrete Institute
http://www.pci.org

PPI The Plastic Pipe Institute
http://www.plasticpipe.org

PEI Porcelain Enamel Institute, Inc.
http://www.porcelainenamel.com

PTI Post-Tensioning Institute
http://www.post-tensioning.org

RFCI The Resilient Floor Covering Institute
http://www.rfci.com

RIS Redwood Inspection Service
See - CRA

RMA Rubber Manufacturers Association, Inc.
http://www.rma.org

SCMA Southern Cypress Manufacturers Association
http://www.cypressinfo.org

SDI Steel Door Institute
http://www.steeldoor.org

SOI	Secretary of the Interior http://www.cr.nps.gov/local-law/arch_stnds_8_2.htm
IGMA	Insulating Glass Manufacturers Alliance http://www.igmaonline.org
SJI	Steel Joist Institute http://www.steeljoist.org
SMACNA	Sheet Metal and Air-Conditioning Contractors National Association, Inc. http://www.smacna.org
SSPC	The Society for Protective Coatings http://www.sspc.org
STI	Steel Tank Institute http://www.steeltank.com
SWI	Steel Window Institute http://www.steelwindows.com
TCA	Tile Council of America, Inc. http://www.tileusa.com
TEMA	Tubular Exchange Manufacturers Association http://www.tema.org
TPI	Truss Plate Institute, Inc. 583 D'Onofrio Drive; Suite 200 Madison, WI 53719 (608) 833-5900
UBC	The Uniform Building Code See ICBO
UL	Underwriters' Laboratories Incorporated http://www.ul.com
ULC	Underwriters' Laboratories of Canada http://www.ulc.ca
WCLIB	West Coast Lumber Inspection Bureau 6980 SW Varns Road, P.O. Box 23145

Portland, OR 97223
(503) 639-0651

WRCLA Western Red Cedar Lumber Association
P.O. Box 120786
New Brighton, MN 55112
(612) 633-4334

WWPA Western Wood Products Association
http://www.wwpa.org

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SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained by the General Contractor.

1.2 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. American Concrete Institute (ACI):

506.4R-94 (R2004).....Guide for the Evaluation of Shotcrete

C. American Society for Testing and Materials (ASTM):

A325-10.....Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

A370-12.....Standard Test Methods and Definitions for Mechanical Testing of Steel Products

A416/A416M-10.....Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete

A490-12.....Standard Specification for Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength

C31/C31M-10.....Standard Practice for Making and Curing Concrete Test Specimens in the Field

C33/C33M-11a.....Standard Specification for Concrete Aggregates

C39/C39M-12.....Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

C109/C109M-11b.....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars

C136-06.....Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

C138/C138M-10b.....Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

C140-12.....Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

C143/C143M-10a.....Standard Test Method for Slump of Hydraulic Cement Concrete

C172/C172M-10.....Standard Practice for Sampling Freshly Mixed Concrete

C173/C173M-10b.....Standard Test Method for Air Content of freshly Mixed Concrete by the Volumetric Method

C330/C330M-09.....Standard Specification for Lightweight Aggregates for Structural Concrete

C567/C567M-11.....Standard Test Method for Density Structural Lightweight Concrete

C780-11.....Standard Test Method for Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

C1019-11.....Standard Test Method for Sampling and Testing Grout

C1064/C1064M-11.....Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete

C1077-11c.....Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

C1314-11a.....Standard Test Method for Compressive Strength of Masonry Prisms

D422-63(2007).....Standard Test Method for Particle-Size Analysis of Soils

D698-07e1.....Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

D1140-00(2006).....Standard Test Methods for Amount of Material in Soils Finer than No. 200 Sieve

D1143/D1143M-07e1.....Standard Test Methods for Deep Foundations Under Static Axial Compressive Load

D1188-07e1.....Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples

D1556-07.....Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

D1557-09.....Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft lbf/ft3 (2,700 KNm/m3))

D2166-06.....Standard Test Method for Unconfined Compressive Strength of Cohesive Soil

D2167-08).....Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

D2216-10.....Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

D2974-07a.....Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

D3666-11.....Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

D3740-11.....Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction

D6938-10.....Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

E94-04(2010).....Standard Guide for Radiographic Examination

E164-08.....Standard Practice for Contact Ultrasonic Testing of Weldments

E329-11c.....Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

E543-09.....Standard Specification for Agencies Performing Non-Destructive Testing

E605-93(R2011).....Standard Test Methods for Thickness and Density of Sprayed Fire Resistive Material (SFRM) Applied to Structural Members

E709-08.....Standard Guide for Magnetic Particle Examination

E1155-96(R2008).....Determining FF Floor Flatness and FL Floor Levelness Numbers

E. American Welding Society (AWS):

D1.D1.1M-10.....Structural Welding Code-Steel

1.3 REQUIREMENTS:

A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E329, C1077, D3666, D3740, A880, E543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."

B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by the Engineer of Record. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of Engineer of Record to such failure.

C. Written Reports: Testing laboratory shall submit test reports to the Engineer of Record and the Contractor, unless other arrangements are agreed to in writing by the Engineer of Record. Submit reports of tests that fail to meet construction contract requirements on colored paper.

D. Verbal Reports: Give verbal notification to the Engineer of Record immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EARTHWORK:

A. General: The Testing Laboratory shall provide qualified personnel, materials, equipment, and transportation as required to perform the services identified/required herein, within the agreed to schedule and/or time frame. The work to be performed shall be as identified herein and shall include but not be limited to the following:

1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the Engineer of Record regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation

of unsuitable material and recommend to Engineer of Record extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.

2. Provide full time observation of fill placement and compaction and field density testing in building areas.
3. Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for structural fill.

B. Testing Compaction:

1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with AASHTO.
2. Make field density tests in accordance with the primary testing method following ASTM D6938 and AASHTO T238 wherever possible. Field density tests shall be utilized on a case by case basis only if there are problems with the validity of the results from the primary method due to specific site field conditions. Should the testing laboratory propose these alternative methods, they should provide satisfactory explanation to the Engineer of Record before the tests are conducted.
   a. Building Slab Subgrade: At least one test of subgrade for every 2000 square feet of building slab, but in no case fewer than three tests.
   b. Foundation Wall Backfill: One test per 100 feet of each layer of compacted fill but in no case fewer than two tests.
   c. Trenches: One test at maximum 100 foot intervals per 4 foot of vertical lift and at changes in required density, but in no case fewer than two tests.
   d. Footing Subgrade: At least one test for each layer of soil on which footings will be placed. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested subgrade when acceptable to Engineer of Record. In each compacted fill layer below wall footings, perform one field density test for every 100 feet of wall. Verify subgrade is level, all loose or disturbed soils have been removed, and correlate actual soil conditions observed with those indicated by test borings.

C. Fill and Backfill Material Gradation: One test per 10 cubic yards of stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM C136.

D. Testing for Footing Bearing Capacity: Evaluate if suitable bearing capacity material is encountered in footing subgrade.

E. Testing Materials: Test suitability of on-site and off-site borrow as directed by Engineer.

3.2 CONCRETE:

A. Batch Plant Inspection and Materials Testing:

1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of the Engineer of Record with concurrence of Contracting Officer and perform periodic inspections thereafter as determined by the Engineer.
2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to the Engineer of Record.
3. Sample and test mix ingredients as necessary to insure compliance with specifications.
4. Sample and test aggregates daily and as necessary for moisture content. Test the dry rodded weight of the coarse aggregate whenever a sieve analysis is made, and when it appears there has been a change in the aggregate.
5. Certify, in duplicate, ingredients and proportions and amounts of ingredients in concrete conform to approved trial mixes. When concrete is batched or mixed off immediate building site, certify (by signing, initialing or stamping thereon) on delivery slips (duplicate) that ingredients in truck-load mixes conform to proportions of aggregate weight, cement factor, and water-cement ratio of approved trial mixes.

B. Field Inspection and Materials Testing:

1. Provide a technician at site of placement at all times to perform concrete sampling and testing.
2. Review the delivery tickets of the ready-mix concrete trucks arriving on-site. Notify the Contractor if the concrete cannot be placed within the specified time limits or if the type of concrete delivered is incorrect. Reject any loads that do not comply with the Specification requirements. Rejected loads are to be removed from the site at the Contractor’s expense. Any rejected concrete that is placed will be subject to removal.

3. Take concrete samples at point of placement in accordance with ASTM C172. Mold and cure compression test cylinders in accordance with ASTM C31. Make at least three cylinders for each 50 cubic yards or less of each concrete type, and at least three cylinders for any one day's pour for each concrete type. After good concrete quality control has been established and maintained as determined by the Engineer of Record make three cylinders for each 100 cubic yards) or less of each concrete type, and at least three cylinders from any one day's pour for each concrete type. Label each cylinder with an identification number. The Engineer of Record may require additional cylinders to be molded and cured under job conditions.
4. Perform slump tests in accordance with ASTM C143. Test the first truck each day, and every time test cylinders are made. Test pumped concrete at the hopper and at the discharge end of the hose at the beginning of each day’s pumping operations to determine change in slump.
5. Determine the air content of concrete per ASTM C173. For concrete required to be air-entrained, test the first truck and every 25 cubic yards thereafter each day. For concrete not required to be air-entrained, test every 100 cubic yards at random. For pumped concrete, initially test concrete at both the hopper and the discharge end of the hose to determine change in air content.
6. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.
7. Perform unit weight tests in compliance with ASTM C138 for normal weight concrete and ASTM C567 for lightweight concrete. Test the first truck and each time cylinders are made.
8. Notify laboratory technician at batch plant of mix irregularities and request materials and proportioning check.
9. Verify that specified mixing has been accomplished.
10. Environmental Conditions: Determine the temperature per ASTM C1064 for each truckload of concrete during hot weather and cold weather concreting operations:
    a. When ambient air temperature falls below 40 degrees F, record maximum and minimum air temperatures in each 24 hour period; record air temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.

b. When ambient air temperature rises above 85 degrees F, record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity; record maximum temperature of surface of hardened concrete.

11. Inspect the reinforcing steel placement, including bar size, bar spacing, top and bottom concrete cover, proper tie into the chairs, and grade of steel prior to concrete placement. Submit detailed report of observations.
12. Observe conveying, placement, and consolidation of concrete for conformance to specifications.
13. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
14. Observe curing procedures for conformance with specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
15. Observe preparations for placement of concrete:
    a. Inspect handling, conveying, and placing equipment, inspect vibrating and compaction equipment.
    b. Inspect preparation of construction, expansion, and isolation joints.
16. Observe preparations for protection from hot weather, cold weather, sun, and rain, and preparations for curing.
17. Observe concrete mixing:
    a. Monitor and record amount of water added at project site.
    b. Observe minimum and maximum mixing times.
18. Measure concrete flatwork for levelness and flatness as follows:
    a. Perform Floor Tolerance Measurements F_F and F_L in accordance with ASTM E1155. Calculate the actual overall F- numbers using the inferior/superior area method.
    b. Perform all floor tolerance measurements within 48 hours after slab installation and prior to removal of shoring and formwork.
    c. Provide the Contractor and the Engineer of Record with the results of all profile tests, including a running tabulation of the overall F_F and F_L values for all slabs installed to date, within 72 hours after each slab installation.
19. Other inspections:
    a. Grouting under base plates.
    b. Grouting anchor bolts and reinforcing steel in hardened concrete.

C. Laboratory Tests of Field Samples:

1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as directed by Engineer of Recorded. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it shall be discarded and strength of spare cylinder shall be used.
2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
3. Furnish certified compression test reports (duplicate) to Engineer of Record. In test report, indicate the following information:
   a. Cylinder identification number and date cast.
   b. Specific location at which test samples were taken.
   c. Type of concrete, slump, and percent air.
   d. Compressive strength of concrete in MPa (psi).
   e. Weight of lightweight structural concrete in kg/m^3 (pounds per cubic feet).
   f. Weather conditions during placing.
   g. Temperature of concrete in each test cylinder when test cylinder was molded.
   h. Maximum and minimum ambient temperature during placing.
   i. Ambient temperature when concrete sample in test cylinder was taken.
   j. Date delivered to laboratory and date tested.

3.3 REINFORCEMENT:

A. Review mill test reports furnished by Contractor.

B. Make one tensile and one bend test in accordance with ASTM A370 from each pair of samples obtained.

C. Written report shall include, in addition to test results, heat number, manufacturer, type and grade of steel, and bar size.

3.4 STRUCTURAL STEEL:

A. General: Provide shop and field inspection and testing services to certify structural steel work is done in accordance with contract documents. Welding shall conform to AWS D1.1 Structural Welding Code.

B. Prefabrication Inspection:

1. Review design and shop detail drawings for size, length, type and location of all welds to be made.
2. Approve welding procedure qualifications either by pre-qualification or by witnessing qualifications tests.
3. Approve welder qualifications by certification or retesting.
4. Approve procedure for control of distortion and shrinkage stresses.
5. Approve procedures for welding in accordance with applicable sections of AWS D1.1.

C. Fabrication and Erection:
1. Weld Inspection:
a. Inspect welding equipment for capacity, maintenance and working condition.
b. Verify specified electrodes and handling and storage of electrodes in accordance with AWS D1.1.
c. Inspect preparation and assembly of materials to be welded for conformance with AWS D1.1.
d. Inspect preheating and interpass temperatures for conformance with AWS D1.1.
e. Measure 25 percent of fillet welds.
f. Welding Magnetic Particle Testing: Test in accordance with ASTM E709 for a minimum of:
1) 20 percent of all shear plate fillet welds at random, final pass only.
2) 20 percent of all continuity plate and bracing gusset plate fillet welds, at random, final pass only.
3) 100 percent of tension member fillet welds (i.e., hanger connection plates and other similar connections) for root and final passes.
4) 20 percent of length of built-up column member partial penetration and fillet welds at random for root and final passes.
5) 100 percent of length of built-up girder member partial penetration and fillet welds for root and final passes.
g. Welding Ultrasonic Testing: Test in accordance with ASTM E164 and AWS D1.1 for 100 percent of all full penetration welds, braced and moment frame column splices, and a minimum of 20 percent of all other partial penetration column splices, at random.

h. Welding Radiographic Testing: Test in accordance with ASTM E94, and AWS D1.1 for 5 percent of all full penetration welds at random.

i. Verify that correction of rejected welds are made in accordance with AWS D1.1.

j. Testing and inspection do not relieve the Contractor of the responsibility for providing materials and fabrication procedures in compliance with the specified requirements.

2. Bolt Inspection:

a. Inspect high-strength bolted connections in accordance AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts.

b. Slip-Critical Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in each connection in accordance with AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.

c. Fully Pre-tensioned Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in 25 percent of connections in accordance with AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.

d. Bolts installed by turn-of-nut tightening may be inspected with calibrated wrench when visual inspection was not performed during tightening.

e. Snug Tight Connections: Inspect 10 percent of connections verifying that plies of connected elements have been brought into snug contact.

f. Inspect field erected assemblies; verify locations of structural steel for plumbness, level, and alignment.

D. Submit inspection reports, record of welders and their certification, and identification, and instances of noncompliance to Engineer of Record.

3.18 TYPE OF TEST:

Approximate Number of Tests Required _____

A. Aggregate Base:

Laboratory Compaction, (AASHTO T180), (ASTM D1557) _____

Field Density, (AASHTO T191), (ASTM D1556) _____

Aggregate, Base Course Gradation (AASHTO T27) _____

Wear (AASHTO T96) _____

Soundness (AASHTO T104) _____

B. Concrete:

Making and Curing Concrete Test Cylinders (ASTM C31) _____

Compressive Strength, Test Cylinders (ASTM C39) _____

Concrete Slump Test (ASTM C143) _____

Concrete Air Content Test (ASTM C173) _____

Unit Weight, Lightweight Concrete (ASTM C567) _____

Aggregate, Normal Weight: Gradation (ASTM C33) _____

Deleterious Substances (ASTM C33) _____

Soundness (ASTM C33) _____

Abrasion (ASTM C33) _____

Aggregate, Lightweight Gradation (ASTM C330) _____

Deleterious Substances (ASTM C330) _____

Unit Weight (ASTM C330) _____

Flatness and Levelness Readings (ASTM E1155) (number of days) _____

C. Reinforcing Steel:

Tensile Test (ASTM A370) _____

Bend Test (ASTM A370) _____

Mechanical Splice (ASTM A370) _____

Welded Splice Test (ASTM A370) _____

J. Structural Steel:

Ultrasonic Testing of Welds (ASTM E164) _____

Magnetic Particle Testing of Welds (ASTM E709) _____

Radiographic Testing of Welds (ASTM E94) _____

L. Inspection:

Technical Personnel (Man-days) _____

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SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

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PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.

B. Environmental pollution and damage is defined as the presence of chemical or physical elements or agents which:
   1. Adversely effect human health or welfare,
   2. Unfavorably alter ecological balances of importance to human life,
   3. Effect other species of importance to humankind, or;
   4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.

C. Definitions of Pollutants:
   1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
   2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
   3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
   4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
   5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.
   6. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.

7. Sanitary Wastes:
   a. Sewage: Domestic sanitary sewage and human and animal waste.
   b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2 QUALITY CONTROL

A. Establish and maintain quality control for the environmental protection of all items set forth herein.

B. Record on daily reports any problems in complying with laws, regulations, and ordinances. Note any corrective action taken.

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

B. U.S. National Archives and Records Administration (NARA):
33 CFR 328.....Definitions

1.4 PROTECTION OF ENVIRONMENTAL RESOURCES

A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.

B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Town Highway Superintendent. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.

1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
   a. Box and protect from damage existing trees and shrubs to remain on the construction site.
   b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.

c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.

3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and divert runoff from the construction site to protected drainage areas approved under paragraph 208 of the Clean Water Act.
   a. Sediment Basins: Trap sediment from construction areas in temporary or permanent sediment basins that accommodate the runoff of a local storm. After each storm, pump the basins dry and remove the accumulated sediment. Control overflow/drainage with paved weirs or by vertical overflow pipes, draining from the surface.
   b. Reuse or conserve the collected topsoil sediment as directed by the Town Highway Superintendent. Topsoil use and requirements are specified in Section 31 20 00, EARTH MOVING.
   c. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.
5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features shown on the Proposed Site Plan. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
6. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Town of Riverhead property and dispose of waste in compliance with Federal, State, and local requirements.
7. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.

C. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of New York and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.

D. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week.
   1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00 p.m. unless otherwise permitted by local ordinance.

E. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Town of Riverhead. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.

F. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the Town of Riverhead Engineer. Cleaning shall include off-site disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from preparation and new work operations.

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.

B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.

C. Contractor shall use all reasonable means to divert construction waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:

1. Waste Management Plan development and implementation.
2. Techniques to minimize waste generation.
3. Sorting and separating of waste materials.
4. Recycling of materials that cannot be reused or sold.

D. At a minimum the following waste categories shall be diverted from landfills:

1. Soil.
2. Inerts (eg, concrete, masonry and asphalt).
3. Clean dimensional wood and palette wood.
4. Green waste (biodegradable landscaping materials).
5. Engineered wood products (plywood, particle board and I-joists, etc).
6. Metal products (eg, steel, wire, beverage containers, copper, etc).
7. Cardboard, paper and packaging.
8. Bitumen roofing materials.
9. Plastics (eg, ABS, PVC).
10. Insulation.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

1.3 QUALITY ASSURANCE

A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction waste includes products of the following:

1. Excess or unusable construction materials.
2. Packaging used for construction products.
3. Poor planning and/or layout.
4. Construction error.
5. Over ordering.
6. Weather damage.
7. Contamination.
8. Mishandling.
9. Breakage.

B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.

C. Contractor shall develop and implement procedures to recycle construction and demolition waste to a minimum of 50 percent.

D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.

E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations.

F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.

G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.

1.4 TERMINOLOGY

A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.

B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.

C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.

D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.

E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).

F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.

G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.

H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.

I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.

J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.

K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.

L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.

   1. On-site Recycling – Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
   2. Off-site Recycling – Materials hauled to a location and used in an altered form in the manufacture of new products.

M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.

N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.

O. Return: To give back reusable items or unused products to vendors for credit.

P. Salvage: To remove waste materials from the site for resale or re-use by a third party.

Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.

R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.

S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

PART 3 - EXECUTION

3.1 COLLECTION

A. Provide all necessary containers, bins and storage areas to facilitate effective waste management.

B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.

C. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations.

3.2 DISPOSAL

A. Construction materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

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SECTION 017500
EQUIPMENT TESTING AND STARTUP

PART 1 — GENERAL

1.01 SCOPE OF WORK

A. Provide a competent field service technician of the manufacturers of all equipment furnished under Divisions 13, 23, 26 to supervise installation, adjustment, initial operation and testing, performance testing, final acceptance testing and startup of the equipment.

B. The Contractor shall provide personnel to assist field service technician during equipment testing and startup.

C. Perform specified equipment field performance tests, final acceptance tests and startup service.

1.02 RELATED WORK

A. Performance and acceptance testing and startup requirements that are included in the respective Sections of Divisions 13, 23, 26 and Attachments A and B.

1.01 SUBMITTALS

A. Submit to the Engineer of Record detailed testing procedures for shop tests, field performance tests and final acceptance tests as specified in the various equipment sections accompanied by completed Submittal Form provided in Section 013300. Test procedures shall be submitted at least 30 days in advance of the proposed test dates and shall include at least the following information:

1. Name of equipment to be tested,
2. Testing schedule of proposed dates and times for testing,
3. Summary of power, lighting, chemical, water, sludge, gas, etc. needs and identification of who will provide them,
4. Outline specific assignments of the responsibilities of the Contractor and manufacturers' factory representative or field service personnel,
5. Detailed description of step-by-step testing requirement, with reference to appropriate standardized testing procedure and laboratory analyses by established technical organizations (e.g. ASTM, WPCF Standard Methods, etc.),
6. Sample of forms to be used to collect and record test data and to present tabulated test results.

B. The Contractor shall submit to the Engineer of Record at least 30 days prior to the proposed testing date, the name, address and resume of the proposed field services

technicians.

C. The Contractor shall submit to the Engineer of Record at least 15 days prior to the testing the following information:

1. Two (2) copies of the installation, operation and maintenance manuals,
2. One (1) copy of the manufacturer's certified characteristics curve,

3. One (1) copy of the following "As-Built" drawings:

    a. Overall layout,
    b. Internal wiring,
    c. Interconnection diagrams for all circuits.

D. Copies of test reports upon completion of specified shop, performance and acceptance tests. Test reports shall incorporate the information provided in the test procedures submittals, modified to reflect the actual conduct of the tests and the following additional information:

1. Copy of all test data sheets and results of lab analyses,

2. Summary comparison of specified test and performance requirements versus actual test results.

3. In the event that actual test results fail to meet specified test and performance requirements, a description of the steps to be taken for bring the equipment in compliance prior to re-testing of the equipment shall be included.

E. Copies of the manufacturer's field service technician's report summarizing the results of their initial inspection, operation, adjustment and pre-tests. The report shall include detailed descriptions and tabulations of the points inspected, tests and adjustments performed, quantitative results obtained, suggestion for precautions to be take to ensure proper maintenance, and the equipment supplier's Certification of Installation in the formation as specified herein.

1.02 REFERENCE STANDARDS

A. American Water Works Association (AWWA)

B. American Society for Testing and Materials (ASTM)

C. Water Pollution Control Facility (WPCF)

1.03 QUALITY ASSURANCE

A. Field service technicians shall be competent and experienced in the proper installation, adjustment, operation, testing and startup of the equipment and systems being installed.

B. Manufacturer's sales and marketing personnel will not be accepted as field service technicians.

1.06 FITNESS REQUIREMENTS

A. The Owner, the Engineer of Record, and the regulatory agencies, may witness shop tests or factory tests as required by the various equipment specifications.

B. Field performance and acceptance tests shall be performed in the presence of the Owner, the Engineer of Record, and the regulatory agencies.

PART 2 PRODUCTS
NOT USED

PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS

A. After installation of the equipment has been completed and the equipment is presumably ready for operation, before others operate it, the manufacturer's field service technician shall inspect, operate, test and adjust the equipment. The inspection shall include at least the following points, where applicable:

1. Soundness (without crack or otherwise damaged parts),

2. Completeness in all details, as specified and required,

3. Correctness of setting, alignment and relative arrangement of various parts.

4. Adequacy and correctness of packing, sealing and lubricants.

B. The operation, testing, and adjustment shall be required to prove that the equipment has been left in proper condition for satisfactory operation under the conditions specified.

C. Upon completion of this work, the manufacturer's field service technician shall submit a signed report of the results of their inspection, operation, adjustments and tests.

END OF SECTION

SECTION 017700
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Close-out procedures
2. Final cleaning
3. Lubrication survey
4. Spare parts and special tools
5. Equipment start-up service
6. As-built documents.

1.02 CLOSE-OUT PROCEDURES

A. Contractor shall submit written certification that Contract Documents have been reviewed, work has been inspected and that work is complete in accordance with the Contract Documents and is ready for inspection by the Engineer of Record and any regulatory agencies.

B. Provide submittals to Engineer of Record, which are required by governing or other authorities.

C. Submit application for final payment identifying total adjusted contract sum, previous payments received and sum remaining due.

1.03 FINAL CLEANING

A. At the completion of the work, the Contractor shall remove all rubbish from and about the site of the work, and all temporary structures, construction signs, tools, scaffolding, materials. supplies and equipment which he or any of his subcontractors may have used in the performance of the work. Contractor shall broom clean paved surfaces and rake clean other surfaces of grounds.

B. Contractor shall thoroughly clean all materials, equipment and structures; all maned surfaces shall be touched up to match adjacent surfaces; dirty filters and burned-out lights replaced as required; all glass surfaces cleaned and floors cleaned and polished so as to leave work in a clean and new appearing condition. Contractor at no additional expense to the Town, shall replace chipped or broken glass and other damaged transparent material.

C. Contractor shall remove spatter, grease, stains, fingerprints, dirt, dust, labels, tags, packing materials and other foreign items or substances from interior and exterior surfaces, equipment, signs and lettering. Clean plumbing fixtures to a sanitary condition.

D. Contractor shall remove paint, clean and restore all equipment and material nameplates, labels and other identification markings.

E. Remove labels that are not permanent labels.

F. Contractor shall maintain cleaning until project, or portion thereof, is occupied by the Town.

1.04 LUBRICATION SURVEY

A. A lubrication survey, made by a lubricant supply firm, subject to the approval of the Engineer of Record shall be provided and paid for by the Contractor.

B. The lubrication survey shall list all equipment, the equipment manufacturer's lubrication recommendations, and an interchangeable lubricants tabulation standardizing and consolidating lubricants whenever possible.

C. The Contractor shall supply all lubricants, applicators, and labor for lubricating the equipment, in accordance with manufacturer's recommendations, as indicated in the approved Operations and Maintenance Manuals, for field testing and prior to final acceptance. A supply of required lubricants sufficient for start-up and one year of operation shall also be supplied by the Contractor.

D. Twelve (12) copies of the approved lubrication survey shall be furnished prior to final acceptance.

1.05 SPART PARTS AND SPECIAL TOOLS

A. Spare Parts:

1. As soon as practicable after approval of the list of equipment, the Contractor shall furnish spare parts data for each different item of equipment listed. The data shall include a complete list of parts and supplies, with current unit prices and source or sources of supply. This data shall be included in the Operation and Maintenance Manual.

2. Contractor shall also furnish a list of parts, and supplies that are either normally furnished at no extra cost with the purchase of the equipment, or specified to be furnished as part of the Contract, and a list of additional items recommended by the manufacturer and tabulated in the Operations and Maintenance Manual to assure efficient operation for the particular installation for a period of one year or the guarantee period, whichever is greater. All parts shall be securely boxed and

tagged, and clearly marked on the box and individually for identification as to the name of manufacturer or supplier, applicable equipment, part number, description and location in the equipment. All parts shall be protected and packaged for a shelf life of at least ten (10) years.

B. Special Tools:

1. Contractor shall furnish to the Engineer of Record with each piece of equipment as a minimum, two (2) complete sets, or the number of sets called for in the Specifications and Operation and Maintenance Manual of suitably marked special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment.

2. Contractor shall submit, for approval by the Engineer of Record, a complete list of the special tools and appliances to be furnished. Such tools and appliances shall be furnished in approved painted steel cases properly labeled and with good grade cylinder locks and duplicate equipment keys.

1.06 EQUIPMENT START-UP SERVICES

A. Equipment start-up period, to initiate the training of Highway Department personnel, shall begin after satisfactory completion and acceptance of the field rests and coincidentally with the certified data of substantial completion for the part of the work for which the equipment is included. If the equipment is not covered by a certificate of substantial completion for a part of the work, the period shall begin upon substantial completion of the project.

B. During the equipment start-up period, the Contractor shall furnish, at no additional cost to the Town, the services of factory trained representatives of the equipment manufacturers for the equipment designated in the Specifications to:

1. Assist in the start-up and operations of the equipment.

2. The Systems Integrator will supervise operations, instruct plant personnel designated by the Town, in the proper operation and maintenance of the equipment where training is not specifically required in the Technical Specifications for the equipment.

C. The Town shall:

1. Provide the necessary Highway Department personnel for training in the operation and maintenance of the equipment. The Town's personnel shall operate all equipment under the supervision of the Contractor and equipment manufacturer's representative during the training sessions.

D. The Town shall pay for all fuel, power, and chemicals consumed and in addition shall provide the quantities of fuel and chemicals specified herein.

E. The Town shall provide all labor to operate and monitor the equipment during the equipment start-up period. The Contractor shall be available to promptly repair all work during the startup period so as to cause minimum disruption to the total plant operation.

F. Upon completion of a minimum of thirty (30) consecutive twenty-four (24) hour days of satisfactory operation, (defined as meeting the permit limits and hereby defined as the startup period) the Town will assume operation and operating cost of the equipment. If the equipment malfunctions during this start-up period, the start-up period will be repeated until satisfactory operation is achieved.

G. In the event, a system, equipment, or component proves defective or is unable to meet the specified performance criteria, the contractor shall replace the defective item and the minimum (2) year guarantee period, or the guarantee period called for in the Specifications for the item shall start after satisfactory replacement and testing of the item. The Contractor shall comply with all requirements of the Specifications.

H. When training is provided as part of the Equipment Start-up Services under the specified Manufacturer's Representative Time and specified herein, training aids such as descriptive handouts and "hands-on" demonstrations shall be provided. The handouts shall be an outline of the subject matter to be covered during the session and shall include an operational description with appropriate references to the operation and maintenance manual for the equipment.

1.07 AS-BUILT DOCUMENTS

A. The Contractor shall provide to the Engineer of Record, within 15 days of project closeout, legibly marked as-built drawings of the electrical system. As-built information provided shall include, but not be limited to the following:

1. Wire sizes
2. Circuit breaker size
3. Circuit breaker panel layout
4. Conduit run locations
5. Any field changes.

B. As-built drawings shall be legibly marked.

1.08 TRAINING (EQUIPMENT)

A. General

1. The Contractor shall provide the services of the manufacturers factory trained specialists to instruct the Town's operation and maintenance personnel in recommended operation and corrective and preventive maintenance procedures for process equipment as specified herein after and in the respective specification section.

2. The qualifications of the specialists shall be submitted to the Engineer of Record

for approval.

3. Contractor shall be responsible for coordinating these services at times acceptable to the Engineer of Record, with a minimum of fourteen (14) days prior notice.

4. Contractor shall provide the services of the manufacturers' factory trained specialists to conduct a combination of classroom and equipment site training. All training shall be conducted at The Town of Riverhead Highway Yard.

5. Contractor shall comply and coordinate with the training requirements contained hereinafter and in the Sections of Specifications.

6. All training sessions may be videotaped for future reference and training.

B. Submittals

1. Contractor shall submit for approval the manufacturers proposed lesson plans for the instruction prior to commencement of scheduled training. Lesson plans shall include operations, mechanical maintenance, and electrical and instrumentation maintenance. Lesson plans shall be submitted a minimum of ninety (90) days prior to initial start-up.

2. Contractor shall provide a minimum of twenty (20) copies of the manufacturers approved typewritten and bound lesson plans the material to be presented during the instructions. The lesson plans shall include illustrations, tables, and wording necessary to supplement the operation and maintenance manuals and to explain the presentation to the operating personnel.

3. Contractor shall submit for approval the credentials of the manufacturers designated instructions. Credentials shall include a brief resume and specific details of the instructor's experience with operation and maintenance of and training on the equipment specified.

C. Instruction Lesson Plans

1. Contractor shall provide the manufacturer's proposed lesson plans which shall include the elements presented in the outline of instruction lesson plans in paragraph 1.08. C.2. and any other information necessary for proper operation and maintenance of the equipment. Specific components and procedures shall be identified in the proposed lesson plans.

    a. Lesson plans shall detail specific instruction topics. Training aids to be utilized in the instructions shall be referenced and attached where applicable to the proposed lesson plans. "Hands-on" demonstrations planned for the instruction shall be described in the lesson plans.

    b. Lesson plans shall indicate the estimated duration of each segment of the

training and instructions.

2. Outline of Instruction Lesson Plans

    a. Equipment:

        i. Describe operating principles and practices.

        ii. Describe routine operating, start-up, and shutdown procedures.

        iii. Describe alarm conditions and response to alarms.

        iv. Identify each monitoring and test point and meter readings and describe routine monitoring and record keeping procedures.

        v. Describe how routine monitoring checks are used to identify impending operating problems.

        vi. Describe housekeeping and special odor control considerations.

    b. Support Systems and Auxiliary Equipment:

        i. Describe operating functions and objectives of each support system and auxiliary equipment as they relate to other systems.

        ii. Describe each system and equipment in detail.

        iii. Describe the conditions and duration under which the equipment may be operated without support systems and auxiliary equipment.

    c. General Considerations:

        i. Describe operation of the system as a whole.

        ii. Identify general safety procedures when working around the system.

3. Mechanical Maintenance Training

    a. Preventive Maintenance:

        i. Define the recommended preventive maintenance program and schedules for each system and equipment item.

        ii. Identify preventive maintenance record keeping procedures and provide recommended preventive maintenance forms.

        iii. Describe preventive maintenance procedures.

iv. Describe routine inspection procedures required to:

- Perform an inspection on equipment while it is operating.
- Identify symptoms of potential problems to anticipate breakdowns.

v. Describe equipment housekeeping procedures.

b. Equipment Troubleshooting:

i. Define recommended systematic troubleshooting procedures.

ii. Provide component-specific troubleshooting checklists.

iii. Describe- applicable equipment testing and diagnostic procedures to facilitate troubleshooting.

c. Equipment Corrective Maintenance:

i. Describe recommended equipment preparation requirements.

ii. Identify and describe the use of any special tools.

iii. Describe component removal/installation and disassembly/ assembly procedures.

iv. Perform at least two "hands-on" demonstrations of common corrective maintenance repairs.

v. Describe recommended measuring instruments and procedures, and provide instruction on interpreting alignment measurements, as appropriate.

vi. Define recommended torquing, mounting, calibration and/or alignment procedures and settings, as appropriate.

vii. Describe recommended procedures to check/test equipment following a corrective repair.

D. Electrical and Instrumental Training:

1. Routine Checking and Preventive Maintenance Procedures:

a. Define the recommended preventive maintenance program and schedules.

b. Describe routine inspection and checking procedures.

c. Identify and demonstrate recommended tests and describe use of test equipment.

d. Describe inspection and test procedures used to identify symptoms of potential problems.

2. Equipment Troubleshooting:

a. Define recommended systematic troubleshooting procedures.

b. Provide component-specific troubleshooting checklists.

c. Describe applicable equipment testing and diagnostic procedures to facilitate troubleshooting.

3. Equipment Corrective Maintenance:

a. Describe recommended equipment preparation.

b. Identify and describe the use of any special tools required for maintenance of the equipment.

c. Describe component removal/installation and disassembly/ assembly procedures.

d. Perform at least two "hands-on" demonstrations of common corrective maintenance repairs.

e. Describe recommended measuring instruments and procedures, and provide instrumentation on interpreting alignment measurements, as appropriate.

f. Describe recommended procedures to check and test equipment following a corrective repair.

E. Training Aids

1. The manufacturer's instructors shall incorporate training aids as appropriate to assist in the instruction. At a minimum, the training aids shall include text and figure handouts. Other appropriate training aids are:

a. Audio-visual (e.g., films slides, videotapes, overhead transparencies, posters, blueprints, diagrams, catalogue sheets).

b. Equipment cutaways and samples (e.g., spare parts, damaged equipment).

c. Tools (e.g., repair tools, customized tools, measuring and calibrating

instruments).

2. The manufacturer's instructors shall utilize descriptive class handouts during the instruction. Photocopied class handouts shall be good quality reproductions. Class handouts shall accompany the instruction with frequent reference made to them. Customized handouts developed especially for the instruction are encouraged. Handouts planned for the instruction shall be attached with the manufacturer's proposed lesson plans.

3. All instructional materials used during the training sessions shall be turned over to the Town upon completion of the training sessions.

F. "Hands-On" Demonstrations

1. The manufacturer's instructors shall present specific and separate "hands-on" demonstrations of common corrective maintenance repairs, involving mechanical repairs, involving electrical repairs and equipment start-up and shutdown procedures. The manufacturer shall provide the tools and equipment to conduct the demonstrations. Requests for supplemental assistance and facilities should be submitted with the manufacturer's proposed lesson plans. The proposed "hands-on" demonstrations shall be described in the manufacturer's proposed lesson plans and shall be specific for equipment installed and the personnel being trained.

2. In any "hands-on" training situation where the Town's operations or maintenance personnel participate in disassembly or assembly equipment components, the manufacturer shall be responsible for such disassembly or assembly and shall provide written certification of proper equipment operation to the Engineer of Record.

G. Responsibilities

The manufacturer's instructors shall be fully prepared for the training sessions. Training delivery shall be communicative, clear and proceed according to the approved lesson plan. If training delivery is found by the Town or Engineer of Record to be not up to standards or requirements, the training shall be postponed and rescheduled at a cost to be borne by the Contractor.

1.09 INSPECTIONS

A. Substantial Completion Inspection

At the time of substantial completion, an inspection shall be held in accordance with the requirements of the Agreement. At this time the Contractor shall also provide all necessary documentation as required.

B. Final Inspection

At the time of completion of all the work a final inspection shall be held in accordance

with the requirements of the agreement. The Contractor shall also provide all necessary documentation as required by the above and comply with all the requirements of the General Conditions.

C. Follow-up Inspection

1. At the time of the completion of the guarantee period as specified in the Agreement, the Engineer of Record will make arrangements with the Town and the Contractor for a follow up inspection and will send a written notice to said parties to inform them of the date and time of the inspection.

2. After the inspection, the Engineer of Record will inform the Contractor of any corrections required.

3. When the corrections have been satisfactorily completed, the Engineer of Record will forward a certificate for the release of Bonds.

1.10 PROCESS TRAINING

A. General

1. The Contractor shall provide the services of process specialists to instruct the Town's operation personnel in obtaining optimum operational performance.

2. The qualifications of the specialists shall be subject to approval by the Town's representative.

3. Contractor shall be responsible for coordinating these services at times acceptable to the Engineer of Record, with a minimum fourteen (14) days prior notice.

4. All training shall be conducted at a site selected by the Town.

5. All training sessions may be videotaped for future reference and training.

PART 2 - PRODUCTS

NOT USED

PART 3 – EXECUTION
NOT USED

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies cast-in-place structural concrete and materials and mixes for other concrete.

1.2 RELATED WORK:

A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

1.3 TESTING AGENCY FOR CONCRETE MIX DESIGN:

A. Testing agency for the trial concrete mix design retained and reimbursed by the Contractor and approved by the Engineer of Record. For all other testing, refer to Section 01 45 29 Testing Laboratory Services.

B. Testing agency maintaining active participation in Program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology.

C. Testing agency shall furnish equipment and qualified technicians to establish proportions of ingredients for concrete mixes.

1.4 TOLERANCES:

A. Formwork: ACI 117, except the elevation tolerance of formed surfaces before removal of shores is +0 inch and -3/4 inch.

B. Reinforcement Fabricating and Placing: ACI 117, except that fabrication tolerance for bar sizes Nos. 10, 13, and 16 (Nos. 3, 4, and 5) (Tolerance Symbol 1 in Fig. 2.1(a), ACI, 117) used as column ties or stirrups is +0 inch and -1/2 inch where gross bar length is less than 12 feet, or +0 inch and -3/4 inch where gross bar length is 12 feet or more.

C. Cross-Sectional Dimension: ACI 117, except tolerance for thickness of slabs 12 inches or less is +3/4 inch and -1/4 inch. Tolerance of thickness of beams more than 12 inch but less than 3 feet is +3/4 inch and -3/8 inch.

D. Slab Finishes: ACI 117, Section 4.5.6, F-number method in accordance with ASTM E1155, except as follows:

1. Test entire slab surface, including those areas within 2 feet of construction joints and vertical elements that project through slab surface.

2. Maximum elevation change which may occur within 2 feet of any column or wall element is 0.25 inches.
3. Allow sample measurement lines that are perpendicular to construction joints to extend past joint into previous placement no further than 5 feet.

1.5 REGULATORY REQUIREMENTS:

A. ACI SP-66 – ACI Detailing Manual.
B. ACI 318 - Building Code Requirements for Reinforced Concrete.
C. ACI 301 – Standard Specifications for Structural Concrete.

1.6 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
B. Shop Drawings: Reinforcing steel: Complete shop drawings
C. Mill Test Reports:
   1. Reinforcing Steel.
   2. Cement.
D. Manufacturer's Certificates:
   1. Abrasive aggregate.
   2. Lightweight aggregate for structural concrete.
   3. Air-entraining admixture.
   4. Chemical admixtures, including chloride ion content.
   5. Waterproof paper for curing concrete.
   6. Liquid membrane-forming compounds for curing concrete.
   7. Non-shrinking grout.
   8. Liquid hardener.
   9. Waterstops.
   10. Expansion joint filler.
   11. Adhesive binder.
E. Testing Agency for Concrete Mix Design: Approval request including qualifications of principals and technicians and evidence of active participation in program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology and copy of report of latest CCRL, Inspection of Laboratory.
F. Test Report for Concrete Mix Designs: Trial mixes including water-cement, fly ash ratio curves, concrete mix ingredients, and admixtures.

G. Shoring and Reshoring Sequence: Submit for approval a shoring and reshoring sequence for flat slab/flat plate portions, prepared by a registered Professional Engineer. As a minimum, include timing of form stripping, reshoring, number of floors to be re-shored and timing of re-shore removal to serve as an initial outline of procedures subject to modification as construction progresses. Submit revisions to sequence, whether initiated by the Engineer of Record (see FORMWORK) or Contractor.

1.7 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Concrete Institute (ACI):

117-10.....Specifications for Tolerances for Concrete Construction and Materials and Commentary

211.1-91(R2009).....Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

211.2-98(R2004).....Standard Practice for Selecting Proportions for Structural Lightweight Concrete

214R-11.....Guide to Evaluation of Strength Test Results of Concrete

301-10.....Standard Practice for Structural Concrete

304R-00(R2009).....Guide for Measuring, Mixing, Transporting, and Placing Concrete

305.1-06.....Specification for Hot Weather Concreting

306.1-90(R2002).....Standard Specification for Cold Weather Concreting

308.1-11.....Specification for Curing Concrete

309R-05.....Guide for Consolidation of Concrete

318-11.....Building Code Requirements for Structural Concrete and Commentary

347-04.....Guide to Formwork for Concrete

SP-66-04.....ACI Detailing Manual

C. American National Standards Institute and American Hardboard Association (ANSI/AHA):

A135.4-2004.....Basic Hardboard

D. American Society for Testing and Materials (ASTM):

A82/A82M-07.....Standard Specification for Steel Wire, Plain, for Concrete Reinforcement

A185/185M-07.....Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

A615/A615M-09.....Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement

A653/A653M-11.....Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process

A706/A706M-09.....Standard Specification for Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

A767/A767M-09.....Standard Specification for Zinc Coated (Galvanized) Steel Bars for Concrete Reinforcement

A775/A775M-07.....Standard Specification for Epoxy Coated Reinforcing Steel Bars

A820-11.....Standard Specification for Steel Fibers for Fiber Reinforced Concrete

A996/A996M-09.....Standard Specification for Rail Steel and Axle Steel Deformed Bars for Concrete Reinforcement

C31/C31M-10.....Standard Practice for Making and Curing Concrete Test Specimens in the field

C33/C33M-11A.....Standard Specification for Concrete Aggregates

C39/C39M-12.....Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

C94/C94M-12.....Standard Specification for Ready Mixed Concrete

C143/C143M-10.....Standard Test Method for Slump of Hydraulic Cement Concrete

C150-11.....Standard Specification for Portland Cement

C171-07.....Standard Specification for Sheet Materials for Curing Concrete

C172-10.....Standard Practice for Sampling Freshly Mixed Concrete

C173-10.....Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

C192/C192M-07.....Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

C231-10.....Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

C260-10.....Standard Specification for Air Entraining Admixtures for Concrete

C309-11.....Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete

C330-09.....Standard Specification for Lightweight Aggregates for Structural Concrete

C494/C494M-11.....Standard Specification for Chemical Admixtures for Concrete

C618-12.....Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

C666/C666M-03(R2008)....Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing

C881/C881M-10.....Standard Specification for Epoxy Resin Base Bonding Systems for Concrete

C1107/1107M-11.....Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

C1315-11.....Standard Specification for Liquid Membrane Forming Compounds Having Special Properties for Curing and Sealing Concrete

D6-95(R2011).....Standard Test Method for Loss on Heating of Oil and Asphaltic Compounds

D297-93(R2006).....Standard Methods for Rubber Products Chemical Analysis

D412—06AE2.....Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension

D1751-04(R2008).....Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

D4263-83(2012).....Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

D4397-10.....Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications

E1155-96(R2008).....Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers

F1869-11.....Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

E. American Welding Society (AWS):

D1.4/D1.4M-11.....Structural Welding Code - Reinforcing Steel

F. Concrete Reinforcing Steel Institute (CRSI):

Handbook 2008

G. National Cooperative Highway Research Program (NCHRP):

Report On.....Concrete Sealers for the Protection of Bridge Structures

H. U. S. Department of Commerce Product Standard (PS):

PS 1.....Construction and Industrial Plywood

PS 20.....American Softwood Lumber

I. U. S. Army Corps of Engineers Handbook for Concrete and Cement:

CRD C513.....Rubber Waterstops

CRD C572.....Polyvinyl Chloride Waterstops

PART 2 – PRODUCTS:

2.1 FORMS:

A. Wood: PS 20 free from loose knots and suitable to facilitate finishing concrete surface specified; tongue and grooved.

B. Plywood: PS-1 Exterior Grade B-B (concrete-form) 5/8 inch, or 3/4 inch thick for unlined contact form. B-B High Density Concrete Form Overlay optional.

H. Form Ties: Develop a minimum working strength of 3000 pounds when fully assembled. Ties shall be adjustable in length to permit tightening of forms and not have any lugs, cones, washers to act as spreader within form, nor leave a hole larger than 3/4 inch diameter, or a depression in exposed concrete surface, or leave metal closer than 1 1/2 inches to concrete surface. Wire ties not permitted. Cutting ties back from concrete face not permitted.

2.2 MATERIALS:

A. Portland Cement: ASTM C150 Type I or II.

B. Fly Ash: ASTM C618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalies, and loss on ignition (LOI) not to exceed 5 percent.

C. Coarse Aggregate: ASTM C33.

1. Size 67 or Size 467 may be used for footings and walls over 12 inches thick.
2. Coarse aggregate for applied topping, encasement of steel columns, and metal pan stair fill shall be Size 7.
3. Maximum size of coarse aggregates not more than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourth of minimum clear spacing between reinforcing bars.

D. Lightweight Aggregates for Structural Concrete: ASTM C330, Table 1. Maximum size of aggregate not larger than one-fifth of narrowest dimension between forms, nor three-fourth of minimum clear distance between reinforcing bars. Contractor to furnish certified report to verify that aggregate is sound and durable, and has a durability factor of not less than 80 based on 300 cycles of freezing and thawing when tested in accordance with ASTM C666.

E. Fine Aggregate: ASTM C33. Fine aggregate for applied concrete floor topping shall pass a No. 4 sieve, 10 percent maximum shall pass a No. 100 sieve.

F. Mixing Water: Fresh, clean, and potable.

G. Admixtures:

1. Water Reducing Admixture: ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water.
2. Water Reducing, Retarding Admixture: ASTM C494, Type D and not contain more chloride ions than are present in municipal drinking water.
3. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water.
4. Non-Corrosive, Non-Chloride Accelerator: ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal

drinking water. Admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory of at least one year duration using an acceptable accelerated corrosion test method such as that using electrical potential measures.

5. Calcium Nitrite corrosion inhibitor: ASTM C494 Type C.
6. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions are not permitted.
7. Certification: Written conformance to the requirements above and the chloride ion content of the admixture prior to mix design review.

H. Vapor Barrier: ASTM D4397, 6 mil.

I. Reinforcing Steel: ASTM A615, or ASTM A996, deformed, grade as shown.

J. Welded Wire Fabric: ASTM A185.

K. Reinforcing Bars to be Welded: ASTM A706.

L. Galvanized Reinforcing Bars: ASTM A767.

M. Epoxy Coated Reinforcing Bars: ASTM A775.

N. Cold Drawn Steel Wire: ASTM A82.

O. Supports, Spacers, and Chairs: Types which will hold reinforcement in position shown in accordance with requirements of ACI 318 except as specified.

P. Expansion Joint Filler: ASTM D1751.

Q. Sheet Materials for Curing Concrete: ASTM C171.

R. Liquid Membrane-forming Compounds for Curing Concrete: ASTM C309, Type I, with fugitive dye, and shall meet the requirements of ASTM C1315.Compound shall be compatible with scheduled surface treatment, such as paint and resilient tile, and shall not discolor concrete surface.

2.3 CONCRETE MIXES:

A. Mix Designs: Proportioned in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318.

1. If trial mixes are used, make a set of at least 6 cylinders in accordance with ASTM C192 for test purposes from each trial mix; test three for compressive strength at 7 days and three at 28 days.
2. Submit a report of results of each test series, include a detailed listing of the proportions of trial mix or mixes, including cement, fly ash, admixtures, weight of fine and coarse aggregate per cubic yard measured dry rodded and damp loose, specific gravity, fineness modulus, percentage of moisture, air content, water-cement, fly ash

ratio, and consistency of each cylinder in terms of slump, include dry unit weight of lightweight structural concrete.

B. Fly Ash Testing: Submit certificate verifying conformance with ASTM 618 initially with mix design and for each truck load of fly ash delivered from source. Submit test results performed within 6 months of submittal date. Notify the Engineer of Record immediately when change in source is anticipated.

1. Testing Laboratory used for fly ash certification/testing shall participate in the Cement and Concrete Reference Laboratory (CCRL) program. Submit most recent CCRL inspection report.

C. After approval of mixes no substitution in material or change in proportions of approval mixes may be made without additional tests. Making and testing of preliminary test cylinders may be carried on pending approval of cement and fly ash, providing Contractor and manufacturer certify that ingredients used in making test cylinders are the same.

D. Cement Factor: Maintain minimum cement factors in Table I regardless of compressive strength developed above minimums. Use Fly Ash as an admixture with 25% max. replacement by weight in all structural work.

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE

Concrete Strength		Non-Air-Entrained	Air-Entrained	
Min. 28 Day Comp. Str. MPa (psi)	Min. Cement kg/m^3 (lbs/c. yd)	Max. Water Cement Ratio	Min. Cement kg/m^3 (lbs/c. yd)	Max. Water Cement Ratio
35 (5000)[1,3]	375 (630)	0.15	385 (650)	0.15
30 (4000)[1,3]	325 (550)	0.15	340 (570)	0.15
25 (3000)[1,3]	280 (470)	0.15	290 (490)	0.15
25 (3000)[1,2]	300 (500)	*	310 (520)	*

E. Maximum Slump: Maximum slump, as determined by ASTM C143 with tolerances as established by ASTM C94, for concrete to be vibrated shall be as shown in Table II.

TABLE II - MAXIMUM SLUMP, INCHES*

Type of Construction	Normal Weight Concrete	Lightweight Structural Concrete
Reinforced Footings and Substructure Walls	3 inches	3 inches
Slabs, Beams, Reinforced Walls, and Building Columns	4 inches	4 inches

F. Slump may be increased by the use of the approved high-range water-reducing admixture (superplasticizer). Tolerances as established by ASTM C94. Concrete containing the high-range-water-reducing admixture may have a maximum slump of 9 inches. The concrete shall arrive at the job site at a slump of 2 inches to 3 inches, and 3 inches to 4 inches for lightweight concrete. This should be verified, and then the high-range-water-reducing admixture added to increase the slump to the approved level.

G. Air-Entrainment: Air-entrainment of normal weight concrete shall conform with Table III. Air-entrainment of lightweight structural concrete shall conform with Table IV. Determine air content by either ASTM C173 or ASTM C231.

TABLE III - TOTAL AIR CONTENT
FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)

Nominal Maximum Size of Total Air Content	Coarse Aggregate, Inches Percentage by Volume
3/8 in. - 6 to 10	1/2 in - 5 to 9
3/4 in - 4 to 8	1 in - 3-1/2 to 6-1/2
1 1/2 in - 3 to 6	

TABLE IV
AIR CONTENT OF LIGHTWEIGHT STRUCTURAL CONCRETE

Nominal Maximum size of Total Air Content	Coarse Aggregate, Inches Percentage by Volume
Greater than 3/8 in 4 to 8	3/8 in or less 5 to 9

H. High early strength concrete, made with Type III cement or Type I cement plus non-corrosive accelerator, shall have a 7-day compressive strength equal to specified minimum 28-day compressive strength for concrete type specified made with standard Portland cement.

I. Lightweight structural concrete shall not weigh more than air-dry unit weight shown. Air-dry unit weight determined on 6 inch by 12 inch test cylinders after seven days standard moist curing followed by 21 days drying at 73.4 ± 3 degrees Fahrenheit, and 50 (plus or minus 7) percent relative humidity. Use wet unit weight of fresh concrete as basis of control in field.

J. Concrete slabs placed at air temperatures below 50 degrees Fahrenheit use non-corrosive, non-chloride accelerator. Concrete required to be air entrained use approved air entraining admixture. Pumped concrete, synthetic fiber concrete, architectural concrete, concrete required to be watertight, and concrete with a water/cement ratio below 0.50 use high-range water-reducing admixture (superplasticizer).

K. Durability: Use air entrainment for exterior exposed concrete subjected to freezing and thawing and other concrete shown or specified. For air content requirements see Table III or Table IV.

L. Enforcing Strength Requirements: Test as specified in Section 01 45 29, TESTING LABORATORY SERVICES, during the progress of the work. Seven-day tests may be used as indicators of 28-day strength. Average of any three 28-day consecutive strength tests of laboratory-cured specimens representing each type of concrete shall be equal to or greater than specified strength. No single test shall be more than 500 psi below specified strength. Interpret field test results in accordance with ACI 214. Should strengths shown by test specimens fall below required values, the Engineer of Record may require any one or any combination of the following corrective actions, at no additional cost to the Town of Riverhead:

1. Require changes in mix proportions by selecting one of the other appropriate trial mixes or changing proportions, including cement content, of approved trial mix.
2. Require additional curing and protection.
3. If five consecutive tests fall below 95 percent of minimum values given in Table I or if test results are so low as to raise a question as to the safety of the structure, the Engineer of Record may direct Contractor to take cores from portions of the structure.

Use results from cores tested by the Contractor retained testing agency to analyze structure.

4. If strength of core drilled specimens falls below 85 percent of minimum value given in Table I, the Engineer of Record may order load tests, made by Contractor retained testing agency, on portions of building so affected. Load tests in accordance with ACI 318 and criteria of acceptability of concrete under test as given therein.
5. Concrete work, judged inadequate by structural analysis, by results of load test, or for any reason, shall be reinforced with additional construction or replaced, if directed by the Engineer of Record.

2.4 BATCHING AND MIXING:

A. General: Concrete shall be "Ready-Mixed" and comply with ACI 318 and ASTM C94 or C685, except as specified. Batch mixing at the site is permitted. With each batch of concrete, furnish certified delivery tickets listing information in Paragraph 16.1 and 16.2 of ASTM C94. Maximum delivery temperature of concrete is 100 degrees Fahrenheit. Minimum delivery temperature as follows:

Atmospheric Temperature	Minimum Concrete Temperature
30 degrees to 40 degrees F	60 degrees F
0 degrees to 30 degrees F	70 degrees F

PART 3 – EXECUTION

3.1 FORMWORK:

A. General: Design in accordance with ACI 347 is the responsibility of the Contractor. The Contractor shall retain a registered Professional Engineer to design the formwork, shores, and reshores.

1. Form boards and plywood forms may be reused for contact surfaces of exposed concrete only if thoroughly cleaned, patched, and repaired for reuse.

2. Provide forms for concrete footings.
3. Corrugated fiberboard forms: Place forms on a smooth firm bed, set tight, with no buckled cartons to prevent horizontal displacement, and in a dry condition when concrete is placed.

B. Treating and Wetting: Treat or wet contact forms as follows:

1. Coat plywood and board forms with non-staining form sealer. In hot weather, cool forms by wetting with cool water just before concrete is placed.

2. Clean and coat removable metal forms with light form oil before reinforcement is placed. In hot weather, cool metal forms by thoroughly wetting with water just before placing concrete.
3. Use sealer on reused plywood forms as specified for new material.

C. Size and Spacing of Studs: Size and space studs, wales and other framing members for wall forms so as not to exceed safe working stress of kind of lumber used nor to develop deflection greater than 1/270 of free span of member.

D. Unlined Forms: Use plywood forms to obtain a smooth finish for concrete surfaces. Tightly butt edges of sheets to prevent leakage. Back up all vertical joints solidly and nail edges of adjacent sheets to same stud with 6d box nails spaced not over 6 inches apart.

E. Lined Forms: May be used in lieu of unlined plywood forms. Back up form lining solidly with square edge board lumber securely nailed to studs with all edges in close contact to prevent bulging of lining. No joints in lining and backing may coincide. Nail abutted edges of sheets to same backing board. Nail lining at not over 8 inches on center along edges and with at least one nail to each square foot of surface area; nails to be 3d blued shingle or similar nails with thin flatheads.

F. Architectural Liner: Attach liner as recommended by the manufacturer with tight joints to prevent leakage.

G. Wall Form Ties: Locate wall form ties in symmetrically level horizontal rows at each line of wales and in plumb vertical tiers. Space ties to maintain true, plumb surfaces. Provide one row of ties within 6 inches above each construction joint. Space through-ties adjacent to horizontal and vertical construction joints not over 18 inches on center.

1. Tighten row of ties at bottom of form just before placing concrete and, if necessary, during placing of concrete to prevent seepage of concrete and to obtain a clean line. Ties to be entirely removed shall be loosened 24 hours after concrete is placed and shall be pulled from least important face when removed.
2. Coat surfaces of all metal that is to be removed with paraffin, cup grease or a suitable compound to facilitate removal.

H. Inserts, Sleeves, and Similar Items: Flashing reglets, steel strips, masonry ties, anchors, wood blocks, nailing strips, grounds, inserts, wire hangers, sleeves, drains, guard angles, forms for floor hinge boxes, inserts or bond blocks for elevator guide rails and supports,

and other items specified as furnished under this and other sections of specifications and required to be in their final position at time concrete is placed shall be properly located, accurately positioned, and built into construction, and maintained securely in place.

1. Locate inserts or hanger wires for furred and suspended ceilings only in bottom of concrete joists, or similar concrete member of overhead concrete joist construction.
2. Install sleeves, inserts and similar items for mechanical services in accordance with drawings prepared specially for mechanical services. Contractor is responsible for accuracy and completeness of drawings and shall coordinate requirements for mechanical services and equipment.
3. Do not install sleeves in beams, joists or columns except where shown or permitted by the Engineer of Record. Install sleeves in beams, joists, or columns that are not shown, but are permitted by the Engineer of Record, and require no structural changes, at no additional cost to the Town of Riverhead.
4. Minimum clear distance of embedded items such as conduit and pipe is at least three times diameter of conduit or pipe, except at stub-ups and other similar locations.
5. Provide recesses and blockouts in floor slabs for door closers and other hardware as necessary in accordance with manufacturer's instructions.

I. Construction Tolerances:

1. Set and maintain concrete formwork to assure erection of completed work within tolerances specified and to accommodate installation of other rough and finish materials. Accomplish remedial work necessary for correcting excessive tolerances. Erected work that exceeds specified tolerance limits shall be remedied or removed and replaced, at no additional cost to the Town of Riverhead.
2. Permissible surface irregularities for various classes of materials are defined as "finishes" in specification sections covering individual materials. They are to be distinguished from tolerances specified which are applicable to surface irregularities of structural elements.

3.2 PLACING REINFORCEMENT:

A. General: Details of concrete reinforcement in accordance with ACI 318 unless otherwise shown.

B. Placing: Place reinforcement conforming to CRSI DA4, unless otherwise shown.
   1. Place reinforcing bars accurately and tie securely at intersections and splices with 16 gauge black annealed wire. Secure reinforcing bars against displacement during the placing of concrete by spacers, chairs, or other similar supports. Portions of supports, spacers, and chairs in contact with formwork shall be made of plastic in areas that will be exposed when building is occupied. Type, number, and spacing of supports conform to ACI 318. Where concrete slabs are placed on ground, use concrete blocks or other non-corrodible material of proper height, for support of reinforcement. Use of brick or stone supports will not be permitted.
   2. Lap welded wire fabric at least 1/2 mesh panels plus end extension of wires not less than 6 inches in slabs on grade.
   3. Splice column steel at no points other than at footings and floor levels unless otherwise shown.

C. Spacing: Minimum clear distances between parallel bars, except in columns and multiple layers of bars in beams shall be equal to nominal diameter of bars. Minimum clear spacing is 1 inch or 1-1/3 times maximum size of coarse aggregate.

D. Splicing: Splices of reinforcement made only as required or shown or specified. Accomplish splicing as follows:
   1. Lap splices: Do not use lap splices for bars larger than Number 36 (Number 11). Minimum lengths of lap as shown.
   2. Welded splices: Splicing by butt-welding of reinforcement permitted providing the weld develops in tension at least 125 percent of the yield strength (fy) for the bars. Welding conform to the requirements of AWS D1.4. Welded reinforcing steel conform to the chemical analysis requirements of AWS D1.4.
      a. Submit test reports indicating the chemical analysis to establish weldability of reinforcing steel.
      b. Submit a field quality control procedure to insure proper inspection, materials and welding procedure for welded splices.
   3. Mechanical Splices: Develop in tension and compression at least 125 percent of the yield strength (fy) of the bars. Stresses of transition splices between two reinforcing bar sizes based on area of smaller bar. Provide mechanical splices at locations indicated. Use approved exothermic, tapered threaded coupling, or swaged and

threaded sleeve. Exposed threads and swaging in the field not permitted.

E. Bending: Bend bars cold, unless otherwise approved. Do not field bend bars partially embedded in concrete.

F. Cleaning: Metal reinforcement, at time concrete is placed, shall be free from loose flaky rust, mud, oil, or similar coatings that will reduce bond.

G. Future Bonding: Protect exposed reinforcement bars intended for bonding with future work by wrapping with felt and coating felt with a bituminous compound unless otherwise shown.

3.3 VAPOR BARRIER:

A. Except where membrane waterproofing is required, interior concrete slab on grade shall be placed on a continuous vapor barrier.

1. Place 4 inches of fine granular fill over the vapor barrier to act as a blotter for concrete slab.
2. Vapor barrier joints lapped 6 inches and sealed with compatible waterproof pressure-sensitive tape.
3. Patch punctures and tears.

3.4 CONSTRUCTION JOINTS:

A. Unless otherwise shown, location of construction joints to limit individual placement shall not exceed 80 feet in any horizontal direction, except slabs on grade which shall have construction joints shown. Allow 48 hours to elapse between pouring adjacent sections unless this requirement is waived by Engineer of Record.

3.5 EXPANSION JOINTS AND CONTRACTION JOINTS:

A. Clean expansion joint surfaces before installing premolded filler and placing adjacent concrete.

B. Provide contraction (control) joints in floor slabs as indicated on the contract drawings. Joints shall be saw cut, to the indicated depth after the surface has been finished. Complete saw joints within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.6 PLACING CONCRETE:

A. Preparation:

1. Remove hardened concrete, wood chips, shavings and other debris from forms.

2. Remove hardened concrete and foreign materials from interior surfaces of mixing and conveying equipment.
3. Have forms and reinforcement inspected and approved by the Engineer of Record before depositing concrete.
4. Provide runways for wheeling equipment to convey concrete to point of deposit. Keep equipment on runways which are not supported by or bear on reinforcement. Provide similar runways for protection of vapor barrier on coarse fill.

B. Bonding: Before depositing new concrete on or against concrete which has been set, thoroughly roughen and clean existing surfaces of laitance, foreign matter, and loose particles.
   1. Preparing surface for applied topping:
      a. Remove laitance, mortar, oil, grease, paint, or other foreign material by sand blasting. Clean with vacuum type equipment to remove sand and other loose material.
      b. Broom clean and keep base slab wet for at least four hours before topping is applied.
      c. Use a thin coat of one part Portland cement, 1.5 parts fine sand, bonding admixture; and water at a 50: 50 ratio and mix to achieve the consistency of thick paint. Apply to a damp base slab by scrubbing with a stiff fiber brush. New concrete shall be placed while the bonding grout is still tacky.

C. Conveying Concrete: Convey concrete from mixer to final place of deposit by a method which will prevent segregation.

D. Placing: For special requirements see Paragraphs, HOT WEATHER and COLD WEATHER.
   1. Do not place concrete when weather conditions prevent proper placement and consolidation, or when concrete has attained its initial set, or has contained its water or cement content more than 1 1/2 hours.
   2. Deposit concrete in forms as near as practicable in its final position. Prevent splashing of forms or reinforcement with concrete in advance of placing concrete.
   3. Do not drop concrete freely more than 10 feet for concrete containing the high-range water-reducing admixture (superplasticizer) or 5 feet for conventional concrete. Where greater drops are required, use a tremie or flexible spout (canvas elephant trunk), attached to a suitable hopper.

4. Discharge contents of tremies or flexible spouts in horizontal layers not exceeding 20 inches in thickness, and space tremies such as to provide a minimum of lateral movement of concrete.
5. Continuously place concrete until an entire unit between construction joints is placed. Rate and method of placing concrete shall be such that no concrete between construction joints will be deposited upon or against partly set concrete, after its initial set has taken place, or after 45 minutes of elapsed time during concrete placement.
6. On bottom of members with severe congestion of reinforcement, deposit 1 inch layer of flowing concrete containing the specified high-range water-reducing admixture (superplasticizer). Successive concrete lifts may be a continuation of this concrete or concrete with a conventional slump.

E. Consolidation: Conform to ACI 309. Immediately after depositing, spade concrete next to forms, work around reinforcement and into angles of forms, tamp lightly by hand, and compact with mechanical vibrator applied directly into concrete at approximately 18 inch intervals. Mechanical vibrator shall be power driven, hand operated type with minimum frequency of 5000 cycles per minute having an intensity sufficient to cause flow or settlement of concrete into place. Vibrate concrete to produce thorough compaction, complete embedment of reinforcement and concrete of uniform and maximum density without segregation of mix. Do not transport concrete in forms by vibration.
1. Carry on vibration continuously with placing of concrete. Do not insert vibrator into concrete that has begun to set.

3.7 HOT WEATHER:

Follow the recommendations of ACI 305 or as specified to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete.

3.8 COLD WEATHER:

Follow the recommendations of ACI 306 or as specified to prevent freezing of concrete and to permit concrete to gain strength properly. Use only the specified non-corrosive, non-chloride accelerator. Do not use calcium chloride, thiocyantes or admixtures containing more than 0.05 percent chloride ions.

3.9 PROTECTION AND CURING:

A. Conform to ACI 308: Initial curing shall immediately follow the finishing operation. Protect exposed surfaces of concrete from premature drying, wash by rain and running water, wind, mechanical injury, and excessively hot or cold temperatures. Keep concrete not covered with membrane or other curing material continuously wet for at least 7 days after placing, except wet curing period for high-early-strength concrete shall be not less than 3 days. Keep wood forms continuously wet to prevent moisture loss until forms are removed. Cure exposed concrete surfaces as described below.

1. Liquid curing and sealing compounds: Apply by power-driven spray or roller in accordance with the manufacturer's instructions. Apply immediately after finishing. Maximum coverage 400 square feet per gallon on steel troweled surfaces and 300 square feet per gallon on floated or broomed surfaces for the curing/sealing compound.
2. Plastic sheets: Apply as soon as concrete has hardened sufficiently to prevent surface damage. Utilize widest practical width sheet and overlap adjacent sheets 2 inches. Tightly seal joints with tape.
3. Paper: Utilize widest practical width paper and overlap adjacent sheets 2 inches. Tightly seal joints with sand, wood planks, pressure-sensitive tape, mastic or glue.

3.10 REMOVAL OF FORMS:

A. Remove in a manner to assure complete safety of structure after the following conditions have been met.

1. Where structure as a whole is supported on shores, forms for beams and girder sides, columns, and similar vertical structural members may be removed after 24 hours, provided concrete has hardened sufficiently to prevent surface damage and curing is continued without any lapse in time as specified for exposed surfaces.
2. Take particular care in removing forms of architectural exposed concrete to insure surfaces are not marred or gouged, and that corners and arises are true, sharp and unbroken.

B. Control Test: Use to determine if the concrete has attained sufficient strength and curing to permit removal of supporting forms. Cylinders required for control tests taken in accordance with ASTM C172, molded in accordance with ASTM C31, and tested in accordance with ASTM C39. Control cylinders cured and protected in the same manner as the structure they represent. Supporting forms or shoring not removed until

strength of control test cylinders have attained at least 70 percent of minimum 28-day compressive strength specified. For post-tensioned systems supporting forms and shoring not removed until stressing is completed. Exercise care to assure that newly unsupported portions of structure are not subjected to heavy construction or material loading.

C. Reshoring: Reshoring is required if superimposed load plus dead load of the floor exceeds the capacity of the floor at the time of loading. In addition, for flat slab/plate, reshoring is required immediately after stripping operations are complete and not later than the end of the same day. Reshoring accomplished in accordance with ACI 347 at no additional cost to the Town.

3.11 CONCRETE SURFACE PREPARATION:

A. Metal Removal: Unnecessary metal items cut back flush with face of concrete members.

B. Patching: Maintain curing and start patching as soon as forms are removed. Do not apply curing compounds to concrete surfaces requiring patching until patching is completed. Use cement mortar for patching of same composition as that used in concrete. Use white or gray Portland cement as necessary to obtain finish color matching surrounding concrete. Thoroughly clean areas to be patched. Cut out honeycombed or otherwise defective areas to solid concrete to a depth of not less than 1 inch. Cut edge perpendicular to surface of concrete. Saturate with water area to be patched, and at least 6 inches surrounding before placing patching mortar. Give area to be patched a brush coat of cement grout followed immediately by patching mortar. Cement grout composed of one part Portland cement, 1.5 parts fine sand, bonding admixture, and water at a 50:50 ratio, mix to achieve consistency of thick paint. Mix patching mortar approximately 1 hour before placing and remix occasionally during this period without addition of water. Compact mortar into place and screed slightly higher than surrounding surface. After initial shrinkage has occurred, finish to match color and texture of adjoining surfaces. Cure patches as specified for other concrete. Fill form tie holes which extend entirely through walls from unexposed face by means of a pressure gun or other suitable device to force mortar through wall. Wipe excess mortar off exposed face with a cloth.

C. Upon removal of forms, clean vertical concrete surface that is to receive bonded applied cementitious application with wire brushes or by sand blasting to remove unset material, laitance, and loose particles

to expose aggregates to provide a clean, firm, granular surface for bond of applied finish.

3.12 CONCRETE FINISHES:

A. Slab Finishes:

1. Set perimeter forms to serve as screed using either optical or laser instruments. For slabs on grade, wet screeds may be used to establish initial grade during strike-off. Where wet screeds are allowed, they shall be placed using grade stakes set by optical or laser instruments. Use rigid screed guides, as opposed to wet screeds, to control strike-off elevation for all types of elevated (non slab-on-grade) slabs. Divide bays into halves or thirds by hard screeds. Adjust as necessary where monitoring of previous placements indicates unshored structural steel deflections to other than a level profile.
2. Place slabs monolithically. Once slab placement commences, complete finishing operations within same day. Slope finished slab to floor drains where they occur, whether shown or not.
3. Use straightedges specifically made for screeding, such as hollow magnesium straightedges or power strike-offs. Do not use pieces of dimensioned lumber. Strike off and screed slab to a true surface at required elevations. Use optical or laser instruments to check concrete finished surface grade after strike-off. Repeat strike-off as necessary. Complete screeding before any excess moisture or bleeding water is present on surface. Do not sprinkle dry cement on the surface.
4. Immediately following screeding, and before any bleed water appears, use a 10 foot wide highway straightedge in a cutting and filling operation to achieve surface flatness. Do not use bull floats or darbys, except that darbying may be allowed for narrow slabs and restricted spaces.
5. Wait until water sheen disappears and surface stiffens before proceeding further. Do not perform subsequent operations until concrete will sustain foot pressure with maximum of 1/4 inch indentation.
6. Hard Steel Trowel Burnished Finish: Finish interior slab to receive resilient floor covering or carpet, monolithic floor slabs to be exposed to view in finished work, future floor roof slabs, applied toppings, and other interior surfaces for which no other finish is

indicated. Steel trowel immediately following floating. During final troweling, tilt steel trowel at a slight angle and exert heavy pressure to compact cement paste and form a dense, smooth surface. Finished surface shall be smooth, free of trowel marks, and uniform in texture and appearance.

7. Broom Finish: Finish exterior aprons with a bristle brush moistened with clear water after surfaces have been floated. Brush in a direction transverse to main traffic.
8. Finished slab flatness (FF) and levelness (FL) values comply with the following minimum requirements:
   a. Areas that will be exposed, receive thin-set tile or resilient flooring, or roof areas designed as future floors:
      1) Slab on grade:
         a) Specified overall value FF 36/FL 20
         b) Minimum local value FF 24/FL 15
   c. "Specified overall value" is based on the composite of all measured values in a placement derived in accordance with ASTM E1155.
   d. "Minimum local value" (MLV) describes the flatness or levelness below which repair or replacement is required. MLV is based on the results of an individual placement and applies to a minimum local area. Minimum local area boundaries may not cross a construction joint or expansion joint. A minimum local area will be bounded by construction and/or control joints, or by column lines and/or half-column lines, whichever is smaller.
9. Measurements
   a. The Town of Riverhead retained testing laboratory will take measurements as directed by Engineer of Record, to verify compliance with FF, FL, and other finish requirements. Measurements will occur within 72 hours after completion of concrete placement (weekends and holidays excluded). Make measurements before shores or forms are removed to insure the "as-built" levelness is accurately assessed. Profile data for above characteristics may be collected using a laser level or any Type II apparatus (ASTM E1155, "profileograph" or "dipstick"). Contractor's surveyor shall establish reference elevations to be used by the Town of Riverhead retained testing laboratory.

b. Contractor not experienced in using FF and FL criteria is encouraged to retain the services of a floor consultant to assist with recommendations concerning adjustments to slab thicknesses, finishing techniques, and procedures on measurements of the finish as it progresses in order to achieve the specific flatness and levelness numbers.

10. Acceptance/ Rejection:
    a. If individual slab section measures less than specified minimum F_F/F_L numbers (this Section, part 3.12.8a), that section shall be rejected and remedial measures shall be required. Sectional boundaries may be set at construction and contraction (control) joints, and not smaller than one-half bay.
    b. If composite value of entire slab installation, combination of all local results, measures less than either of specified overall F_F/F_L numbers, then whole slab shall be rejected and remedial measures shall be required.
11. Remedial Measures for Rejected Slabs: Correct rejected slab areas by grinding, planing, surface repair with underlayment compound or repair topping, retopping, or removal and replacement of entire rejected slab areas, as directed by Engineer of Record, until a slab finish constructed within specified tolerances is accepted.

- - - E N D - - -

SECTION 07 21 13
THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Thermal insulation.
      a. Board or block insulation at foundation perimeter.
      b. Batt or blanket insulation at exterior framed and furred walls.

1.2 RELATED REQUIREMENTS

A. Safing Insulation: Section 07 84 00, FIRESTOPPING.
B. Insulation for Prefabricated Metal Buildings: Section 13 34 19, METAL BUILDING SYSTEMS.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.
B. ASTM International (ASTM):
   1. C578-15 - Rigid, Cellular Polystyrene Thermal Insulation.
   2. C591-15 - Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
   3. C612-14 - Mineral Fiber Block and Board Thermal Insulation.
   4. C1002-14 - Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Submittal Drawings:
   1. Show insulation type, thickness, and R-value for each location.

1.5 DELIVERY

A. Deliver products in manufacturer's original sealed packaging.
B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.6 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight facility.

B. Protect products from damage during handling and construction operations.

C. Protect foam plastic insulation from UV exposure.

1.7 WARRANTY

A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS

2.1 INSULATION - GENERAL

A. Insulation Thickness:

1. Provide thickness required by R-value shown on drawings.
2. Provide thickness indicated when R-value is not shown on drawings.

B. Insulation Types:

1. Provide one insulation type for each application.

2.2 THERMAL INSULATION

A. Perimeter Insulation In Contact with Soil:

1. Polystyrene Board: ASTM C578, Type IV, V, VI, VII, or IX.

B. Exterior Framing or Furring Insulation:

1. Mineral Fiber: ASTM C665, Type II, Class C, Category I where concealed by thermal barrier to be provided by building manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.

3.2 INSTALLATION - GENERAL

A. Install products according to manufacturer's instructions and approved submittal drawings.

1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Engineer of Record’s consideration.

B. Install insulation with vapor barrier facing the heated side, unless indicated otherwise.

C. Install board and block insulation with joints close and flush, in regular courses, and with end joints staggered.

D. Install batt and blanket insulation with joints tight. Fill framing voids completely. Seal penetrations, terminations, facing joints, facing cuts, tears, and unlapped joints with tape.

E. Fit insulation tight against adjoining construction and penetrations, unless indicated otherwise.

3.3 THERMAL INSULATION

A. Perimeter Insulation In Contact with Soil:

1. Vertical insulation:
   a. Fill joints of insulation with same material used for bonding.
   b. Bond polystyrene board to surfaces with adhesive.
   c. Bond cellular glass insulation to surfaces with adhesive cement.
2. Horizontal insulation under concrete floor slab:
   a. Lay insulation boards and blocks horizontally on level, compacted and drained fill.
   b. Extend insulation from foundation walls towards center of building minimum 24 inches.

B. Exterior Framing or Furring Insulation:

1. General:
   a. Open voids are not acceptable.
   b. Pack insulation around door frames and windows, in building expansion joints, door soffits, and other voids.
   c. Pack behind outlets, around pipes, ducts, and services encased in walls.
   d. Hold insulation in place with pressure sensitive tape.
   e. Lap facing flanges together over framing for continuous surface. Seal penetrations through insulation and facings.
2. Metal Studs:
   a. Fasten insulation between metal studs, framing, and furring with pressure sensitive tape continuous along flanged edges.
3. Ceilings and Soffits:
   a. Metal Framing:
      1) Fasten insulation between metal framing with pressure sensitive tape continuous along flanged edges.
      2) At metal framing and ceilings suspension systems, install insulation above suspended ceilings and metal framing at right angles to main runners and framing.
      3) Tape insulation tightly together without gaps. Cover metal framing members with insulation.

b. Ceiling / Roof:

1) Secure blanket and batt with continuous cleats to structure above.

3.4 CLEANING

A. Remove excess adhesive before adhesive sets.

3.5 PROTECTION

A. Protect insulation from construction operations.

B. Repair damage.

- - E N D - -

SECTION 07 60 00
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

Formed sheet metal work for wall and roof flashing, copings, roof edge metal, fasciae, drainage specialties, and formed expansion joint covers are specified in this section.

1.2 RELATED WORK

A. Flashing components of factory finished roofing and wall systems: Division 07 roofing and wall system sections.

B. Joint Sealants: Section 07 92 00, JOINT SEALANTS.

C. Color of factory coated exterior architectural metal and anodized aluminum items: Per Owner

D. Flashing and sheet metal in connection with prefabricated metal buildings: Section 13 34 19, METAL BUILDING SYSTEMS.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.

B. Aluminum Association (AA):

AA-C22A41.....Aluminum chemically etched medium matte, with clear anodic coating, Class I Architectural, 0.7-mil thick

AA-C22A42.....Chemically etched medium matte, with integrally colored anodic coating, Class I Architectural, 0.7 mils thick

AA-C22A44.....Chemically etched medium matte with electrolytically deposited metallic compound, integrally colored coating Class I Architectural, 0.7-mil thick finish

C. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):

ANSI/SPRI ES-1-03.....Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

D. American Architectural Manufacturers Association (AAMA):

AAMA 620.....Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Aluminum

AAMA 621.....Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates

E. ASTM International (ASTM):

A240/A240M-14.....Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.

A653/A653M-11.....Steel Sheet Zinc-Coated (Galvanized) or Zinc Alloy Coated (Galvanized) by the Hot- Dip Process

B32-08.....Solder Metal

B209-10.....Aluminum and Aluminum-Alloy Sheet and Plate

B370-12.....Copper Sheet and Strip for Building Construction

D173-03(R2011).....Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing

D412-06(R2013).....Vulcanized Rubber and Thermoplastic Elastomers-Tension

D1187-97(R2011).....Asphalt Base Emulsions for Use as Protective Coatings for Metal

D1784-11.....Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

D3656-07.....Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns

D4586-07.....Asphalt Roof Cement, Asbestos Free

F. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06.....Metal Finishes Manual

G. Federal Specification (Fed. Spec):

A-A-1925A.....Shield, Expansion; (Nail Anchors)

UU-B-790A.....Building Paper, Vegetable Fiber

H. International Code Commission (ICC): International Building Code, Current Edition

1.4 PERFORMANCE REQUIREMENTS

A. Wind Design Standard: Fabricate and install roof-edge flashings tested per ANSI/SPRI ES-1 to resist design pressure indicated on Drawings.

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS

A. Aluminum Sheet: ASTM B209, alloy 3003-H14
Alloy required to produce specified color shall have the same structural properties as alloy 3003-H14.

B. Galvanized Sheet: ASTM, A653.

2.2 FLASHING ACCESSORIES

A. Fasteners:

1. Use copper, copper alloy, bronze, brass, or stainless steel for copper and copper clad stainless steel, and stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.
2. Nails:
   a. Minimum diameter for aluminum nails 0.105 inch.
   b. Minimum diameter for stainless steel nails: 0.095 inch and annular threaded.
   c. Length to provide not less than 7/8 inch penetration into anchorage.
3. Rivets: Not less than 1/8 inch diameter.
4. Expansion Shields: Fed Spec A-A-1925A.

B. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.

C. Insect Screening: ASTM D3656, 18 by 18 regular mesh.

2.3 SHEET METAL THICKNESS

A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:

B. Concealed Locations (Built into Construction):

1. Galvanized steel: 0.021 inch thick.

C. Exposed Locations:

1. Stainless steel: 0.015 inch.

3. Copper clad stainless steel: 0.015 inch.

D. Thickness of aluminum or galvanized steel is specified with each item.

2.4 FABRICATION, GENERAL

A. Jointing:

1. In general, copper, stainless steel and copper clad stainless steel joints, except expansion and contraction joints, shall be locked and soldered.
2. Jointing of copper over 20 oz weight or stainless steel over 0.018 inch thick shall be done by lapping, riveting and soldering.
3. Joints shall conform to following requirements:
   a. Flat-lock joints shall finish not less than 3/4 inch wide.
   b. Lap joints subject to stress shall finish not less than one inch wide and shall be soldered and riveted.
   c. Unsoldered lap joints shall finish not less than 4 inches wide.
4. Flat and lap joints shall be made in direction of flow.
5. Soldering:
   a. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
   b. Completely remove acid and flux after soldering is completed.

B. Expansion and Contraction Joints:

1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
2. Space joints as shown or as specified.
3. Space expansion and contraction joints for copper, stainless steel, and copper clad stainless steel at intervals not exceeding 24 feet.
4. Space expansion and contraction joints for aluminum at intervals not exceeding 18 feet, except do not exceed 10 feet for gravel stops and fascia-cant systems.
5. Fabricate slip-type or loose locked joints and fill with sealant unless otherwise specified.
6. Fabricate joint covers of same thickness material as sheet metal served.

C. Cleats:

1. Fabricate cleats to secure flashings and sheet metal work over 12 inches wide and where specified.

2. Provide cleats for maximum spacing of 12 inch centers unless specified otherwise.
3. Form cleats of same metal and weights or thickness as the sheet metal being installed unless specified otherwise.
4. Fabricate cleats from 2 inch wide strip. Form end with not less than 3/4 inch wide loose lock to item for anchorage. Form other end of length to receive nails free of item to be anchored and end edge to be folded over and cover nail heads.

D. Edge Strips or Continuous Cleats:
1. Fabricate continuous edge strips where shown and specified to secure loose edges of the sheet metal work.
2. Except as otherwise specified, fabricate edge strips or minimum 24 ounce copper 0.024 inch thick stainless steel 0.050 inch thick aluminum.
3. Use material compatible with sheet metal to be secured by the edge strip.
4. Fabricate in 10 feet maximum lengths with not less than 3/4 inch loose lock into metal secured by edge strip.
5. Fabricate anchor edge maximum width of 3 inches or of sufficient width to provide adequate bearing area to insure a rigid installation using 0.031 inch thick stainless steel or 0.0625 inch thick aluminum.

E. Drips:
1. Form drips at lower edge of sheet metal counter-flashings (cap flashings), fascias, wall copings, by folding edge back 1/2 inch and bending out 45 degrees from vertical to carry water away from the wall.
2. Form drip to provide hook to engage cleat or edge strip for fastening for not less than 3/4 inch loose lock where shown.

F. Edges:
1. Edges of flashings concealed in masonry joints opposite drain side shall be turned up 1/4 inch to form dam, unless otherwise specified or shown otherwise.
2. Finish exposed edges of flashing with a 1/4 inch hem formed by folding edge of flashing back on itself when not hooked to edge strip or cleat. Use 1/4 inch minimum penetration beyond wall face with drip for through-wall flashing exposed edge.

3. All metal roof edges shall meet requirements of IBC, current edition.

G. Metal Options:

1. Where options are permitted for different metals use only one metal throughout.
2. Stainless steel may be used in concealed locations for fasteners of other metals exposed to view.

2.5 FINISHES

A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise (color by Town).

B. Finish exposed metal surfaces as follows, unless specified otherwise:

1. Copper: Mill finish.
2. Stainless Steel: Finish No. 2B or 2D.
3. Aluminum:
   a. Colored Finish: AA-C22A42 (anodized) or AA-C22A44 (electrolytically deposited metallic compound) medium matte, integrally colored coating, Class 1 Architectural, 0.7 mils thick. Dyes will not be accepted.
4. Steel and Galvanized Steel:
   a. Manufacturer's finish:
      1) Baked-on prime and finish coat over a phosphate coating.

2.6 THROUGH-WALL FLASHINGS

A. Form through-wall flashing to provide a mechanical bond or key against lateral movement in all directions. Install a sheet having 1/16 inch deep transverse channels spaced four to every one inch, or ribbed diagonal pattern, or having other deformation unless specified otherwise.

1. Fabricate in not less than 8 feet lengths; 10 feet maximum lengths.
2. Fabricate so keying nests at overlaps.

B. Lintel Flashing:

1. Use either copper, stainless steel, copper clad stainless steel plane flat sheet, or non-reinforced elastomeric sheeting, bituminous coated copper, copper covered paper, or polyethylene coated copper.

C. Door Sill Flashing:

1. Where concealed, use 0.018 inch thick stainless steel, or 0.018 inch thick copper clad stainless steel.

2.7 BASE FLASHING

A. Use metal base flashing at vertical surfaces intersecting built-up roofing without cant strips or where shown.
   1. Use either copper, or stainless steel, thickness specified unless specified otherwise.

B. Pipe Flashing: (Other than engine exhaust or flue stack)
   1. Fabricate roof flange not less than 4 inches beyond sleeve on all sides.
   2. Extend sleeve up and around pipe and flange out at bottom not less than 1/2 inch and solder to flange and sleeve seam to make watertight.
   3. At low pipes 8 inch to 18 inch above roof:
      a. Form top of sleeve to turn down into the pipe at least one inch.
      b. Allow for loose fit around and into the pipe.
   4. At high pipes and pipes with goosenecks or other obstructions which would prevent turning the flashing down into the pipe:
      a. Extend sleeve up not less than 12 inch above roofing.
      b. Allow for loose fit around pipe.

2.8 HANGING GUTTERS

A. Fabricate gutters of not less than the following:
   1. 6”-7”, 0.032 inch thick rolled formed aluminum or 24 ga. Steel ‘G’ Style gutters.
      a. Fabricate hanging gutters in sections not less than 208 feet long, except at ends of runs where shorter lengths are required.

B. Building side of gutter shall be not less than 1 1/2 inches higher than exterior side.

C. Gutter Spacers:
   1. Fabricate of same material and thickness as gutter.
   2. Fabricate one inch wide strap and fasten to gutters not over 36 inches on center.
   3. Rivet and solder to gutter except rivet and seal to aluminum.

D. Outlet Tubes:
   1. Form outlet tubes to connect gutters to conductors of same metal and thickness as gutters extend into the conductor 3 inch. Flange upper end of outlet tube 1/2 inch.
   2. Lock and solder longitudinal seam except use sealant in lieu of solder with aluminum.

3. Solder tube to gutter. Seal aluminum tube to gutter and rivet to gutter.

E. Gutter Brackets:

1. Fabricate of same metal as gutter. Use the following:
   a. 1/8 by 1 1/2 inch stainless steel or
   b. 1/4 by 1 inch aluminum.
2. Fabricate to gutter profile.
3. Drill two 3/16 inch diameter holes in anchor leg for countersunk flat head screws.

2.9 CONDUCTORS (DOWNSPOUTS)

A. Fabricate 4”x5” conductors of same metal and thickness as gutters in sections as required with 3/4 inch wide flat locked seams.

1. Fabricate open face channel shape with hemmed longitudinal edges.

B. Fabricate elbows by mitering, riveting, and soldering except seal aluminum in lieu of solder. Lap upper section to the inside of the lower piece.

C. Fabricate conductor brackets or hangers of same material as conductor, 1/16 inch thick by one inch minimum width. Form to support conductors one inch from wall surface in accordance with Architectural Sheet Metal Manual Plate 34, Design C for rectangular shapes and E for round shapes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 1/4 inch with sheet metal compatible with the roofing and flashing material used.

5. Coordinate with masonry work for the application of a skim coat of mortar to surfaces of unit masonry to receive flashing material before the application of flashing.
6. Apply a layer of 15 pound saturated felt followed by a layer of rosin paper to wood surfaces to be covered with copper. Lap each ply 2 inch with the slope and nail with large headed copper nails.
7. Confine direct nailing of sheet metal to strips 12 inch or less wide. Nail flashing along one edge only. Space nail not over 4 inches on center unless specified otherwise.
8. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 3 inch on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
9. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
10. Nail continuous cleats on 3 inch on centers in two rows in a staggered position.
11. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
12. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
13. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.
14. Isolate aluminum in contact with dissimilar metals others than stainless steel, white bronze or other metal compatible with aluminum by:
    a. Paint dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
    b. Paint dissimilar metal with a coat of bituminous paint.
    c. Apply an approved caulking material between aluminum and dissimilar metal.
15. Paint aluminum in contact with or built into mortar, concrete, plaster, or other masonry materials with a coat of bituminous paint.

16. Paint aluminum in contact with absorptive materials that may become repeatedly wet with two coats of bituminous paint or two coats of aluminum paint.

3.2 THROUGH-WALL FLASHING

A. General:

1. Install continuous through-wall flashing between top of concrete foundation walls
2. Where exposed portions are used as a counter flashings, lap base flashings at least 4 inches and use thickness of metal as specified for exposed locations.
3. Exposed edge of flashing may be formed as a receiver for two piece counter flashing as specified.
4. Terminate exterior edge beyond face of wall approximately 1/4 inch with drip edge where not part of counter flashing.

B. Flashing at Top of Concrete Foundation Walls Where concrete is exposed. Turn up not less than 8 inch high and into masonry backup mortar joint or reglet in concrete backup as specified.

C. Door Sill Flashing:

1. Install flashing under bottom of plate sills of doors over curbs opening onto roofs. Extend flashing out to form counter flashing or receiver for counter flashing over base flashing. Set in sealant.
2. Extend sill flashing 8 inch beyond jamb opening. Turn ends up one inch in vertical masonry joint, extend end to face of wall. Join to counter flashing for water tight joint.
3. Where doors thresholds cover over waterproof membranes install sill flashing over water proof membrane under thresholds. Extend beyond opening to cover exposed portion of waterproof membrane and not less than 6 inch beyond door jamb opening at ends. Turn up approximately 1/4 inch under threshold.

3.3 BASE FLASHING

A. Install where roof membrane type base flashing is not used and where shown on Plans.

1. Install flashing at intersections of roofs with vertical surfaces or at penetrations through roofs, to provide watertight construction.
2. Install metal flashings and accessories having flanges extending out on top of the built-up roofing before final bituminous coat and roof aggregate is applied.

3. Set flanges in heavy trowel coat of roof cement and nail through flanges into wood nailers over bituminous roofing.
4. Secure flange by nailing through roofing into wood blocking with nails spaced 3 inch on centers or, when flange over 4 inch wide terminate in a 1/2 inch folded edge anchored with cleats spaced 8 inch on center. Secure one end of cleat over nail heads. Lock other end into the seam.

B. For long runs of base flashings install in lengths of not less than 8 feet nor more than ten feet. Install a 3 inch wide slip type, loose lock expansion joint filled with sealant in joints of base flashing sections over 8 feet in length. Lock and solder corner joints at corners.

C. Extend base flashing up under counter flashing of roof specialties and accessories or equipment not less than 3 inch.

3.4 HANGING GUTTERS

A. Hang gutters with high points equidistant from downspouts. Slope at not less than 1/16 inch per foot.

B. Lap joints, except for expansion joints, at least one inch in the direction of flow. Rivet and seal or solder lapped joints.

C. Support gutters in brackets spaced not more than 24 inch on centers, brackets attached to facial or wood nailer by at least two screws or nails.
1. For stainless steel gutters use stainless steel brackets.
2. For aluminum gutters use aluminum brackets or stainless steel brackets.
3. Use brass or stainless steel screws.

D. Secure brackets to gutters in such a manner as to allow free movement of gutter due to expansion and contraction.

E. Gutter Expansion Joint:
1. Locate expansion joints midway between outlet tubes.
2. Provide at least a one inch expansion joint space between end baffles of gutters.
3. Install a cover plate over the space at expansion joint.
4. Fasten cover plates to gutter section on one side of expansion joint only.
5. Secure loose end of cover plate to gutter section on other side of expansion joint by a loose-locked slip joint.

3.5 CONDUCTORS (DOWNSPOUTS)

A. Where scuppers discharge into downspouts install conductor head to receive discharge with back edge up behind drip edge of scupper. Fasten and seal joint. Sleeve conductors to gutter outlet tubes and fasten joint and joints between sections.

B. Set conductors plumb and clear of wall, and anchor to wall with two anchor straps, located near top and bottom of each section of conductor. Strap at top shall be fixed to downspout, intermediate straps and strap at bottom shall be slotted to allow not less than 1/2 inch movement for each 10 feet of downspout.

C. Install elbows, offsets and shoes where shown and required. Slope not less than 45 degrees.

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SECTION 07 84 00
FIRESTOPPING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Provide UL or equivalent approved firestopping system for the closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction.

1.2 RELATED WORK:

A. Sealants and application: Section 07 92 00, JOINT SEALANTS.

1.3 DELIVERY AND STORAGE:

A. Deliver materials in their original unopened containers with manufacturer's name and product identification.

B. Store in a location providing protection from damage and exposure to the elements.

1.4 QUALITY ASSURANCE:

A. FM, UL, or WH or other approved laboratory tested products will be acceptable.

B. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991 or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. ASTM International (ASTM):

E84-14.....Surface Burning Characteristics of Building Materials

E699-09.....Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components

E814-13a.....Fire Tests of Through-Penetration Fire Stops

E2174-14.....Standard Practice for On-Site Inspection of Installed Firestops

E2393-10a.....Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers

C. FM Global (FM):

Annual Issue Approval Guide Building Materials

4991-13.....Approval of Firestop Contractors

D. Underwriters Laboratories, Inc. (UL):

Annual Issue Building Materials Directory

Annual Issue Fire Resistance Directory

723-10(2008).....Standard for Test for Surface Burning Characteristics of Building Materials

1479-04(R2014).....Fire Tests of Through-Penetration Firestops

E. Intertek Testing Services - Warnock Hersey (ITS-WH):

Annual Issue Certification Listings

F. Environmental Protection Agency (EPA):

40 CFR 59(2014).....National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 FIRESTOP SYSTEMS:

A. Provide either factory built (Firestop Devices) or field erected (through-Penetration Firestop Systems) to form a specific building system maintaining required integrity of the fire barrier and stop the passage of gases or smoke. Firestop systems to accommodate building movements without impairing their integrity.

B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 4 in. nominal pipe or 16 sq. in. in overall cross sectional area.

C. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials to have following properties:

1. Classified for use with the particular type of penetrating material used.
2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping systems that allow unrestricted cable changes without damage to the seal.

D. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.

E. Materials to be nontoxic and noncarcinogen at all stages of application or during fire conditions and to not contain hazardous chemicals. Provide firestop material that is free from Ethylene Glycol, PCB, MEK, and asbestos.

F. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 in. or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means acceptable to the firestop manufacturer.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

PART 3 - EXECUTION

3.1 PREPARATION:

A. Remove dirt, grease, oil, laitance and form-release agents from concrete, loose materials, or other substances that prevent adherence and bonding or application of the firestopping or smoke stopping materials.

B. Remove insulation on insulated pipe for a distance of 6 inches on each side of the fire rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.

C. Prime substrates where required by joint firestopping system manufacturer using that manufacturer’s recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

D. Masking Tape: Apply masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

3.2 INSTALLATION:

A. Do not begin firestopping work until the specified material data and installation instructions of the proposed firestopping systems have been submitted and approved.

B. Install firestopping systems with smoke stopping in accordance with FM, UL, WH, or other approved system details and installation instructions.

C. Install smoke stopping seals in smoke partitions.

3.3 CLEAN-UP:

A. As work on each floor is completed, remove materials, litter, and debris.

B. Clean up spills of liquid type materials.

C. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

D. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to provide firestopping complying with specified requirements.

3.4 INSPECTIONS AND ACCEPTANCE OF WORK:

A. Do not conceal or enclose firestop assemblies until inspection is complete and approved by the Contracting Officer Representative (COR).

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SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section covers interior and exterior sealant and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK (INCLUDING BUT NOT LIMITED TO THE FOLLOWING):

A. Firestopping Penetrations: Section 07 84 00, FIRESTOPPING.

B. Mechanical Work:

Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING

1.3 PROJECT CONDITIONS:

A. Environmental Limitations:

1. Do not proceed with installation of joint sealants under following conditions:

a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 degrees F.

b. When joint substrates are wet.

B. Joint-Width Conditions:

1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions:

1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.4 DELIVERY, HANDLING, AND STORAGE:

A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.

B. Carefully handle and store to prevent inclusion of foreign materials.

C. Do not subject to sustained temperatures exceeding 90 degrees F or less than 40 degrees F.

1.5 DEFINITIONS:

A. Definitions of terms in accordance with ASTM C717 and as specified.

B. Backing Rod: A type of sealant backing.

C. Bond Breakers: A type of sealant backing.

D. Filler: A sealant backing used behind a back-up rod.

1.6 WARRANTY:

A. Construction Warranty: Comply with FAR clause 52.246-21 "Warranty of Construction".

B. Manufacturer Warranty: Manufacturer shall warranty their sealant for a minimum of five (5) years from the date of installation.

1.7 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. ASTM International (ASTM):

C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material

C612-14.....Mineral Fiber Block and Board Thermal Insulation

C717-14a.....Standard Terminology of Building Seals and Sealants

C734-06(R2012).....Test Method for Low-Temperature Flexibility of Latex Sealants after Artificial Weathering

C794-10.....Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants

C919-12.....Use of Sealants in Acoustical Applications.

C920-14a.....Elastomeric Joint Sealants.

C1021-08(R2014).....Laboratories Engaged in Testing of Building Sealants

C1193-13.....Standard Guide for Use of Joint Sealants.

C1248-08(R2012).....Test Method for Staining of Porous Substrate by Joint Sealants

C1330-02(R2013).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants

C1521-13.....Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints

D412-06a(R2013).....Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension

D1056-14.....Specification for Flexible Cellular Materials—Sponge or Expanded Rubber

E84-09.....Surface Burning Characteristics of Building Materials

C. Sealant, Waterproofing and Restoration Institute (SWRI).
The Professionals' Guide

D. Environmental Protection Agency (EPA):
40 CFR 59(2014).....National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 SEALANTS:

A. Exterior Sealants:
1. Vertical surfaces, provide non-staining ASTM C920, Type S or M, Grade NS, Class 25
2. Horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T.
3. Provide location(s) of exterior sealant as follows:
a. Joints formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Provide sealant at exterior surfaces of exterior wall penetrations.
b. Metal to metal.
c. Masonry to masonry or stone.
d. Masonry expansion and control joints.
e. Voids where items penetrate exterior walls.
f. Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.

B. Floor Joint Sealant:
1. ASTM C920, Type S or M, Grade P, Class 25,
2. Provide location(s) of floor joint sealant as follows.
a. Seats of metal thresholds exterior doors.
b. Control and expansion joints in slabs.

C. Interior Sealants:
1. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system are to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):
a. Architectural Sealants: 250 g/L.
b. Sealant Primers for Nonporous Substrates: 250 g/L.
c. Sealant Primers for Porous Substrates: 775 g/L.

2. Vertical and Horizontal Surfaces: ASTM C920, Type S or M, Grade NS, Class 25, .
3. Provide location(s) of interior sealant as follows:
   a. Typical narrow joint 1/4 inch or less at walls and adjacent components.
   b. Interior surfaces of exterior wall penetrations.
   c. Joints at masonry walls and columns, piers, concrete walls or exterior walls.

2.2 COLOR:

A. Sealants used with unpainted concrete are to match color of adjacent concrete.

B. Color of sealants for other locations to be light gray or aluminum, unless otherwise indicated in construction documents.

2.3 JOINT SEALANT BACKING:

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
   1. Type C: Closed-cell material with a surface skin.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056 or synthetic rubber (ASTM C509), nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 degrees F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 FILLER:

A. Mineral fiberboard: ASTM C612, Class 1.

B. Thickness same as joint width.

C. Depth to fill void completely behind back-up rod.

2.5 PRIMER:

A. As recommended by manufacturer of caulking or sealant material.

B. Stain free type.

2.6 CLEANERS-NON POROUS SURFACES:

A. Chemical cleaners compatible with sealant and acceptable to manufacturer of sealants and sealant backing material. Cleaners to be free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.

B. Coordinate for repair and resolution of unsound substrate materials.

C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

A. Prepare joints in accordance with manufacturer's instructions and SWRI (The Professionals' Guide).

B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.

1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include but are not limited to the following:
   a. Concrete.
   b. Masonry.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous surfaces include but are not limited to the following:
   a. Metal.

b. Glass.

c. Porcelain enamel.

d. Glazed surfaces of ceramic tile.

C. Do not cut or damage joint edges.

D. Apply non-staining masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions or as indicated by pre-construction joint sealant substrate test.

1. Apply primer prior to installation of back-up rod or bond breaker tape.
2. Use brush or other approved means that will reach all parts of joints. Avoid application to or spillage onto adjacent substrate surfaces.

3.3 BACKING INSTALLATION:

A. Install backing material, to form joints enclosed on three sides as required for specified depth of sealant.

B. Where deep joints occur, install filler to fill space behind the backing rod and position the rod at proper depth.

C. Cut fillers installed by others to proper depth for installation of backing rod and sealants.

D. Install backing rod, without puncturing the material, to a uniform depth, within plus or minus 1/8 inch for sealant depths specified.

E. Where space for backing rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

3.4 SEALANT DEPTHS AND GEOMETRY:

A. At widths up to 1/4 inch, sealant depth equal to width.

B. At widths over 1/4 inch, sealant depth 1/2 of width up to 1/2 inch maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

3.5 INSTALLATION:

A. General:

1. Apply sealants and caulking only when ambient temperature is between

40 degrees and 100 degrees F.

2. Do not install polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
3. Do not install sealant type listed by manufacture as not suitable for use in locations specified.
4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
5. Avoid dropping or smearing compound on adjacent surfaces.
6. Fill joints solidly with compound and finish compound smooth.
7. Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C1193 unless shown or specified otherwise in construction documents. Remove masking tape immediately after tooling of sealant and before sealant face starts to "skin" over. Remove any excess sealant from adjacent surfaces of joint, leaving the working in a clean finished condition.
8. Finish paving or floor joints flush unless joint is otherwise detailed.
9. Apply compounds with nozzle size to fit joint width.
10. Test sealants for compatibility with each other and substrate. Use only compatible sealant. Submit test reports.
11. Replace sealant which is damaged during construction process.

B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise. Take all necessary steps to prevent three-sided adhesion of sealants.

3.6 CLEANING:

A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by manufacturer of the adjacent material or if not otherwise indicated by the caulking or sealant manufacturer.

B. Leave adjacent surfaces in a clean and unstained condition.

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SECTION 08 36 13
SECTIONAL DOORS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies manually operated sectional overhead steel doors.

1.2 RELATED WORK:

A. Lock Cylinders for Cylindrical Locks: Section 08 71 00, DOOR HARDWARE.

B. Factory Primed and Finished Doors: Finished Color by Owner.

C. Electrical Installation:

1. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.3 MANUFACTURER'S AND INSTALLER'S QUALIFICATIONS:

A. Manufacturer's with three (3) years' experience in providing items of type specified.

B. Installers who are trained and approved by manufacturer for installation of units required.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Details of construction, accessories, hardware and location.

C. Manufacturer's Literature and Data:

1. Brochures or catalog cuts.
2. Manufacturer's installation procedures and instructions.
3. Maintenance instructions, parts list.

D. Manufacturer warranty.

1.5 QUALITY ASSURANCE:

A. Source: Obtain sectional doors from single source from single manufacturer.

1.6 WARRANTY:

A. Construction Warranty: Comply with FAR clause 52.246-21 "Warranty of Construction".

B. Manufacturer Warranty: Manufacturer shall warranty their sectional doors for a minimum of two (2) years from the date of installation and final acceptance by the Town of Riverhead. Submit manufacturer warranty.

1.7 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American Architectural Manufacturers Association (AAMA):

2603-13.....Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels

C. American Society of Civil Engineers (ASCE):

7-10.....Wind Load Provisions

D. ASTM International (ASTM):

A36/A36M-14.....Structural Steel

A227/A227M-06(R2011)....Steel Wire, Cold-Drawn for Mechanical Springs

A229/229M-12.....Steel Wire, Oil-Tempered for Mechanical Springs

A653/A653M-12(R2013)....Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy Coated (Galvanized) by the Hot Dip Process

C1363-11.....Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

E84-14.....Surface Burning Characteristics of Building Materials

E283-04(R2012).....Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Difference Across the Specimen

E331-00(R2009).....Water Penetration of Exterior Windows, Curtain Walls, and Doors by the Uniform Static Air Pressure Difference.

E. American National Standards Institute and Door and Access Systems Manufacturers Association (ANSI/DASMA):

102-11.....Sectional Overhead Type Doors.

F. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06.....Metal Finishes Manual

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Steel: ASTM A653/A653M for forming operations. ASTM A36/A36M for structural sections.

B. Hard Drawn Spring wire: ASTM A227/A227M.

C. Oil Tempered Spring wire: ASTM A229/A229M.

D. Weather-strips, Gaskets, and Thermal Breaks:

1. Neoprene, EPDM, PVC, silicone rubber, or other low conductance material.
2. Standard with door manufacturer.

2.2 DESIGN REQUIREMENTS:

A. Wind Load: Design to withstand uniform pressure (velocity pressure) of 20 lbs. per sq. ft. acting inward and outward when tested in accordance with ASTM E330/E330M. Doors are to remain operable under design wind load.

B. Thermal Performance for Insulated Doors: Maximum U value of 0.14 for door when tested in accordance with ASTM C1363.

C. Air Infiltration for Exterior Doors: Maximum of 0.10 cfm at 24 Km (15 miles per hour) wind speed per foot of crack between door sections and door perimeter opening when tested in accordance with ASTM E283.

D. Water Infiltration for Exterior Doors: No infiltration when tested in accordance with ASTM E331.

E. Comply with ANSI/DASMA 102. Provide metal doors with horizontal sections hinged together to operate in a system of tracks to completely close the door opening in the closed position and make the full width and height of the door opening available for use in the open position.

2.3 FABRICATION:

A. Steel Door Sections:

1. Formed of hot-dipped galvanized steel.
2. Meeting rails: Interlocking joints with thermal breaks separating face sheets formed to provide weathertight closure and alignment for full width of door.
3. Height of Each Section: Not to exceed 24 inches.
4. Reinforced for hardware anchorage with not less than 10 gage galvanized steel.

B. Tracks:

1. Manufacturer's standard, formed of galvanized steel.
2. Track Configuration: Standard-lift track.
3. Minimum of 14 gage for 2 inch tracks and 12 gauge 3 inch tracks.
4. Vertical tracks fabricated with adjustable brackets for mounting at incline to continuous steel angle wall bracket.

5. Horizontal Track: Reinforce with continuous steel angle anchored to vertical steel angle wall bracket and to ceiling angle supports. Provide vertical and cross or diagonal braces to obtain rigid installation of horizontal track.
6. Provide not less than 13 gage galvanized steel angles.

C. Hardware:
1. Manufacturers standard hinges, brackets, rollers, locking devices and other hardware required for a complete installation.
2. Hinges and Roller Brackets: Minimum of 13 gage galvanized steel.
3. Provide rollers with ball bearings and case hardened races.
4. Provide positive locking device to receive cylinder lock, specified in Section 08 71 00, DOOR HARDWARE, with interlocking switch to motor actuator.
5. Weatherseals: Manufacturer's standard fitted around entire perimeter of door. Provide combination bottom weatherseal and sensor edge.

D. Manual Operation:
1. Chain Hoist Operation: Provide galvanized, endless chain operating over a sprocket.
a. Extend chain to within 4 feet of the floor and mount on inside of building.
b. Obtain reduction by use of roller chain and sprocket drive or gearing.
c. Provide chain cleat and pin for securing actuator chain.
d. Allow for installation of power actuators to chain hoist operator when indicated in construction documents.
e. Do not exceed the maximum lifting force of 25 pound force required to operate the door.

2.5 FINISHES:

A. Steel:
1. Comply with NAAMM's AMP 500-06 Metal Finishes Manual for recommendations for applying and designating finishes.
2. Clean surfaces free of scale, rust, oil and grease.
3. Baked-Enamel or Powder-Coat Finish: AAMA 2603.
4. Apply shop prime coat of corrosion inhibitive paint on exposed surfaces after fabrication that is compatible with field applied finishes, manufacturer to apply finished paint (2 coats), color per owner.
5. Do not paint track, rollers, hinges, or locks.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install in accordance with approved shop drawings and manufacturer's instructions.

B. Locate anchors and inserts for tracks, brackets, hardware, and other accessories for working doors in locations provided in design drawings.

C. Attach tracks to adjoining construction with not less than 3/8 inch diameter bolts, spaced near each end and not over 24 inches apart.

D. Lubricate, adjust and demonstrate door to operate freely.

E. Upon completion, leave door openings weathertight and doors free from warp, twists, or distortion.

3.2 REPAIR:

A. Repair zinc-coated surfaces both bare and painted, by the application of galvanizing repair compound.

B. Spot prime and apply finish paint to repairs.

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SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Door hardware and related items necessary for complete installation and operation of doors.

1.2 RELATED WORK

A. Caulking: Section 07 92 00 JOINT SEALANTS.

1.3 GENERAL

A. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.

B. Provide rated door hardware assemblies where required by most current version of the International Building Code (IBC).

PART 2 - PRODUCTS

2.1 BUTT HINGES

A. ANSI A156.1. Provide only three-knuckle hinges, except five-knuckle where the required hinge type is not available in a three-knuckle version (e.g., some types of swing-clear hinges). The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:

1. Exterior Doors: Type A2112/A5112 for doors 3 feet wide or less and Type A2111/A5111 for doors over 3 feet wide. Hinges for exterior outswing doors shall have non-removable pins. Hinges for exterior fire-rated doors shall be of stainless steel material.

B. Provide quantity and size of hinges per door leaf as follows:

1. Doors 4 feet 7 feet 5 inches high: 3 hinges minimum.
2. Doors up to 3 feet wide, standard weight: 4-1/2 inches x 4-1/2 inches hinges.

C. See Articles "MISCELLANEOUS HARDWARE" and "HARDWARE SETS" for pivots and hinges other than butts specified above and continuous hinges specified below.

2.2 LOCKS AND LATCHES

A. Conform to ANSI A156.2. Locks and latches for doors 1-3/4 inch thick or over shall have beveled fronts. Lock cylinders shall have not less than six pins. Cylinders shall be furnished with construction removable cores and construction master keys. Provide temporary keying device or

construction core to allow opening and closing during construction and prior to the installation of final cores.

2.3 KEYS

A. Stamp all keys with change number and key set symbol. Furnish keys in quantities as follows:

Locks/Keys	Quantity
Cylinder locks	2 keys each
Overhead Door locks	2 keys each

B. Mandoors shall be keyed alike.

C. Overhead doors shall be keyed alike.

2.4 THRESHOLDS

A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, thresholds shall be installed in a bed of sealant with ¼-20 stainless steel machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.

B. At exterior mandoors, provide threshold with non-slip abrasive finish.

2.5 WEATHERSTRIPS (FOR EXTERIOR DOORS)

A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length (0.000774m^3/s/m).

2.6 FINISHES

A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on all hinges, pivots, thresholds, etc., shall be as specified below under "Miscellaneous Finishes”

B. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.

C. Miscellaneous Finishes:

1. Hinges exterior doors: 626 or 630.
2. Thresholds: Mill finish aluminum.

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

A. For new buildings locate hardware on doors at heights specified below, with all hand-operated hardware centered within 34 inches to 48 inches, unless otherwise noted:

B. Hardware Heights from Finished Floor:

1. Exit devices centerline of strike 40-5/16 inches.

2. Locksets and latch sets centerline of strike 40-5/16 inches.

3.2 INSTALLATION

A. Hinge Size Requirements:

Door Thickness	**Door Width**	**Hinge Height**
1-3/4 inch	3 feet and less	4-1/2 inches

B. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim and surrounding conditions.

C. Hinges Required Per Door:

Doors over 5 ft high and not over 7 ft 6 in high	3 butts

D. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.

E. After locks have been installed; show in presence of Town Highway Yard Manager that keys operate their respective locks in accordance with keying requirements.

3.3 HARDWARE SETS

A. Following sets of hardware correspond to hardware symbols shown on drawings. Only those hardware sets that are shown on drawings will be required. Disregard hardware sets listed in specifications but not shown on drawings.

B. Hardware Consultant working on a project will be responsible for providing additional information regarding these hardware sets. The numbers shown in the following sets come from BHMA standards.

PROPOSED EXTERIOR SINGLE MAN DOOR (36″w x 7′-0″h, qty – 2):

HW-E1

Each Man Door to Have:		NON-RATED
3 Butt Hinges		
1 Entry Lock	F11	
1 Latch Protector (outswing door)		
1 Threshold (outswing door)	J32120 x SILICONE GASKET	
1 Set Frame Seals	R0Y164	

PROPOSED EXTERIOR OVERHEAD DOOR (14′-0″w x 14′-0″h, qty – 8):

HW-E5

Each Overhead Door to Have:		NON-RATED
2 Cylinders	Type as Required	

Balance of Hardware by Section 08 36 13, Sectional Doors

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SECTION 08 90 00
LOUVERS AND VENTS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies fixed and operable wall louvers and wall vents.

1.2 RELATED WORK:

A. Color of finish: Per Town Highway Superintendent

1.3 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. The Master Painters Institute (MPI):
Approved Product List – Updated Monthly

C. ASTM International (ASTM):

A240/A240M-14.....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

A653/A653M-13.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process

A1008/A1008M-13.....Steel, Sheet, Carbon, Cold Rolled, Structural, and High Strength Low-Alloy with Improved Formability

B209-14.....Aluminum and Aluminum Alloy, Sheet and Plate

B209M-14.....Aluminum and Aluminum Alloy, Sheet and Plate (Metric)

B221-14.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B221M-13.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)

D1187/D1187M-97(R2011)..Asphalt-Base Emulsions for Use as Protective Coatings for Metal

D. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06.....Metal Finishes Manual

E. National Fire Protection Association (NFPA):

90A-15.....Installation of Air Conditioning and Ventilating Systems

F. American Architectural Manufacturers Association (AAMA):
2605-13.....High Performance Organic Coatings on Architectural Extrusions and Panels

G. Air Movement and Control Association, Inc. (AMCA):
500-L-07.....Testing Louvers

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Aluminum, Extruded: ASTM B221M (B221)

B. Galvanized Steel Sheet: ASTM A653/A653M; G90 min.

C. Fasteners: Fasteners for securing louvers and wall vents to adjoining construction, except as otherwise specified or indicated in construction documents, to be toggle or expansion bolts of size and type as required for each specific type of installation and service condition.

1. Fasteners for louvers, louver frames, and wire guards to be of stainless steel or aluminum with same finish as louvers.

2.2 EXTERIOR WALL LOUVERS:

A. General:

1. Building Manufacturer to provide louvers of size and design per NYSBC, HVAC equipment requirements.
2. Heads, sills and jamb sections are to have formed caulking slots or be designed to retain caulking. Head sections are to have exterior drip lip, and sill sections an integral water stop.
3. Furnish louvers with sill extension or separate sill as shown.
4. Frame shall be mechanically fastened or welded construction with welds dressed smooth and flush.

B. Performance Characteristics:

1. Louvers are to bear AMCA certified rating seals for air performance and water penetration ratings.

C. Aluminum Louvers:

1. General: Frames, blades, sills and mullions (sliding interlocking type); 0.078-inch thick extruded 6063-T5 or –T52 aluminum. Blades to be standard drainable type and have reinforcing bosses.
2. Louvers, fixed: Make frame sizes 1/2-inch smaller than openings. Single louvers frames are not to exceed 66 inches wide. When openings exceed 66 inches, provide twin louvers separated by mullion members.

3. Louvers are to withstand the effects or gravity loads and the following wind loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors.
   a. Wind load acting inward or outward of not less than 30 lb. per sq. ft.
4. Louvers, operable: Louver frame opening sizes, single louver sizes and mullion requirements are to be as specified for fixed louvers.
   a. Blades: Attach blades to frame with aluminum pivot pins through nylon bearings. Fasten each blade to stainless steel operation arms that are connected to minimum 1/8-inch thick stainless steel operating bar handle arranged for simultaneous operation of blades.
   b. Spring/chain operation: Exposed operator activated by spring attached to operating bar handle and mounted on frame. Control of louver to be by pull chain of required length to be operable from floor. Provide pulleys and brackets as required.
   c. Motor operation: Motor operated by approved electric motor. Motors are to be removable and located at jambs of louver. Connect motor operator lever arm to operating bar by means of stainless steel connecting rod.

D. Stainless Steel Louvers: Form stainless steel louvers using 0.063-inch thick sheet for frames, blades, sills and mullions.
   1. Provide louver with fixed 45 degree standard drainable blades with water baffle. Make overall frame size 1/2-inch less than opening, unless otherwise indicated in construction documents.
   2. Single louver sections are not to exceed 66 inches in width. For openings larger than 66 inches wide, provide multiple sections not larger than 66 inches wide separated by mullions.

E. Formed Steel Louvers: Form galvanized louvers using 0.059-inch thick sheet for frames, blades, sills and mullions.
   1. Provide louver with fixed 45 degree standard drainable blades with water baffle. Make overall frame size 1/2-inch) less than opening, unless otherwise indicated in construction documents.
   2. Single louver sections are not to exceed 66 inches in width. For openings larger than 66 inches wide, provide multiple sections not larger than 66 inches side separated by mullions.

2.3 CLOSURE ANGLES AND CLOSURE PLATES:

A. Fabricate from 0.078-inch thick stainless steel or aluminum.

B. Provide continuous closure angles and closure plates on inside head, jambs and sill of exterior wall louvers.

C. Secure angles and plates to louver frames with screws, and to masonry or concrete with fasteners as indicated in construction documents.

2.4 WIRE GUARDS:

A. Provide wire guards on outside of all exterior louvers, except on exhaust air louvers.

B. Fabricate frames from 0.078-inch thick extruded or sheet aluminum 0.059-inch thick stainless steel designed to retain wire mesh.

C. Wire mesh to be woven from not less than 0.063-inch diameter aluminum wire 0.05-inch diameter stainless steel wire 1/2-inch square mesh.

D. Miter corners and join by concealed corner clips or locks extending not less than 2-1/4 inches into rails and stiles. Equip wire guards over 4 feet in height with a mid-rail constructed as specified for frame components.

E. Fasten frames to outside of louvers with aluminum or stainless steel devices of same finish as louvers designed to allow removal and replacement without damage to the wire guard or the louver.

2.5 BLANK-OFF PANELS:

A. Uninsulated panels attached with clips or screws as follows: Panel finish is to be same finish applied to louvers same finish type applied to louvers but black color.

1. Aluminum sheet for aluminum louvers, 0.050 inch minimum thickness.
2. Galvanized-steel sheet for galvanized-steel louvers, 0.040 inch minimum.
3. Stainless-steel sheet for stainless-steel louvers, not less than 0.038 inch minimum.

B. Insulated laminated panels consisting of an insulating core surfaced on back and front with metal sheets and attached to back of louver with clips on screws and gasketed or sealant sealed perimeter. Panel finish is to be same finish applied to louvers same type of finish applied to louvers but black color.

1. Thickness: 2 inches.
2. Aluminum sheet for aluminum louver 0.032 inch minimum.
3. Galvanized-steel sheet for galvanized-steel louver 0.028 inch minimum.

4. Stainless-steel sheet for stainless-steel louvers 0.031 inch minimum.
5. Insulating Core: Rigid, glass-fiber-board insulation extruded-polystyrene foam.

2.6 AIR INTAKE VENTS:

A. Fabricate exterior wall ventilators for fresh air intake from extruded aluminum, ASTM B221M (B221). Form with integral horizontal louvers and frame, with drip extending beyond face of wall and integral water stops. Coordinate with air conditioning units proposed on design drawings for manufacturer's requirements.

B. Provide 0.032-inch thick aluminum sleeves in cavity walls where indicated in construction documents.

2.7 FINISH:

A. In accordance with NAAMM Metal Finishes Manual: AMP 500-505

B. Aluminum Louvers, Air Intake Vents, Wire Guards, Blank Off Panels:
   1. Anodized finish
      a. AA-M1X, Mill finish, as fabricated.

C. Stainless Steel: Mechanical finish No.4 in accordance with NAAMM Metal Finishes Manual.

D. Galvanized Sheet Steel: Two-coat baked-enamel or powder-coat finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness.
   1. Paint interior surfaces of lightproof louvers with two (2) additional finish shop coats of baked-on flat black enamel.

E. Steel: Surfaces of steel work, for which no other finish is specified, are to be cleaned free from scale, rust, oil and grease, and then given a light colored prime paint after fabrication, except ferrous metals concealed in finished work. Paint all contact surfaces of assembled work (except welded contact surfaces) with an additional shop coat of similar paint.

2.8 PROTECTION:

A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with a heavy coat of bituminous coating (complete coverage), or by separating the contact surfaces with a performed synthetic rubber tape having pressure sensitive adhesive coating on one side.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Set work accurately, in alignment and where indicated in construction documents. Install plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

B. Furnish setting drawings and instructions for installation of anchors and for the positioning of items having anchors to be built into masonry construction. Provide temporary bracing for such items until masonry is set.

C. Provide anchoring devices and fasteners as shown and as necessary for securing louvers and vents to building construction.

3.2 CLEANING AND ADJUSTING:

A. After installation, all exposed prefinished and plated items and all items fabricated from stainless steel and aluminum are to be cleaned as recommended by the manufacturer and protected from damage until completion of the project.

B. All movable parts, including hardware, are to be cleaned and adjusted to operate as designed without binding or deformation of the members, so as to be centered in the opening of frame, and where applicable, to have all contact surfaces fit tight and even without forcing or warping the components.

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SECTION 13 34 19
METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

This section covers materials, labor and equipment required to complete the pre-engineered metal building shown and specified.

1.2 RELATED WORK

Concrete foundations: Section 03 30 00, CAST-IN-PLACE CONCRETE.

Builders' Hardware: Section 08 71 00, DOOR HARDWARE.

Insulation: Section 07 21 13, Thermal Insulation

Flashing and Sheet Metal: Section 07 60 00

Sectional Doors: Section 08 36 13

Color of panels, and other components: Per Town and design drawings.

1.3 MANUFACTURERS QUALIFICATIONS

A. Approval by Engineer of Record is required of products or service of proposed manufacturer, suppliers and installers, and will be based upon submission by Contractor of certification that:

B. Manufacturer regularly and presently manufactures pre-engineered metal buildings as specified as one of its principal products.

C. Installer has technical qualifications, experience, trained personnel and facilities to install specified items. Approval will not be given, however, where experience record is one of unsatisfactory performance.

D. Manufacturer's product submitted has been in satisfactory and efficient operation on three installations similar and equivalent to this project for three years. Submit list of installations.

1.4 DESIGN CRITERIA

A. Design metal buildings to resist the dead load, the live load, and the combination of these loads as set forth in Metal Building Manufacturers Association (MBMA) "Recommended Design Practices Manual":

1. Roof Live Load: 25 pounds per square foot applied on horizontal projection of roof structure.
2. Wind Load: 130 miles per hour.
3. Seismic loading as required by Uniform Building Code.

B. Deflection Limits (Live and Wind Loads Only):

1. Roof Framing: L/270.
2. Roof Panels: L/180.
3. Walls Panels: L/180., where L = Span length.

C. Metal Building components shall be capable of supporting design loads without permanent deformation, loss of water tightness, or disengagement of any part of installation.

D. Mimimum "R" Value: Total "R" value through wall panel, roof panels, and insulation shall not be less than 19 and shall take infiltration and stud effect at joints into account.

E. Structural steel sections shall be designed in accordance with AISC, "Specification for Structural Steel Buildings". Light gage cold formed structural members shall be designed in accordance with latest edition of AISI, "Specifications for the Design of Light Gage Cold Formed Steel Structural Members". Welding shall comply with AWS Standard No. D1.1.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:

B. Certificates:

1. Stating that the zinc coating on steel panels is the specified thickness.
2. Stating that the thermal values of the roof and wall panels with insulation meet the specified requirements.
3. Indicating manufacturers and installers meet qualifications specified.
4. Certificate test reports confirming compliance’s with specified bullet resistive rating.

C. Manufacturer's Literature and Data:

Metal Panels

Insulation

Sealing materials

Steel doors, door frames and hardware interlocking thresholds

D. Shop Drawings: Shop drawings, erection drawings and erection manuals showing complete erection layouts, installation instructions, and details of connections. Details and layouts shall show the steel framing location, lengths, and markings of panels and other component parts to correspond with sequence and procedure for erection. Shop drawings shall show connections with adjoining work (plate/anchor bolt configuration for connection @ foundation).

E. Structural Design Analysis:

1. Furnish complete structural design analysis for all structural components of the prefabricated metal buildings.

2. Provide manufacturer load tables indicating the selected panel material, configuration and thickness meets the design requirements for the spans shown.

1.6 STORAGE AND PROTECTION

Materials stored on site before erection shall be stacked and covered with suitable weather tight covering. Store metal panels so that any accumulated water will drain off. Panels shall not be stored in contact with materials that cause staining. Materials having defects or damages that effect appearance, serviceability or use will be rejected.

1.7 WARRANTY

Prefabricated metal building shall be warranty against defects in materials and workmanship, and that after erection completed work shall be weather tight and shall be subject to the terms of the "Warranty of Construction" Article in FAR clause 52.246-21, except that the warranty period shall be two years.

1.8 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

A36/A36M-08.....Carbon Structural Steel.

A48 . . . . . Hillside Washer, Class 30 A, gray iron castings.

A242/A242M-04(R2009)....High-Strength Low-Alloy Structural Steel.

A307 . . . . . Carbon Steel Bolts, Studs, Threaded Rod 60,000 PSI Tensile Strength

A325. . . . . Type 1, heavy hex bolt w heavy hex nut, AST A563 Grade C

A436 . . . . . Austenitic Gray Iron Castings

A475 . . . . . Zinc-coated Wire Strand

A500B . . . . . Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes

A529 . . . . . High-Strength Carbon-Manganese Steel of Structural Quality

A563 . . . . . Carbon and Alloy Steel Nuts

A653/A653M-10.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron-alloy-Coated (Galvannealed) by the Hot-Dip Process

A475 . . . . . EHS(extra high strength) 7 wire Class A galv. Steel strand

A792 . . . . . Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by Hot-Dip Process

A992 . . . . . Stuctural Steel Shapes

A1008/A1008M-12.....Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy

A1011/A1011M-12.....Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy

B117-11.....Standard Practice for Operating Salt Spray (Fog)

B209/209M-10.....Aluminum and Aluminum-Alloy Sheet and Plate

C553-10.....Specifications for Mineral Fiber Blanket Thermal Insulation for Commercial and Insulation for Commercial and Industrial Applications

C1036-11.....Flat glass

C1104-00 (R2006).....Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation

D522-93(R2008).....Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings

D2244-11.....Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

D2794-93(R2010).....Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation

D3359-09.....Standard Test Methods for Measuring Adhesion by Tape Test

D4214-07.....Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films

F4236 . . . . . Washer, Type 1

G153-04(R2010).....Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

C. Metal Building Manufacturers Association (MBMA):

1. Recommended Guide Specifications for Pre-Engineered Metal Buildings.

2. Recommended Design Practices Manual.

D. American Institute of Steel Construction (AISC):

360-10.....Specifications for Structural Steel Buildings; Allowable Stress Design and Plastic Design (1989).

E. National Fire Protection Association (NFPA):

220-12.....Standard Types of Building Construction.

F. American Welding Society (AWS):

D1.1/D1.1M-10.....Structural Welding Code-Steel.

G. American Iron and Steel Institute (AISI):Cold Formed Steel Design Manual Latest Edition.

H. Society of Automotive Engineers (SAE):

J78 . . . . . Fasteners

Uniform Building Code, Latest Edition.

I. Underwriters Laboratories, Inc. (UL):

752-05(R2011) Bullet-Resisting Equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Framing and Structural Steel Members: ASTM A36 or A242, except uncoated steel for light gage members shall conform to ASTM A1008 or A1011.

B. Panels:

1. Sheet Steel, galvanized light gage steel of specified thickness shall conform to ASTM A653/A653M with G40 zinc coating each face.
2. Aluminum: Sheet aluminum shall conform to ASTM B209, alloy 3004.

C. Joint Sealant: Sealant shall be heat-resisting compound having low shrinkage factor; unaffected by water; with flash-point in excess of 750 degrees F. Sealant shall not migrate oil up to 250 degrees F nor exude oil under pressure. It shall not skin, sag, nor weep in panel joints under vibration up to temperature of 150 degrees F, nor become brittle at temperature down to 30 degree F.

D. Sealing Tape: Manufacturer's standard in color to match metal building panels.

E. Weatherstrips: Door manufacturer's standard approved products; closed cell neoprene or extruded vinyl.

F. Thresholds: Aluminum, interlocking type.

G. Semirigid Insulation: Mineral fiberboard, ASTM C553, Type 2, faced with a vapor barrier having a perm rating of not more than 0.5.

2.2 FABRICATION

A. General: Coordinate fabrication and erection of work with related work of other trades. Provide cutouts and supplemental reinforcement as required to accommodate materials and work specified in other sections of the specifications.

B. Protection of Dissimilar Metals: Dissimilar materials which are not compatible with adjoining materials when exposed to moisture shall be separated by means of coatings, gaskets, or other effective means.

C. Steel Framework Fabrication:

1. Steel framing required for pre-engineered metal building shall be coordinated with building supplier. Columns and related components shall be shop fabricated complete, with connection holes for attachment of primary and secondary framing members and bracing.
2. Framing, purlins, girts, struts and miscellaneous steel members required for attachment of pre-engineered metal building panels to building structure shall be roll formed members complying with either ASTM A1008/A1008M. Design, size, space and install members to meet job and loading conditions. Members shall have factory-punched holes and shall be furnished complete with angle clips and fastenings required for attaching to structure.
3. Bolted connections shall use either ribbed or high-tensile steel bolts as appropriate for each connection.
4. Welding shall be in accordance with AWS Standard. Operators shall be qualified as prescribed by American Welding Society. Certification shall be furnished upon request of the Engineer of Record.

D. Wall Panels: Steel face sheets shall be 29 gauge thick. Design exterior face sheets of panels with grade of steel or aluminum and configuration of cross section capable of withstanding specified design load conditions without exceeding specified stress and deflection limitations, with same support configuration as that in proposed building. Seal joints between panels with joint sealant as specified. Insulation for panels cores shall be mineral insulation of a type standard with panel manufacturer and shall be noncombustible as defined by NFPA No. 220. Fasten panels to adjoining panels and to steel framework by method recommended by panel manufacturer and approved before work is started.

E. Roof Panels: Roofing panels shall be 29 gauge thick. Design roof panels with grade of steel or aluminum and configuration of cross section capable of withstanding design load conditions without exceeding specified stress and deflection limitations, with same support configuration as that in proposed building. Sheets shall be applied with a minimum sidelap of not less than one full configuration. Exposed insulation for installation on inside face of roof panels shall be semirigid insulation.

F. Flashing, Trim And Closures: Same material, gage and finish as adjacent wall and roof panels. Fastenings shall be as specified for wall and roof panels. Form or mold closure strips to match configuration of the roofing or siding. Install closures wherever necessary to insure weather tight construction.

G. Louvers: Fabricate wall louvers of same material, gage and finish as face sheets for wall panels. Design louver assembly to prevent infiltration of water into building. Provide insect screens and wire guards on wall louvers except omit insect screens on louvers connected to exhaust ducts.

H. Doors and Frames: Doors and frames shall be complete with weatherstrips as specified. Doors, frames and related items shall be cut, reinforced, drilled, and tapped at the factory for the specified hardware.
   1. Doors: Fiberglass, 6 panel. Equipment doors with interlocking aluminum thresholds and weatherstrips at heads, jambs and meeting stiles.
   2. Door Frames: Wood, standard frame thickness
   3. Surfaces of doors and frames shall be filled, sanded smooth, cleaned and prepared to receive prime coat of paint.

2.3 FACTORY FINISH AND PAINTING

A. Wall and roof panels, including related components, accessories and fastenings, shall have approved factory finish as follows:
   1. Finish on the weather face of wall and roof panels, and related components shall be a prime coat of epoxy primer with a finish coat of Valspar 40 year (color by Town).
   2. Finish on exposed face of liner panel shall be off white baked enamel suitable as a finished surface or as a base for field painting.

B. Steel framing members shall be given one coat of shop paint.

C. Doors, frames, and other similar components shall be bonderized and given one prime coat of baked-on shop paint, then factory applied finish coat.

D. Louvers shall be factory finished to match adjacent wall panels.

E. Field paint all exterior exposed fastenings to match adjacent panels.

F. Abraded surfaces shall be wire-brushed and touched up with the same materials as the shop prime or finish coat of paint.

G. Finish coat color by Owner.

PART 3 - EXECUTION

3.1 ERECTION

A. Bolt settings and other dimensions shall be held to a tolerance of plus or minus 1/8-inch. Use templates or other gaging devices to assure accurate spacing of anchor bolts. Bolt field connections unless otherwise shown or specified.

1. Set accurately bases or sill members to obtain uniform bearing and maintain established floor line elevation. Anchors and anchor bolts for securing members to concrete curb or structural steel sub-frame shall be of black steel, set accurately to templates and of proper size to adequately resist applicable design loads at the base.

B. Wall Panels: Panels shall be applied with configurations running in a vertical position. Supply panels in single lengths from base to eave with no horizontal joints, except at the junction of door units, louver panels, and similar openings. End laps for panels shall be not less than four inches. Walls shall be closed at base and eave, and around doors, frames, louvers, and other similar openings by flashings and/or formed closures to assure adequate weathertightness. Flashing or stops will not be required where weather-closed or approved self-flashing panels are used.

C. Roof Panels: Roof panels shall be applied with configurations running in direction of roof slope. Supply panels with no transverse joints except at junctions for roof openings and at roof ridge. Lay side laps away from prevailing winds, and seal side laps and end-laps of roof with roof joint sealant. Roof shall be flashed and/or sealed at ridge at eaves, rakes, at projections through roof, and elsewhere as necessary to make roof weather tight. Flashing and/or caulking shall be accomplished in a manner that will assure complete weather-tightness and method to be used shall be subject to approval by the Engineer of

Record. Minimum end-laps for roofing and ridge caps for pre-engineered and factory-punched laps shall be six inches; other minimum end-laps shall be not less than 12 inches.

1. Install insulation on interior face of roof sheets or panels as shown on approved shop drawings. Secure materials permanently in place and free of inordinate deflection. Finished work shall be neat, clean, uniform in appearance, and free of noticeable variations in color and texture.

D. Fasteners for Securing Roof and Wall Panels: Fastening method, size and spacing shall be as recommended by metal building manufacturer and as approved by the Engineer of Record. Fasteners shall be non-corrosive and of design that will produce a weathertight connection. Clearly show fasteners and fastening method on shop and erection drawings. Field paint exterior exposed fastenings to match adjacent panels as specified in paragraph, FACTORY FINISH AND PAINTING.

E. Door Frame Installation: Set frames plumb and align and brace securely until permanent anchors are set. Build in wall anchors or secure to adjoining construction as indicated or specified. Where frames require overhead bracing, securely anchor to structure above.

F. Weatherproofing: Joints between exterior pre-engineered metal building components and other adjacent components and materials, except flashing of metal wall panels shall be designed for and shall receive sealing tapes, gaskets, sealant materials, metal flashing and other methods of sealing as required to provide weathertight joints. Workmanship for installing sealants shall comply with Section 07 92 00, JOINT SEALANTS. Joint sealing shall be installed under this section and shall be guaranteed as specified. Color of sealing materials shall match adjacent metal building components.

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SECTION 22 05 11
COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section shall apply to all sections of Division 22.

B. Definitions:

1. Exposed: Piping and equipment exposed to view in finished rooms.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

C. Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT.

D. Section 03 30 00, CAST-IN-PLACE CONCRETE: Concrete and Grout.

E. Section 07 60 00, FLASHING AND SHEET METAL: Flashing for Wall and Roof Penetrations.

F. Section 07 84 00, FIRESTOPPING.

G. Section 07 92 00, JOINT SEALANTS.

I. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below shall form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Mechanical Engineers (ASME):

ASME Boiler and Pressure Vessel Code -

BPVC Section IX-2013....Welding, Brazing, and Fusing Qualifications

B31.1-2012.....Power Piping

C. American Society for Testing and Materials (ASTM):

A36/A36M-2012.....Standard Specification for Carbon Structural Steel

A575-96(R2013)e1.....Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades

E84-2013a.....Standard Test Method for Surface Burning Characteristics of Building Materials

E119-2012a.....Standard Test Methods for Fire Tests of Building Construction and Materials

D. International Code Council, (ICC):

IBC-2012.....International Building Code

IPC-2012.....International Plumbing Code

E. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc:

SP-58-2009.....Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application and Installation

SP-69-2003.....Pipe Hangers and Supports - Selection and Application

F. Military Specifications (MIL):

P-21035B.....Paint High Zinc Dust Content, Galvanizing Repair (Metric)

G. National Electrical Manufacturers Association (NEMA):

MG 1-2011.....Motors and Generators

H. National Fire Protection Association (NFPA):

51B-2014.....Standard for Fire Prevention During Welding, Cutting and Other Hot Work

54-2012.....National Fuel Gas Code

70-2014.....National Electrical Code (NEC)

I. NSF International (NSF):

5-2012.....Water Heaters, Hot Water Supply Boilers, and Heat Recovery Equipment

14-2012.....Plastic Piping System Components and Related Materials

61-2012.....Drinking Water System Components – Health Effects

372-2011.....Drinking Water System Components – Lead Content

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 11, COMMON WORK RESULTS FOR PLUMBING", with applicable paragraph identification.

C. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements and will fit the space available.

D. If equipment is submitted which differs in arrangement from that shown, provide drawings that show the rearrangement of all associated systems. Approval will be given only if all features of the equipment and associated systems, including accessibility, are equivalent to that required by the contract.

E. Prior to submitting shop drawings for approval, contractor shall certify in writing that manufacturers of all major items of equipment have each reviewed drawings and specifications, and have jointly coordinated and properly integrated their equipment and controls to provide a complete and efficient installation.

F. Installing Contractor shall provide lists of previous installations for selected items of equipment. Contact persons who will serve as references, with telephone numbers and e-mail addresses shall be submitted with the references.

G. Manufacturer's Literature and Data: Manufacturer’s literature shall be submitted under the pertinent section rather than under this section.
   1. Equipment and materials identification.
   2. Firestopping materials.
   3. Hangers, inserts, supports and bracing. Provide load calculations for variable spring and constant support hangers.
   4. Wall, floor, and ceiling plates.

H. Submittals and shop drawings for interdependent items, containing applicable descriptive information, shall be furnished together and complete in a group. Coordinate and properly integrate materials and equipment in each group to provide a completely compatible and efficient installation. Final review and approvals will be made only by groups.

I. Coordination Drawings: Complete consolidated and coordinated layout drawings shall be submitted for all new systems, and for existing systems that are in the same areas. The drawings shall include plan views, elevations and sections of all systems and shall be on a scale of not less than 1:32 (3/8 inch equal to one foot). Clearly identify and dimension the proposed locations of the principal items of equipment. The drawings shall clearly show the proposed location and

adequate clearance for all equipment, controls, piping, pumps, valves and other items. All valves, trap primer valves, water hammer arrestors, strainers, and equipment requiring service shall be provided with an access door sized for the complete removal of plumbing device, component, or equipment. Equipment foundations shall not be installed until equipment or piping layout drawings have been approved. Detailed layout drawings shall be provided for all piping systems. In addition, details of the following shall be provided.

1. Hangers, inserts, supports, and bracing.
2. Pipe sleeves.
3. Equipment penetrations of floors, walls, ceilings, or roofs.

J. Maintenance Data and Operating Instructions:

1. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS, Article, INSTRUCTIONS, for systems and equipment. Include complete list indicating all components of the systems with diagrams of the internal wiring for each item of equipment.
2. Include listing of recommended replacement parts for keeping in stock supply, including sources of supply, for equipment shall be provided. The listing shall include belts for equipment: Belt manufacturer, model number, size and style, and distinguished whether of multiple belt sets.

1.5 QUALITY ASSURANCE

A. Products Criteria:

1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture, supply and servicing of the specified products for at least 5 years.
2. Equipment Service: There shall be permanent service organizations, authorized and trained by manufacturers of the equipment supplied, located within 100 miles of the project. These organizations shall come to the site and provide acceptable service to restore operations within four hours of receipt of notification by phone, e-mail or fax in event of an emergency, such as the shut-down of equipment; or within 24 hours in a non-emergency. Names, mail and e-mail addresses and phone numbers of service organizations providing service under these conditions for (as applicable to the project): pumps, compressors, water heaters, critical instrumentation,

computer workstation and programming shall be submitted for project record and inserted into the operations and maintenance manual.

3. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.
4. The products and execution of work specified in Division 22 shall conform to the referenced codes and standards as required by the specifications. Local codes and amendments enforced by the local code official shall be enforced, if required by local authorities such as the natural gas supplier. If the local codes are more stringent, then the local code shall apply. Any conflicts shall be brought to the attention of the Engineer of Record.
5. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
6. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
7. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
8. Asbestos products or equipment or materials containing asbestos shall not be used.

B. Welding: Before any welding is performed, contractor shall submit a certificate certifying that welders comply with the following requirements:

1. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".
2. Comply with provisions of ASME B31 series "Code for Pressure Piping".
3. Certify that each welder and welding operator has passed American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.
4. All welds shall be stamped according to the provisions of the American Welding Society.

C. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Tradesmen prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

D. Execution (Installation, Construction) Quality:

1. All items shall be applied and installed in accordance with manufacturer's written instructions. Conflicts between the manufacturer's instructions and the contract documents shall be referred to the Engineer of Record for resolution. Printed copies or electronic files of manufacturer’s installation instructions shall be provided to the Engineer of Record at least 10 working days prior to commencing installation of any item.
2. All items that require access, such as for operating, cleaning, servicing, maintenance, and calibration, shall be easily and safely accessible by persons standing at floor level, or standing on permanent platforms, without the use of portable ladders. Examples of these items include, but are not limited to: all types of valves, filters and strainers, transmitters, and control devices. Prior to commencing installation work, refer conflicts between this requirement and contract documents to Engineer of Record for resolution.
3. Complete layout drawings shall be required by Paragraph, SUBMITTALS. Construction work shall not start on any system until the layout drawings have been approved by Engineer of Record.
4. Installer Qualifications: Installer shall be licensed and shall provide evidence of the successful completion of at least five projects of equal or greater size and complexity. Provide tradesmen skilled in the appropriate trade.
5. If an installation is unsatisfactory to the Engineer of Record, the Contractor shall correct the installation at no additional cost or additional time to the Town of Riverhead.

E. Guaranty: Warranty of Construction, FAR clause 52.246-21.

F. Plumbing Systems: IPC, International Plumbing Code. Unless otherwise required herein, perform plumbing work in accordance with the latest

version of the IPC. For IPC codes referenced in the contract documents, advisory provisions shall be considered mandatory, the word "should" shall be interpreted as "shall".

G. Cleanliness of Piping and Equipment Systems:
   1. Care shall be exercised in the storage and handling of equipment and piping material to be incorporated in the work. Debris arising from cutting, threading and welding of piping shall be removed.
   2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
   3. The interior of all tanks shall be cleaned prior to delivery and beneficial use by the Town of Riverhead. All piping shall be tested in accordance with the specifications and the International Plumbing Code (IPC). All filters, strainers, fixture faucets shall be flushed of debris prior to final acceptance.
   4. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

1.6 DELIVERY, STORAGE AND HANDLING

A. Protection of Equipment:
   1. Equipment and material placed on the job site shall remain in the custody of the Contractor until phased acceptance, whether or not the Town of Riverhead has reimbursed the Contractor for the equipment and material. The Contractor is solely responsible for the protection of such equipment and material against any damage.
   2. Damaged equipment shall be replaced with an identical unit as determined and directed by the Engineer of Record. Such replacement shall be at no additional cost or additional time to the Town of Riverhead.
   3. Interiors of new equipment and piping systems shall be protected against entry of foreign matter. Both inside and outside shall be cleaned before painting or placing equipment in operation.
   4. Existing equipment and piping being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected as required for new work.

1.7 AS-BUILT DOCUMENTATION

A. Submit manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.

B. Submit operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be inserted into a three ring binder. All aspects of system operation and maintenance procedures, including piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices such as damper and door closure interlocks shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the Town will be required to employ shall be inserted into the As-Built documentation.

C. The installing contractor shall maintain as-built drawings of each completed phase for verification; and, shall provide the complete set at the time of final systems certification testing. As-built drawings are to be provided, and a copy of them on Auto-Cad version 13 or earlier provided on compact disk or DVD. Should the installing contractor engage the testing company to provide as-built or any portion thereof, it shall not be deemed a conflict of interest or breach of the 'third party testing company' requirement.

D. Certification documentation shall be provided prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and a certification that all results of tests were within limits specified.

PART 2 - PRODUCTS

2.1 MATERIALS FOR VARIOUS SERVICES

A. Non-pressure PVC pipe shall contain a minimum of 25 percent recycled content. Steel pipe shall contain a minimum of 25 percent recycled content.

2.2 FACTORY-ASSEMBLED PRODUCTS

A. Standardization of components shall be maximized to reduce spare part requirements.

B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.

1. All components of an assembled unit need not be products of same manufacturer.
2. Constituent parts that are alike shall be products of a single manufacturer.
3. Components shall be compatible with each other and with the total assembly for intended service.
4. Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly at no additional cost or time to the Town of Riverhead.

C. Components of equipment shall bear manufacturer's name and trademark, model number, serial number and performance data on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.

D. Major items of equipment, which serve the same function, shall be the same make and model.

2.3 COMPATIBILITY OF RELATED EQUIPMENT

A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational system that conforms to contract requirements.

2.4 LIFTING ATTACHMENTS

A. Equipment shall be provided with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered, without bending or distortion of shape, such as rapid lowering and braking of load.

2.5 EQUIPMENT AND MATERIALS IDENTIFICATION

A. Interior (Indoor) Equipment: Engraved nameplates, with letters not less than 3/16 inch high of brass with black-filled letters, or rigid black plastic with white letters shall be permanently fastened to the equipment. Unit components such as water heaters, tanks, coils, filters, etc. shall be identified.

B. Control Items: All temperature, pressure, and controllers shall be labeled and the component’s function identified. Identify and label each item as they appear on the control diagrams.

C. Valve Tags and Lists:

1. Plumbing: All valves shall be provided with valve tags and listed on a valve list (Fixture stops not included).
2. Valve tags: Engraved black filled numbers and letters not less than 1/2 inch high for number designation, and not less than 1/4 inch for service designation on 19 gage, 1-1/2 inches round brass disc, attached with brass "S" hook or brass chain.
3. Valve lists: Valve lists shall be created using a word processing program and printed on plastic coated cards. The plastic coated valve list card(s), sized 8-1/2 inches by 11 inches shall show valve tag number, valve function and area of control for each service or system. The valve list shall be in a punched 3-ring binder notebook. An additional copy of the valve list shall be mounted in picture frames for mounting to a wall. Engineer of Record shall instruct contractor where frames shall be mounted.
4. A detailed plan for each floor of the building indicating the location and valve number for each valve shall be provided in the 3-ring binder notebook. Each valve location shall be identified with a color coded sticker or thumb tack in ceiling or access door.

2.6 FIRESTOPPING

A. Section 07 84 00, FIRESTOPPING specifies an effective barrier against the spread of fire, smoke and gases where penetrations occur for piping.

2.7 PIPE AND EQUIPMENT SUPPORTS AND RESTRAINTS

A. In lieu of the paragraph which follows, suspended equipment support and restraints may be designed and installed in accordance with the International Building Code (IBC) requirements, or the following paragraphs of this Section shall be stamped and signed by a professional engineer registered in the state where the project is located. The Support system of suspended equipment over 500 pounds shall be submitted for approval of the Engineer of Record in all cases. See the above specifications for lateral force design requirements.

B. Type Numbers Specified: For materials, design, manufacture, selection, application, and installation refer to MSS SP-58. For selection and application refer to MSS SP-69. Refer to Section 05 50 00, METAL FABRICATIONS, for miscellaneous metal support materials and prime coat painting.

C. For Attachment to Steel Construction: MSS SP-58.
   1. Welded attachment: Type 22.
   2. Beam clamps: Types 20, 21, 28 or 29. Type 23 C-clamp may be used for individual copper tubing up to 7/8 inch outside diameter.

D. Hanger Rods: Hot-rolled steel, ASTM A36/A36M or ASTM A575 for allowable load listed in MSS SP-58. For piping, provide adjustment means for controlling level or slope. Types 13 or 15 turn-buckles shall provide 1-1/2 inches minimum of adjustment and incorporate locknuts. All-thread rods are acceptable.

E. Multiple (Trapeze) Hangers: Galvanized, cold formed, lipped steel channel horizontal member, not less than 1-5/8 inches by 1-5/8 inches, (No. 12 gage), designed to accept special spring held, hardened steel nuts.
   1. Allowable hanger load: Manufacturers rating less 200 pounds.
   2. Guide individual pipes on the horizontal member of every other trapeze hanger with 1/4 inch U-bolt fabricated from steel rod. Provide Type 40 insulation shield, secured by two 1/2 inch galvanized steel bands, or insulated calcium silicate shield for insulated piping at each hanger.

F. Pipe Hangers and Supports: (MSS SP-58), use hangers sized to encircle insulation on insulated piping.
   1. General Types (MSS SP-58):
      a. Standard clevis hanger: Type 1; provide locknut.
      b. Riser clamps: Type 8.
      c. Wall brackets: Types 31, 32 or 33.
      d. Roller supports: Type 41, 43, 44 and 46.
      e. Saddle support: Type 36, 37 or 38.
      f. Turnbuckle: Types 13 or 15.
      g. U-bolt clamp: Type 24.
      h. Copper Tube:
         1) Hangers, clamps and other support material in contact with tubing shall be painted with copper colored epoxy paint, copper-coated, plastic coated or taped with isolation tape to prevent electrolysis.
         2) For vertical runs use epoxy painted, copper-coated or plastic coated riser clamps.

3) For supporting tube to strut: Provide epoxy painted pipe straps for copper tube or plastic inserted vibration isolation clamps.

4) Insulated Lines: Provide pre-insulated calcium silicate shields sized for copper tube.

i. Spring hangers are required on all plumbing system pumps one horsepower and greater.

2. Plumbing Piping (Other Than General Types):

a. Horizontal piping: Type 1, 5, 7, 9, and 10.

b. Chrome plated piping: Chrome plated supports.

c. Hangers and supports in pipe chase: Prefabricated system ABS self-extinguishing material, not subject to electrolytic action, to hold piping, prevent vibration and compensate for all static and operational conditions.

d. Blocking, stays and bracing: Angle iron or preformed metal channel shapes, 18 gage minimum.

G. Pre-insulated Calcium Silicate Shields:

1. Provide 360 degree water resistant high density 140 psig compressive strength calcium silicate shields encased in galvanized metal.

2. Pre-insulated calcium silicate shields to be installed at the point of support during erection.

3. Shield thickness shall match the pipe insulation.

4. The type of shield is selected by the temperature of the pipe, the load it must carry, and the type of support it will be used with.

a. Shields for supporting cold water shall have insulation that extends a minimum of 1 inch past the sheet metal.

b. The insulated calcium silicate shield shall support the maximum allowable water filled span as indicated in MSS SP-69. To support the load, the shields shall have one or more of the following features: structural inserts 600 psig compressive strength, an extra bottom metal shield, or formed structural steel (ASTM A36/A36M) wear plates welded to the bottom sheet metal jacket.

5. Shields may be used on steel clevis hanger type supports, trapeze hangers, roller supports or flat surfaces.

2.8 PIPE PENETRATIONS

A. Pipe penetration sleeve materials shall comply with all firestopping requirements for each penetration.

B. Penetrations are not allowed through beams or ribs, but may be installed in concrete beam flanges, with structural engineer prior approval.

C. Cast iron or zinc coated pipe sleeves shall be provided for pipe passing through exterior walls below grade. The space between the sleeve and pipe shall be made watertight with a modular or link rubber seal. The link seal shall be applied at both ends of the sleeve.

D. Galvanized steel or an alternate black iron pipe with asphalt coating sleeves shall be for pipe passing through concrete beam flanges, except where brass pipe sleeves are called for

E. Sleeve clearance through floors, walls, partitions, and beam flanges shall be 1 inch greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation plus 1 inch in diameter. Interior openings shall be caulked tight with firestopping material and sealant to prevent the spread of fire, smoke, water and gases.

E. Sealant and Adhesives: Shall be as specified in Section 07 92 00, JOINT SEALANTS. Bio-based materials shall be utilized when possible.

F. Pipe passing through roof shall be installed through a 4.9 kg per square meter copper flashing with an integral skirt or flange. Skirt or flange shall extend not less than 8 inches from the pipe and set in a solid coating of bituminous cement. Extend flashing a minimum of 10 inches up the pipe. Pipe passing through a waterproofing membrane shall be provided with a clamping flange. The annular space between the sleeve and pipe shall be sealed watertight.

2.9 TOOLS AND LUBRICANTS

A. Furnish, and turn over to the Town Yard Superintendent, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.

B. Grease Guns with Attachments for Applicable Fittings: One for each type of grease required for each motor or other equipment.

C. Tool Containers: metal, permanently identified for intended service and mounted, or located, where directed by the Town Yard Superintendent.

D. Lubricants: A minimum of 1 quart of oil, and 1 pound of grease, of equipment manufacturer's recommended grade and type, in unopened containers and properly identified as to use for each different application. Bio-based materials shall be utilized when possible.

PART 3 - EXECUTION

3.1 ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING

A. Location of piping, sleeves, inserts, hangers, and equipment, access provisions shall be coordinated with the work of all trades. Piping, sleeves, inserts, hangers, and equipment shall be located clear of windows, doors, openings, light outlets, and other services and utilities. Equipment layout drawings shall be prepared to coordinate proper location and personnel access of all facilities.

B. Manufacturer's published recommendations shall be followed for installation methods not otherwise specified.

C. Structural systems necessary for pipe and equipment support shall be coordinated to permit proper installation.

D. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.

E. Cutting Holes:

1. Holes shall be located to avoid interference with structural members such as beams or grade beams. Holes shall be laid out in advance and drilling done only after approval by Engineer of Record. If the Contractor considers it necessary to drill through structural members, this matter shall be referred to Engineer of Record for approval.
2. Waterproof membrane shall not be penetrated. Pipe floor penetration block outs shall be provided outside the extents of the waterproof membrane.
3. Holes through concrete and masonry shall be cut by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill will not be allowed, except as permitted by Engineer of Record where working area space is limited.

F. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other services are not shown but must be provided.

G. Protection and Cleaning:

1. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the Engineer of Record. Damaged or defective

items in the opinion of the Engineer of Record, shall be replaced at no additional cost or time to the Town of Riverhead.

2. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Pipe openings, equipment, and plumbing fixtures shall be tightly covered against dirt or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.

H. Interconnection of Controls and Instruments: Electrical interconnection is generally not shown but shall be provided. This includes interconnections of sensors, transmitters, transducers, control devices, control and instrumentation panels, alarms, instruments and computer workstations. Comply with NFPA 70.

I. Many plumbing systems interface with the HVAC control system. Provide for HVAC control system requirements.

3.2 PIPE AND EQUIPMENT SUPPORTS

A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels secured directly to joist and rib structure that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Holes shall be drilled or burned in structural steel ONLY with the prior written approval of the Engineer of Record.

B. The use of chain pipe supports, wire or strap hangers; wood for blocking, stays and bracing, or hangers suspended from piping above shall not be permitted. Rusty products shall be replaced.

C. Hanger rods shall be used that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. A minimum of 1/2 inch clearance between pipe or piping covering and adjacent work shall be provided.

D. For horizontal and vertical plumbing pipe supports, refer to the International Plumbing Code (IPC) and these specifications.

E. Overhead Supports:

1. The basic structural system of the building is designed to sustain the loads imposed by equipment and piping to be supported overhead.

2. Provide steel structural members, in addition to those shown, of adequate capability to support the imposed loads, located in accordance with the final approved layout of equipment and piping.
3. Tubing and capillary systems shall be supported in channel troughs.

3.3 CLEANING

A. Prior to final inspection and acceptance of the plant and facilities for beneficial use by the Town of Riverhead, the plant facilities, equipment and systems shall be thoroughly cleaned.
B. In addition, the following special conditions apply:
   1. Cleaning shall be thorough. Solvents, cleaning materials and methods recommended by the manufacturers shall be used for the specific tasks.
   2. Control and instrument panels shall be cleaned and damaged surfaces repaired. Touch-up painting shall be made with matching paint type and color obtained from manufacturer or computer matched.

3.4 STARTUP AND TEMPORARY OPERATION

A. Startup of equipment shall be performed as described in the equipment specifications. Vibration within specified tolerance shall be verified prior to extended operation. Temporary use of equipment is specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT.
B. The commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the Contracting Officer’s Representative and Commissioning Agent. Provide a minimum of weeks prior notice.

3.5 OPERATING AND PERFORMANCE TESTS

A. Prior to the final inspection, all required tests shall be performed as specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, TESTS and submit the test reports and records to the Engineer of Record.
B. Should evidence of malfunction in any tested system, or piece of equipment or component part thereof, occur during or as a result of tests, make proper corrections, repairs or replacements, and repeat tests at no additional cost to the Town of Riverhead.
C. When completion of certain work or systems occurs at a time when final control settings and adjustments cannot be properly made to make performance tests, then conduct such performance tests and finalize control settings during the first actual seasonal use of the respective

systems following completion of work. Rescheduling of these tests shall be requested in writing to Engineer of Record for approval.

3.6 OPERATION AND MAINTENANCE MANUALS

A. All new equipment and all elements of each assembly shall be included.

B. Data sheet on each device listing model, size, capacity, pressure, speed, horsepower, impeller size, and other information shall be included.

C. Manufacturer's installation, maintenance, repair, and operation instructions for each device shall be included. Assembly drawings and parts lists shall also be included. A summary of operating precautions and reasons for precautions shall be included in the Operations and Maintenance Manual.

D. Schematic diagrams and wiring diagrams of all control systems corrected to include all field modifications shall be included.

E. Set points of all interlock devices shall be listed.

F. Trouble-shooting guide for the control system troubleshooting shall be inserted into the Operations and Maintenance Manual.

G. The control system sequence of operation corrected with submittal review comments shall be inserted into the Operations and Maintenance Manual.

H. Emergency procedures for shutdown and startup of equipment and systems.

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SECTION 23 11 23
FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

Fuel gas systems, including piping, equipment and all necessary accessories as designated in this section. Fuel gas piping for central boiler plants is not included.

1.2 RELATED WORK

A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Section 07 84 00, FIRESTOPPING.

C. Section 07 92 00, JOINT SEALANTS.

D. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Manufacturer's Literature and Data:

1. Pipe & Fittings.
2. Valves.
3. Strainers.
4. All items listed in Part 2 - Products.

1.4 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Federal Specifications (Fed. Spec.):

A-A-59617.....Unions, Brass or Bronze Threaded, Pipe Connections and Solder-Joint Tube Connections

C. American National Standards Institute (ANSI):

American Society of Mechanical Engineers (ASME): (Copyrighted Society)

A13.1-(2007) .....Scheme for Identification of Piping Systems

B16.3-(2006).....Malleable Iron Threaded Fittings: Classes 150 and 300 ANSI/ASME

B16.9-2007.....Factory-Made Wrought Steel Buttwelding Fittings ANSI/ASME

B16.11-2009.....Forged Steel Fittings, Socket-Welding and Threaded ANSI/ASME

B16.15-2006.....Cast Copper Alloy Threaded Fittings: Classes 125 and 250 ANSI/ASME

B31.8-2010 .....Gas Transmission and Distribution Piping Systems ANSI/ASME

D. American Society for Testing and Materials (ASTM):

A47-99(2009) .....Standard Specification for Ferritic Malleable Iron Castings

A53-10.....Standard Specification for Pipe, Steel, Black And Hot-Dipped, Zinc-coated Welded and Seamless

A183-09.....Standard Specification for Carbon Steel Track Bolts and Nuts

A536-09.....Standard Specification for Ductile Iron Castings

A733-03(2009)e1.....Standard Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples

B687-99(2005)e1.....Standard Specification for Brass, Copper, and Chromium-Plated Pipe Nipples

E. National Fire Protection Association (NFPA):

54-2009 .....National Fuel Gas Code

F. International Code Council

IPC 2009 .....International Plumbing Code

IFGC 2009.....International Fuel Gas Code

G. International Association of Plumbing and Mechanical Officials (IAPMO):

Uniform Plumbing Code – 2009

IS6-06.....Installation Standard

H. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):

SP-72-2010 .....Ball Valves with Flanged or Butt-Welding For General Service

SP-110-2010.....Ball Valve Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends

1.5 SYSTEM PRESSURE

Natural gas systems unless otherwise noted are designed and materials and equipment selected to prevent failure under gas pressure of 15 psi entering Town of Riverhead property and 5 psi at downstream side of pressure regulator.

PART 2 - PRODUCTS

2.1 FUEL GAS SERVICE CONNECTIONS TO BUILDING

A. From inside face of exterior wall to a distance of approximately 5 feet outside of building, use coated piping.

B. Pipe: Black steel, ASTM A53, Schedule 40. Shop-applied pipe coating shall be one of the following types:

1. Coal Tar Enamel Coating: Exterior of pipe and fittings shall be cleaned, primed with Type B primer and coated with hot-applied coal tar enamel with bonded layer of felt wrap in accordance with AWWA C203. Asbestos felt shall not be used; felt material shall be fibrous glass mat as specified in Appendix Section A2.1 of AWWA C203.
2. Adhesive-thermoplastic Resin Coating: Fed. Spec. L-C-530, Type I
3. Thermosetting Epoxy Coating: Fed. Spec. L-C-530, Type II
4. Field-applied plastic tape material used on pipe joints and for repairing damaged areas of shop-applied coatings, Fed. Spec. L-T-1512, Type I, 10 mils nominal thickness for pipe joints, and Type II, 20 mils nominal thickness for coating repairs.

C. Fittings:

1. Butt weld fittings, wrought steel, ANSI B16.9.
2. Socket weld and threaded fittings forged steel, ANSI B16.11.
3. Grooved End: Ductile iron (ASTM A536, Grade 65-45-12), malleable iron (ASTM A47, Grade 32510), or steel (ASTM A53, Type F or Type E or S, Grade B).

D. Joints: Welded, ANSI B31.8.

2.2 FUEL GAS PIPING

A. Pipe: Black steel, ASTM A53, Schedule 40.

B. Nipples: Steel, ASTM A733, Schedule 40.

C. Fittings:

1. Sizes 2 inch under ANSI B 16.3 threaded malleable iron.
2. Over 2 inch and up to 4 inch ANSI B16.11 socket welded.
3. Over 4 inch ANSI 16.9 butt welded.

D. Joints: Provide welded or threaded joints.

2.3 EXPOSED FUEL GAS PIPING

A. Finished Room: Use full iron pipe size chrome plated brass piping for exposed fuel gas piping connecting fixtures, casework, cabinets, equipment and reagent racks when not concealed by apron including those furnished by the Town of Riverhead or specified in other sections.

1. Pipe: Fed. Spec. WW-P-351, standard weight
2. Fittings: ANSI B16.15 cast bronze threaded fittings with chrome finish, (125 and 250).
3. Nipples: ASTM B 687, Chromium-plated.
4. Unions: 2 inches and smaller, Mss SP-72, SP-110, Brass or Bronze threaded with chrome finish. Unions 2-1/2 inches and larger shall be flange type with approved gaskets.
5. Valves: Mss SP-72, SP-110, Brass or bronze with chrome finish.

B. Unfinished Rooms: Chrome-plated brass piping is not required. Paint piping systems as specified in NYS Plumbing Code.

A. Ball Valve: Bronze body, rated for 150 psi at 365°F, 250 psi at 250°F, reinforced TFE seat, stem seal and thrust washer; end entry, threaded ends, UL-listed for natural or LP gas shut off service when used on those services.

B. Gas Vent Cocks: Type 701: Bronze body, tee handle, rated for 30 psi at 100°F, ground plug, rated for tight shut-off on fuel gas service.

2.4 WATERPROOFING

A. Provide at points where pipes pass through membrane waterproofed floors or walls in contact with earth.

B. Floors: Provide cast iron stack sleeve with flashing device and a underdeck clamp. After stack is passed through sleeve, provide a waterproofed caulked joint at top hub.

C. Walls: See detail shown on drawings.

2.5 STRAINERS

A. Provide on high pressure side of pressure reducing valves, on inlet side of indicating and control instruments and equipment subject to sediment damage and where shown on drawings. Strainer element shall be removable without disconnection of piping.

B. Gas Lines: "Y" type with removable mesh lined brass strainer sleeve.

C. Body: Smaller than 3 inches, brass or bronze; 3 inches and larger, cast iron or semi-steel.

2.6 DIELECTRIC FITTINGS

Provide dielectric couplings or unions between ferrous and non-ferrous pipe.

2.7 GAS EQUIPMENT CONNECTORS

Flexible connectors with teflon core, interlocked galvanized steel protective casing, AGA certified design.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with the International Fuel Gas Code and the following:

1. Install branch piping for fuel gas and connect to all fixtures, valves, cocks, outlets, casework, cabinets and equipment, including those furnished by the Town of Riverhead or specified in other sections.
2. Pipe shall be round and straight. Cutting shall be done with proper tools. Pipe, shall be reamed to full size after cutting.
3. All pipe runs shall be laid out to avoid interference with other work.
4. Install valves with stem in horizontal position whenever possible. All valves shall be easily accessible.
5. Install union and shut-off valve on pressure piping at connections to equipment.
6. Pipe Hangers, Supports and Accessories:
   a. All piping shall be supported per the International Fuel Gas Code, Chapter No. 4.
   b. Shop Painting and Plating: Hangers, supports, rods, inserts and accessories used for Pipe supports shall be shop coated with red lead or zinc Chromate primer paint. Electroplated copper hanger rods, hangers and accessories may be used with copper tubing.
   c. Floor, Wall and Ceiling Plates, Supports, Hangers:
      1) Solid or split unplated cast iron, chrome plated in finished areas.
      2) All plates shall be provided with set screws.
      3) Pipe Hangers: Height adjustable clevis type.
      4) Adjustable Floor Rests and Base Flanges: Steel.
      5) Concrete Inserts: "Universal" or continuous slotted type.
      6) Hanger Rods: Mild, low carbon steel, fully threaded or Threaded at each end with two removable nuts at each end for positioning rod and hanger and locking each in place.
      7) Riser Clamps: Malleable iron or steel.
      8) Rollers: Cast iron.
      9) Self-drilling type expansion shields shall be "Phillips" type, with case hardened steel expander plugs.

10) Miscellaneous Materials: As specified, required, directed or as noted on the drawings for proper installation of hangers, supports and accessories.

7. Install cast chrome plated escutcheon with set screw at each wall, floor and ceiling penetration in exposed finished locations and within cabinets and millwork.
8. Penetrations:
   a. Fire Stopping: Where pipes pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING. Completely fill and seal clearances between piping and openings with the fire stopping materials.
   b. Waterproofing: At floor penetrations, completely seal clearances around the pipe and make watertight with sealant as specified in Section 07 92 00, JOINT SEALANTS.

B. Piping shall conform to the following:
   1. Fuel Gas:
      a. Entire fuel gas piping installation shall be in accordance with requirements of NFPA 54.
      b. Provide fuel gas piping with plugged drip pockets at low points.

3.2 CLEANING OF SYSTEM AFTER INSTALLATION

Clean all piping systems to remove all dirt, coatings and debris.

3.3 TESTS

A. General: Test system either in its entirety or in sections after system is installed or cleaned.

B. Test shall be made in accordance with Section 406 of the International Fuel Gas Code. The system shall be tested at a minimum of 1.5 times maximum working pressure, but not less than 20 kPa gage)

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SECTION 26 05 11
REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section applies to all sections of Division 26.

B. Furnish and install electrical systems, materials, equipment, and accessories in accordance with the specifications and drawings. Capacities and ratings of panelboards and other items and arrangements for the specified items are shown on the drawings.

C. Electrical service entrance equipment and arrangements for temporary and permanent connections to the electric utility company's system shall conform to the electric utility company's requirements. Coordinate fuses, circuit breakers and relays with the Town's electric utility system, and obtain electric utility company approval for sizes and settings of these devices.

D. Conductor ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways sized per NEC. Aluminum conductors are prohibited.

1.2 MINIMUM REQUIREMENTS

A. The latest International Building Code (IBC), Underwriters Laboratories, Inc. (UL), Institute of Electrical and Electronics Engineers (IEEE), and National Fire Protection Association (NFPA) codes and standards are the minimum requirements for materials and installation.

B. The drawings and specifications shall govern in those instances where requirements are greater than those stated in the above codes and standards.

1.3 TEST STANDARDS

A. All materials and equipment shall be listed, labeled, or certified by a Nationally Recognized Testing Laboratory (NRTL) to meet Underwriters Laboratories, Inc. (UL), standards where test standards have been established. Materials and equipment which are not covered by UL standards will be accepted, providing that materials and equipment are listed, labeled, certified or otherwise determined to meet the safety requirements of a NRTL. Materials and equipment which no NRTL accepts, certifies, lists, labels, or determines to be safe, will be considered

if inspected or tested in accordance with national industrial standards, such as ANSI, NEMA, and NETA. Evidence of compliance shall include certified test reports and definitive shop drawings.

B. Definitions:

1. Listed: Materials and equipment included in a list published by an organization that is acceptable to the Authority Having Jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed materials and equipment or periodic evaluation of services, and whose listing states that the materials and equipment either meets appropriate designated standards or has been tested and found suitable for a specified purpose.
2. Labeled: Materials and equipment to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the Authority Having Jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled materials and equipment, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
3. Certified: Materials and equipment which:
   a. Have been tested and found by a NRTL to meet nationally recognized standards or to be safe for use in a specified manner.
   b. Are periodically inspected by a NRTL.
   c. Bear a label, tag, or other record of certification.
4. Nationally Recognized Testing Laboratory: Testing laboratory which is recognized and approved by the Secretary of Labor in accordance with OSHA regulations.

1.4 QUALIFICATIONS (PRODUCTS AND SERVICES)

A. Manufacturer’s Qualifications: The manufacturer shall regularly and currently produce, as one of the manufacturer's principal products, the materials and equipment specified for this project, and shall have manufactured the materials and equipment for at least three years.

B. Product Qualification:

1. Manufacturer's materials and equipment shall have been in satisfactory operation, on three installations of similar size and type as this project, for at least three years.

1.5 APPLICABLE PUBLICATIONS

A. Applicable publications listed in all Sections of Division 26 shall be the latest issue, unless otherwise noted.

B. Products specified in all sections of Division 26 shall comply with the applicable publications listed in each section.

1.6 MANUFACTURED PRODUCTS

A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, and for which replacement parts shall be available. Materials and equipment furnished shall be new, and shall have superior quality and freshness.

B. When more than one unit of the same class or type of materials and equipment is required, such units shall be the product of a single manufacturer.

C. Equipment Assemblies and Components:

1. Components of an assembled unit need not be products of the same manufacturer.
2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
3. Components shall be compatible with each other and with the total assembly for the intended service.
4. Constituent parts which are similar shall be the product of a single manufacturer.

D. Factory wiring and terminals shall be identified on the equipment being furnished and on all wiring diagrams.

1.7 VARIATIONS FROM CONTRACT REQUIREMENTS

A. Where the Engineer of Record or the Contractor requests variations from the contract requirements, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

1.8 MATERIALS AND EQUIPMENT PROTECTION

A. Materials and equipment shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.

1. Store materials and equipment indoors in clean dry space with uniform temperature to prevent condensation.
2. During installation, equipment shall be protected against entry of foreign matter, and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
3. General Contractor shall make Engineer of Record aware of damaged equipment, the engineer will then determine if equipment should be repaired or replaced.
4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
5. Damaged paint on equipment shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.9 WORK PERFORMANCE

A. All electrical work shall comply with requirements of the latest NFPA 70 (NEC), NFPA 70B, NFPA 70E, NFPA 99, NFPA 110, OSHA Part 1910 subpart J – General Environmental Controls, OSHA Part 1910 subpart K – Medical and First Aid, and OSHA Part 1910 subpart S – Electrical, in addition to other references required by contract.

B. Job site safety and worker safety is the responsibility of the General Contractor.

C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. However, energized electrical work may be performed only for the non-destructive and non-invasive diagnostic testing. In such case, all aspects of energized electrical work, such as the availability of appropriate/correct personal protective equipment (PPE) and the use of PPE, shall comply with the latest NFPA 70E, as well as the following requirements:
   1. Only Qualified Person(s) shall perform energized electrical work. Supervisor of Qualified Person(s) shall witness the work of its entirety to ensure compliance with safety requirements and approved work plan.
   2. Prior to initiating any energized electrical work, the Contractor and the Qualified Person(s) who is designated to perform the work shall visually inspect, verify and confirm that the work area and electrical equipment can safely accommodate the work involved.

D. For work that affects existing electrical systems, arrange, phase and perform work to assure minimal interference with normal functioning of the facility.

E. New work shall be installed and connected to existing work neatly, safely and professionally. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.

F. Coordinate location of equipment and conduit with other trades to minimize interference.

1.10 EQUIPMENT INSTALLATION AND REQUIREMENTS

A. Equipment location shall be as close as practical to locations shown on the drawings.

B. Working clearances shall not be less than specified in the NEC.

C. Inaccessible Equipment:

1. Where the Riverhead Highway Superintendent determines that the Contractor has installed equipment not readily accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Town of Riverhead.

2. "Readily accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

D. Electrical service entrance equipment and arrangements for temporary and permanent connections to the electric utility company's system shall conform to the electric utility company's requirements. Coordinate fuses, circuit breakers and relays with the electric utility company's system, and obtain electric utility company approval for sizes and settings of these devices.

1.11 EQUIPMENT IDENTIFICATION

A. In addition to the requirements of the NEC, install an identification sign which clearly indicates information required for use and maintenance of items such as switchboards and switchgear, panelboards, cabinets, motor controllers, fused and non-fused safety switches, generators, automatic transfer switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards,

switchgear and motor control assemblies, control devices and other significant equipment.

B. Identification signs for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering. Identification signs for Essential Electrical System (EES) equipment, as defined in the NEC, shall be laminated red phenolic resin with a white core with engraved lettering. Lettering shall be a minimum of 1/2 inch high. Identification signs shall indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires, and type of EES power branch as applicable. Secure nameplates with screws.

C. Install adhesive arc flash warning labels on all equipment as required by the latest NFPA 70E. Label shall show specific and correct information for specific equipment based on its arc flash calculations. Label shall show the followings:

1. Nominal system voltage.
2. Equipment/bus name, date prepared, and manufacturer name and address.
3. Arc flash boundary.
4. Available arc flash incident energy and the corresponding working distance.
5. Minimum arc rating of clothing.
6. Site-specific level of PPE.

1.12 SINGULAR NUMBER

A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

1.13 ACCEPTANCE CHECKS AND TESTS

A. The Contractor shall furnish the instruments, materials, and labor for tests.

B. Where systems are comprised of components specified in more than one section of Division 26, the Contractor shall coordinate the installation, testing, and adjustment of all components between various manufacturer’s representatives and technicians so that a complete, functional, and operational system is delivered to the Town of Riverhead.

C. When test results indicate any defects, the Contractor shall repair or replace the defective materials or equipment, and repeat the tests for the equipment. Repair, replacement, and re-testing shall be accomplished at no additional cost to the Town of Riverhead.

1.14 WARRANTY

A. All work performed and all equipment and material furnished under this Division shall be free from defects and shall remain so for a period of one year from the date of acceptance of the entire installation by the Engineer of Record for the Town of Riverhead.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

---END---

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of the electrical conductors and cables for use in electrical systems rated 600 V and below, indicated as cable(s), conductor(s), wire, or wiring in this section.

1.2 RELATED WORK

A. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire-resistant rated construction.

B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for conductors and cables.

1.3 FACTORY TESTS

A. Conductors and cables shall be thoroughly tested at the factory per NEMA to ensure that there are no electrical defects. Factory tests shall be certified.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by designation only.

B. American Society of Testing Material (ASTM):

D2301-10.....Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape

D2304-10.....Test Method for Thermal Endurance of Rigid Electrical Insulating Materials

D3005-10.....Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape

C. National Electrical Manufacturers Association (NEMA):

WC 70-09.....Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy

D. National Fire Protection Association (NFPA):

70-11.....National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. (UL):

44-10.....Thermoset-Insulated Wires and Cables

83-08.....Thermoplastic-Insulated Wires and Cables

467-07.....Grounding and Bonding Equipment

486A-486B-03.....Wire Connectors

486C-04.....Splicing Wire Connectors

486D-05.....Sealed Wire Connector Systems

486E-09.....Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors

493-07.....Thermoplastic-Insulated Underground Feeder and Branch Circuit Cables

514B-04.....Conduit, Tubing, and Cable Fittings

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Conductors and cables shall be in accordance with NEMA, UL, as specified herein, and as shown on the drawings.

B. All conductors shall be copper.

C. Single Conductor and Cable:

1. No.12 AWG: Minimum size, except where smaller sizes are specified herein or shown on the drawings.
2. No.8 AWG and larger: Stranded.
3. No.10 AWG and smaller: Solid; except shall be stranded for final connection to motors, transformers, and vibrating equipment.
4. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

D. Color Code:

1. No.10 AWG and smaller: Solid color insulation or solid color coating.
2. No.8 AWG and larger: Color-coded using one of the following methods:
   a. Solid color insulation or solid color coating.
   b. Stripes, bands, or hash marks of color specified.
   c. Color using 0.75 inch wide tape.

3. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.
4. Conductors shall be color-coded as follows:

208/120 V	Phase	480/277 V
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray *
* or white with colored (other than green) tracer.		

5. Lighting circuit “switch legs”, and 3-way and 4-way switch “traveling wires,” shall have color coding that is unique and distinct (e.g., pink and purple) from the color coding indicated above. The unique color codes shall be solid and in accordance with the NEC. Coordinate color coding in the field with the Town Electrician.
6. Color code for isolated power system wiring shall be in accordance with the NEC.

2.2 SPLICES

A. Splices shall be in accordance with NEC and UL.

B. Above Ground Splices for No.10 AWG and Smaller:
   1. Solderless, screw-on, reusable pressure cable type, with integral insulation, approved for copper and aluminum conductors.
   2. The integral insulator shall have a skirt to completely cover the stripped conductors.
   3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.

C. Above Ground Splices for No.8 AWG to No.4/0 AWG:
   1. Compression, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.
   2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
   3. Splice and insulation shall be product of the same manufacturer.

4. All bolts, nuts, and washers used with splices shall be zinc-plated steel.

D. Above Ground Splices for 250 kcmil and Larger:
   1. Long barrel “butt-splice” or “sleeve” type compression connectors, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.
   2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
   3. Splice and insulation shall be product of the same manufacturer.

E. Underground Splices for No.10 AWG and Smaller:
   1. Solderless, screw-on, reusable pressure cable type, with integral insulation. Listed for wet locations, and approved for copper and aluminum conductors.
   2. The integral insulator shall have a skirt to completely cover the stripped conductors.
   3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.

F. Underground Splices for No.8 AWG and Larger:
   1. Mechanical type, of high conductivity and corrosion-resistant material. Listed for wet locations, and approved for copper and aluminum conductors.
   2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
   3. Splice and insulation shall be product of the same manufacturer.

G. Plastic electrical insulating tape: Per ASTM D2304, flame-retardant, cold and weather resistant.

2.3 CONNECTORS AND TERMINATIONS

A. Mechanical type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.

B. Long barrel compression type of high conductivity and corrosion-resistant material, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.

C. All bolts, nuts, and washers used to connect connections and terminations to bus bars or other termination points shall be zinc-plated steel.

2.4 CONTROL WIRING

A. Unless otherwise specified elsewhere in these specifications, control wiring shall be as specified herein, except that the minimum size shall be not less than No.14 AWG.

B. Control wiring shall be sized such that the voltage drop under in-rush conditions does not adversely affect operation of the controls.

2.5 WIRE LUBRICATING COMPOUND

A. Lubricating compound shall be suitable for the wire insulation and conduit, and shall not harden or become adhesive.

B. Shall not be used on conductors for isolated power systems.

PART 3 - EXECUTION

3.1 GENERAL

A. Install conductors in accordance with the NEC, as specified, and as shown on the drawings.

B. Install all conductors in raceway systems.

C. Splice conductors only in outlet boxes, junction boxes, pullboxes, manholes, or handholes.

D. Conductors of different systems (e.g., 120 V and 277 V) shall not be installed in the same raceway.

E. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.

F. In panelboards, cabinets, wireways, switches, enclosures, and equipment assemblies, neatly form, train, and tie the conductors with non-metallic ties.

G. For connections to motors, transformers, and vibrating equipment, stranded conductors shall be used only from the last fixed point of connection to the motors, transformers, or vibrating equipment.

H. Use expanding foam or non-hardening duct-seal to seal conduits entering a building, after installation of conductors.

I. Conductor and Cable Pulling:

1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling. Use lubricants approved for the cable.

2. Use nonmetallic pull ropes.
3. Attach pull ropes by means of either woven basket grips or pulling eyes attached directly to the conductors.
4. All conductors in a single conduit shall be pulled simultaneously.
5. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

J. No more than three branch circuits shall be installed in any one conduit.

K. When stripping stranded conductors, use a tool that does not damage the conductor or remove conductor strands.

3.2 SPLICE AND TERMINATION INSTALLATION

A. Splices and terminations shall be mechanically and electrically secure, and tightened to manufacturer's published torque values using a torque screwdriver or wrench.

B. Where the Engineer of Record determines that unsatisfactory splices or terminations have been installed, replace the splices or terminations at no additional cost to the Town of Riverhead.

3.3 CONDUCTOR IDENTIFICATION

A. When using colored tape to identify phase, neutral, and ground conductors larger than No.8 AWG, apply tape in half-overlapping turns for a minimum of 3 inches from terminal points, and in junction boxes, pullboxes, and manholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable, stating size and insulation type.

3.4 CONTROL WIRING INSTALLATION

A. Unless otherwise specified in other sections, install control wiring and connect to equipment to perform the required functions as specified or as shown on the drawings.

B. Install a separate power supply circuit for each system, except where otherwise shown on the drawings.

3.5 CONTROL WIRING IDENTIFICATION

A. Install a permanent wire marker on each wire at each termination.

B. Identifying numbers and letters on the wire markers shall correspond to those shown in manufactures installation guidelines.

C. Wire markers shall retain their markings after cleaning.

3.6 ACCEPTANCE CHECKS AND TESTS

A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests: Inspect physical condition.
2. Electrical tests:
   a. After installation but before connection to utilization devices, such as fixtures, motors, or appliances, test conductors phase-to-phase and phase-to-ground resistance with an insulation resistance tester. Existing conductors to be reused shall also be tested.
   b. Applied voltage shall be 500 V DC for 300 V rated cable, and 1000 V DC for 600 V rated cable. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. Minimum insulation resistance values shall not be less than 25 megohms for 300 V rated cable and 100 megohms for 600 V rated cable.
   c. Perform phase rotation test on all three-phase circuits.

---END---

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

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PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of grounding and bonding equipment, indicated as grounding equipment in this section.

B. "Grounding electrode system" refers to grounding electrode conductors and all electrodes required or allowed by NEC, as well as made, supplementary, and lightning protection system grounding electrodes.

C. The terms "connect" and "bond" are used interchangeably in this section and have the same meaning.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit and boxes.

D. Section 26 24 16, PANELBOARDS: Low-voltage panelboards.

1.3 QUALITY ASSURANCE

A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American Society for Testing and Materials (ASTM):

B1-07.....Standard Specification for Hard-Drawn Copper Wire

B3-07.....Standard Specification for Soft or Annealed Copper Wire

B8-11.....Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

81-83.....IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part 1: Normal Measurements

D. National Fire Protection Association (NFPA):

70-11.....National Electrical Code (NEC)

70E-12.....National Electrical Safety Code

99-12.....Health Care Facilities

E. Underwriters Laboratories, Inc. (UL):

44-10 .....Thermoset-Insulated Wires and Cables

83-08 .....Thermoplastic-Insulated Wires and Cables

467-07 .....Grounding and Bonding Equipment

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Equipment grounding conductors shall be insulated stranded copper, except that sizes No.10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No.4 AWG and larger shall be identified per NEC.

B. Bonding conductors shall be bare stranded copper, except that sizes No. 10 AWG and smaller shall be bare solid copper. Bonding conductors shall be stranded for final connection to motors, transformers, and vibrating equipment.

C. Conductor sizes shall not be less than shown on the drawings, or not less than required by the NEC, whichever is greater.

D. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

2.2 GROUND RODS

A. Steel or copper clad steel, 0.75 inch diameter by 10 feet long.

B. Quantity of rods shall be as shown on the shop drawings, and as required to obtain the specified ground resistance.

2.3 CONCRETE ENCASED ELECTRODE

A. Concrete encased electrode shall be No.4 AWG bare copper wire, installed per NEC.

2.4 GROUND CONNECTIONS

A. Below Grade and Inaccessible Locations: Exothermic-welded type connectors.

B. Above Grade:

1. Bonding Jumpers: Listed for use with aluminum and copper conductors. For wire sizes No.8 AWG and larger, use compression-type connectors. For wire sizes smaller than No.8 AWG, use mechanical type lugs. Connectors or lugs shall use zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.
2. Connection to Building Steel: Exothermic-welded type connectors.
3. Connection to Grounding Bus Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.
4. Connection to Equipment Rack and Cabinet Ground Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.5 EQUIPMENT RACK AND CABINET GROUND BARS

A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks. Ground bars shall have minimum dimensions of 0.25 inch thick x 0.75 inch wide, with length as required or as shown on the drawings. Provide insulators and mounting brackets.

2.6 GROUND TERMINAL BLOCKS

A. At any equipment mounting location (e.g., backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide mechanical type lugs, with zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.7 GROUNDING BUS BAR

A. Pre-drilled rectangular copper bar with stand-off insulators, minimum 0.25 inch thick x 4 inches high in cross-section, length as shown on the drawings, with hole size, quantity, and spacing per detail shown on the drawings. Provide insulators and mounting brackets.

PART 3 - EXECUTION

3.1 GENERAL

A. Install grounding equipment in accordance with the NEC, as shown on the drawings, and as specified herein.

B. System Grounding:
   1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformer.
   2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.

C. Equipment Grounding: Metallic piping, building structural steel, electrical enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.

D. For patient care area electrical power system grounding, conform to NFPA 99 and NEC.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

A. Make grounding connections, which are normally buried or otherwise inaccessible, by exothermic weld.

3.3 MEDIUM-VOLTAGE EQUIPMENT AND CIRCUITS

A. Switchgear: Provide a bare grounding electrode conductor from the switchgear ground bus to the grounding electrode system.

B. Duct Banks and Manholes: Provide an insulated equipment grounding conductor in each duct containing medium-voltage conductors, sized per NEC except that minimum size shall be No.2 AWG. Bond the equipment grounding conductors to the switchgear ground bus, to all manhole grounding provisions and hardware, to the cable shield grounding provisions of medium-voltage cable splices and terminations, and to equipment enclosures.

3.4 SECONDARY VOLTAGE EQUIPMENT AND CIRCUITS

A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.

B. Metallic Piping, Building Structural Steel, and Supplemental Electrode(s):
   1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water pipe systems, building structural steel, and supplemental or made electrodes. Provide jumpers across insulating joints in the metallic piping.
   2. Provide a supplemental ground electrode as shown on the drawings and bond to the grounding electrode system.

C. Panelboards and other electrical equipment:
   1. Connect the equipment grounding conductors to the ground bus.

2. Connect metallic conduits by grounding bushings and equipment grounding conductor to the equipment ground bus.

3.5 RACEWAY

A. Conduit Systems:

1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
2. Non-metallic conduit systems, except non-metallic feeder conduits that carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment, shall contain an equipment grounding conductor.
3. Metallic conduit that only contains a grounding conductor, and is provided for its mechanical protection, shall be bonded to that conductor at the entrance and exit from the conduit.
4. Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with a equipment grounding conductor to the equipment ground bus.

B. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, and power and lighting branch circuits.

C. Boxes and Panelboards:

1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).
2. Provide lugs in each box and enclosure for equipment grounding conductor termination.

D. Wireway Systems:

1. Bond the metallic structures of wireway to provide electrical continuity throughout the wireway system, by connecting a No.6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.
2. Install insulated No.6 AWG bonding jumpers between the wireway system, bonded as required above, and the closest building ground at each end and approximately every 50 feet.
3. Use insulated No.6 AWG bonding jumpers to ground or bond metallic wireway at each end for all intermediate metallic enclosures and across all section junctions.

4. Use insulated No.6 AWG bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 49 feet.

E. Receptacles shall not be grounded through their mounting screws. Ground receptacles with a jumper from the receptacle green ground terminal to the device box ground screw and a jumper to the branch circuit equipment grounding conductor.

F. Ground lighting fixtures to the equipment grounding conductor of the wiring system. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

G. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

3.6 CORROSION INHIBITORS

A. When making grounding and bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.7 CONDUCTIVE PIPING

A. Bond all conductive piping systems, interior and exterior, to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

B. In operating rooms and at intensive care and coronary care type beds, bond the medical gas piping and medical vacuum piping at the outlets directly to the patient ground bus.

3.8 LIGHTNING PROTECTION SYSTEM

A. Bond the lightning protection system to the electrical grounding electrode system.

3.9 GROUND RESISTANCE

A. Grounding system resistance to ground shall not exceed 5 ohms. Make any modifications or additions to the grounding electrode system necessary for compliance without additional cost to the Government. Final tests shall ensure that this requirement is met.

B. Grounding system resistance shall comply with the electric utility company ground resistance requirements.

3.10 GROUND ROD INSTALLATION

A. For outdoor installations, drive each rod vertically in the earth, until top of rod is 24 inches below final grade.

B. For indoor installations, leave 4 inches of each rod exposed.

C. Where buried or permanently concealed ground connections are required, make the connections by the exothermic process, to form solid metal joints. Make accessible ground connections with mechanical pressure-type ground connectors.

3.11 ACCEPTANCE CHECKS AND TESTS

A. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized or connected to the electric utility company ground system, and shall be made in normally dry conditions not fewer than 48 hours after the last rainfall.

B. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

C. Below-grade connections shall be visually inspected by the Engineer of Record prior to backfilling. The Contractor shall notify the Engineer of Record 24 hours before the connections are ready for inspection.

---END---

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of conduit, fittings, and boxes, to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.

B. Definitions: The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

1.2 RELATED WORK

A. Section 07 60 00, FLASHING AND SHEET METAL: Fabrications for the deflection of water away from the building envelope at penetrations.

B. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire rated construction.

C. Section 07 92 00, JOINT SEALANTS: Sealing around conduit penetrations through the building envelope to prevent moisture migration into the building.

D. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.

1.4 SUBMITTALS

A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1. Shop Drawings:
   a. Size and location of main feeders.
   b. Size and location of panels and pull-boxes.
   c. Layout of required conduit penetrations through structural elements.
   d. Submit the following data for approval:
      1) Raceway types and sizes.
      2) Conduit bodies, connectors and fittings.
      3) Junction and pull boxes, types and sizes.
2. Certifications: Two weeks prior to final inspection, submit the following:

a. Certification by the Contractor that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment have been properly installed.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American National Standards Institute (ANSI):

C80.1-05.....Electrical Rigid Steel Conduit
C80.3-05.....Steel Electrical Metal Tubing
C80.6-05.....Electrical Intermediate Metal Conduit

C. National Fire Protection Association (NFPA):

70-11.....National Electrical Code (NEC)

D. Underwriters Laboratories, Inc. (UL):

1-05.....Flexible Metal Conduit
5-11.....Surface Metal Raceway and Fittings
6-07.....Electrical Rigid Metal Conduit - Steel
50-95.....Enclosures for Electrical Equipment
360-13.....Liquid-Tight Flexible Steel Conduit
467-13.....Grounding and Bonding Equipment
514A-13.....Metallic Outlet Boxes
514B-12.....Conduit, Tubing, and Cable Fittings
514C-07.....Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers
651-11.....Schedule 40 and 80 Rigid PVC Conduit and Fittings
651A-11.....Type EB and A Rigid PVC Conduit and HDPE Conduit
797-07.....Electrical Metallic Tubing
1242-06.....Electrical Intermediate Metal Conduit - Steel

E. National Electrical Manufacturers Association (NEMA):

TC-2-13.....Electrical Polyvinyl Chloride (PVC) Tubing and Conduit
TC-3-13.....PVC Fittings for Use with Rigid PVC Conduit and Tubing

FB1-12.....Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable

FB2.10-13.....Selection and Installation Guidelines for Fittings for use with Non-Flexible Conduit or Tubing (Rigid Metal Conduit, Intermediate Metallic Conduit, and Electrical Metallic Tubing)

FB2.20-12.....Selection and Installation Guidelines for Fittings for use with Flexible Electrical Conduit and Cable

F. American Iron and Steel Institute (AISI):

S100-2007.....North American Specification for the Design of Cold-Formed Steel Structural Members

PART 2 - PRODUCTS

2.1 MATERIAL

A. Conduit Size: In accordance with the NEC, but not less than 0.5-inch unless otherwise shown. Where permitted by the NEC, 0.5-inch flexible conduit may be used for tap connections to recessed lighting fixtures.

B. Conduit:

1. Size: In accordance with the NEC, but not less than 0.5-inch.
2. Rigid Steel Conduit (RMC): Shall conform to UL 6 and ANSI C80.1.
3. Rigid Intermediate Steel Conduit (IMC): Shall conform to UL 1242 and ANSI C80.6.
4. Electrical Metallic Tubing (EMT): Shall conform to UL 797 and ANSI C80.3. Maximum size not to exceed 105 mm (4 inches) and shall be permitted only with cable rated 600 V or less.
5. Flexible Metal Conduit: Shall conform to UL 1.
6. Liquid-tight Flexible Metal Conduit: Shall conform to UL 360.

C. Conduit Fittings:

1. Rigid Steel and Intermediate Metallic Conduit Fittings:
   a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
   b. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.

c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.

d. Bushings: Metallic insulating type, consisting of an insulating insert, molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.

e. Erickson (Union-Type) and Set Screw Type Couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case-hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.

f. Sealing Fittings: Threaded cast iron type. Use continuous drain-type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.

3. Electrical Metallic Tubing Fittings:

a. Fittings and conduit bodies shall meet the requirements of UL 514B, ANSI C80.3, and NEMA FB1.

b. Only steel or malleable iron materials are acceptable.

c. Compression Couplings and Connectors: Concrete-tight and rain-tight, with connectors having insulated throats.//

d. Indent-type connectors or couplings are prohibited.

e. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.

4. Flexible Metal Conduit Fittings:

a. Conform to UL 514B. Only steel or malleable iron materials are acceptable.

b. Clamp-type, with insulated throat.

5. Liquid-tight Flexible Metal Conduit Fittings:

a. Fittings shall meet the requirements of UL 514B and NEMA FB1.

b. Only steel or malleable iron materials are acceptable.

c. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.

6. Surface Metal Raceway Fittings: As recommended by the raceway manufacturer. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, conduit entry fittings, accessories, and other fittings as required for complete system.
7. Expansion and Deflection Couplings:
   a. Conform to UL 467 and UL 514B.
   b. Accommodate a 19 mm (0.75-inch) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
   c. Include internal flexible metal braid, sized to guarantee conduit ground continuity and a low-impedance path for fault currents, in accordance with UL 467 and the NEC tables for equipment grounding conductors.
   d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat-resistant molded rubber material with stainless steel jacket clamps.

D. Conduit Supports:
1. Parts and Hardware: Zinc-coat or provide equivalent corrosion protection.
2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
3. Multiple Conduit (Trapeze) Hangers: Not less than 1.5 x 1.5 inches, 12-gauge steel, cold-formed, lipped channels; with not less than 0.375-inch diameter steel hanger rods.
4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.

E. Outlet, Junction, and Pull Boxes:
1. UL-50 and UL-514A.
2. Rustproof cast metal where required by the NEC or shown on drawings.
3. Sheet Metal Boxes: Galvanized steel, except where shown on drawings.

F. Metal Wireways: Equip with hinged covers, except as shown on drawings. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for a complete system.

PART 3 - EXECUTION

3.1 PENETRATIONS

A. Cutting or Holes:

1. Cut holes in advance where they should be placed in the structural elements, such as ribs or beams. Obtain the approval of the Building Manufacturer prior to drilling through structural elements.
2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammers, impact electric, hand, or manual hammer-type drills are not allowed, except when permitted by the Engineer where working space is limited.

B. Firestop: Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING.

C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal the gap around conduit to render it watertight, as specified in Section 07 92 00, JOINT SEALANTS.

3.2 INSTALLATION, GENERAL

A. In accordance with UL, NEC, NEMA, as shown on drawings, and as specified herein.

B. Raceway systems used for Essential Electrical Systems (EES) shall be entirely independent of other raceway systems.

C. Install conduit as follows:

1. In complete mechanically and electrically continuous runs before pulling in cables or wires.
2. Unless otherwise indicated on the drawings or specified herein, installation of all conduits shall be concealed within finished walls, floors, and ceilings.
3. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new conduits.
4. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
5. Cut conduits square, ream, remove burrs, and draw up tight.
6. Independently support conduit at 8 feet on centers with specified materials and as shown on drawings.

7. Do not use suspended ceilings, suspended ceiling supporting members, lighting fixtures, other conduits, cable tray, boxes, piping, or ducts to support conduits and conduit runs.
8. Support within 12 inches of changes of direction, and within 12 inches of each enclosure to which connected.
9. Close ends of empty conduits with plugs or caps at the rough-in stage until wires are pulled in, to prevent entry of debris.
10. Conduit installations under fume and vent hoods are prohibited.
11. Secure conduits to cabinets, junction boxes, pull-boxes, and outlet boxes with bonding type locknuts. For rigid steel and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
12. Flashing of penetrations of the roof membrane is specified in Section 07 60 00, FLASHING AND SHEET METAL.
13. Conduit bodies shall only be used for changes in direction, and shall not contain splices.

D. Conduit Bends:
1. Make bends with standard conduit bending machines.
2. Conduit hickey may be used for slight offsets and for straightening stubbed out conduits.
3. Bending of conduits with a pipe tee or vise is prohibited.

E. Layout and Homeruns:
1. Install conduit with wiring, including homeruns, as shown on drawings.
2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted and approved by the Engineer.

3.3 CONCEALED WORK INSTALLATION

A. Above Furred or Suspended Ceilings and in Walls:
1. Conduit for Conductors Above 600 V: Rigid steel. Mixing different types of conduits in the same system is prohibited.
2. Conduit for Conductors 600 V and Below: Rigid steel, IMC or EMT. Mixing different types of conduits in the same system is prohibited.
3. Align and run conduit parallel or perpendicular to the building lines.

4. Connect recessed lighting fixtures to conduit runs with maximum 6 feet of flexible metal conduit extending from a junction box to the fixture.
5. Tightening set screws with pliers is prohibited.
6. For conduits running through metal studs, limit field cut holes to no more than the recommendations of the Building Manufacturer. Spacing between holes shall be at least that required by the Building Manufacturer. Cuts or notches in flanges or return lips shall not be permitted.

3.4 EXPOSED WORK INSTALLATION

A. Unless otherwise indicated on drawings, exposed conduit is only permitted in mechanical and electrical rooms.
B. Conduit for Conductors Above 600 V: Rigid steel. Mixing different types of conduits in the system is prohibited.
C. Conduit for Conductors 600 V and Below: Rigid steel, IMC or EMT. Mixing different types of conduits in the system is prohibited.
D. Align and run conduit parallel or perpendicular to the building lines.
E. Install horizontal runs close to the ceiling or beams and secure with conduit straps.
F. Support horizontal or vertical runs at not over 8 feet intervals.
G. Surface Metal Raceways: Use only where shown on drawings.

3.5 WET OR DAMP LOCATIONS

A. Use rigid steel or IMC conduits unless as shown on drawings.
B. Provide sealing fittings to prevent passage of water vapor where conduits pass from warm to cold locations, i.e., refrigerated spaces, constant-temperature rooms, air-conditioned spaces, building exterior walls, roofs, or similar spaces.
C. Use rigid steel or IMC conduit within 5 feet of the exterior and below concrete building slabs in contact with soil, gravel, or vapor barriers, unless as shown on drawings. Conduit shall be half-lapped with 10 mil PVC tape before installation. After installation, completely recoat or retape any damaged areas of coating.
D. Conduits run on roof shall be supported with integral galvanized lipped steel channel, attached to UV-inhibited polycarbonate or polypropylene blocks every 8 feet with 3/8-inch galvanized threaded rods, square washer and locknut. Conduits shall be attached to steel channel with conduit clamps.

3.6 MOTORS AND VIBRATING EQUIPMENT

A. Use flexible metal conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission.

B. Use liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, inside airstream of HVAC units, and locations subject to seepage or dripping of oil, grease, or water.

C. Provide a green equipment grounding conductor with flexible and liquid-tight flexible metal conduit.

3.7 EXPANSION JOINTS

A. Conduits 3 inch and larger that are secured to the building structure on opposite sides of a building expansion joint require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.

B. Provide conduits smaller than 3 inch with junction boxes on both sides of the expansion joint. Connect flexible metal conduits to junction boxes with sufficient slack to produce a 5 inch vertical drop midway between the ends of the flexible metal conduit. Flexible metal conduit shall have a green insulated copper bonding jumper installed. In lieu of this flexible metal conduit, expansion and deflection couplings as specified above are acceptable.

C. Install expansion and deflection couplings where shown.

3.8 CONDUIT SUPPORTS

A. Safe working load shall not exceed one-quarter of proof test load of fastening devices.

B. Use pipe straps or individual conduit hangers for supporting individual conduits.

C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and an additional 200 lbs. Attach each conduit with U-bolts or other approved fasteners.

D. Support conduit independently of junction boxes, pull-boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.

E. Bolts supported only by plaster or gypsum wallboard are not acceptable.

F. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.

G. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.

H. Chain, wire, or perforated strap shall not be used to support or fasten conduit.

I. Spring steel type supports or fasteners are prohibited for all uses except horizontal and vertical supports/fasteners within walls.

J. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.9 BOX INSTALLATION

A. Boxes for Concealed Conduits:

1. Flush-mounted.
2. Provide raised covers for boxes to suit the wall or ceiling, construction, and finish.

B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling-in operations or where more than the equivalent of 4-90 degree bends are necessary.

C. Locate pullboxes so that covers are accessible and easily removed. Coordinate locations with piping and ductwork where installed above ceilings.

D. Remove only knockouts as required. Plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.

E. Outlet boxes mounted back-to-back in the same wall are prohibited. A minimum 24 inch center-to-center lateral spacing shall be maintained between boxes.

F. Flush-mounted wall or ceiling boxes shall be installed with raised covers so that the front face of raised cover is flush with the wall. Surface-mounted wall or ceiling boxes shall be installed with surface-style flat or raised covers.

G. Minimum size of outlet boxes for ground fault circuit interrupter (GFCI) receptacles is 4 inches square x 2.125 inches deep, with device covers for the wall material and thickness involved.

H. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example "SIG-FA JB No. 1."

I. On all branch circuit junction box covers, identify the circuits with black marker.

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SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of panelboards.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. International Code Council (ICC):

IBC-12.....International Building Code

C. National Electrical Manufacturers Association (NEMA):

PB 1-11.....Panelboards

250-08.....Enclosures for Electrical Equipment (1,000V Maximum)

D. National Fire Protection Association (NFPA):

70-11.....National Electrical Code (NEC)

70E-12.....Standard for Electrical Safety in the Workplace

E. Underwriters Laboratories, Inc. (UL):

50-95.....Enclosures for Electrical Equipment

67-09.....Panelboards

489-09.....Molded Case Circuit Breakers and Circuit Breaker Enclosures

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Panelboards shall be in accordance with NEC, NEMA, UL, as specified, and as shown on the drawings.

B. Panelboards shall have main breaker or main lugs, bus size, voltage, phases, number of circuit breaker mounting spaces, top or bottom feed, flush or surface mounting, branch circuit breakers, and accessories as shown on the drawings.

C. Panelboards shall be completely factory-assembled with molded case circuit breakers and integral accessories as shown on the drawings or specified herein.

D. Non-reduced size copper bus bars, rigidly supported on molded insulators, and fabricated for bolt-on type circuit breakers.

E. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type.

F. Mechanical lugs furnished with panelboards shall be cast, stamped, or machined metal alloys listed for use with the conductors to which they will be connected.

G. Neutral bus shall be 200% rated, mounted on insulated supports.

H. Grounding bus bar shall be equipped with screws or lugs for the connection of equipment grounding conductors.

I. Bus bars shall be braced for the available short-circuit current as shown on the drawings, but not be less than 10,000 A symmetrical for 120/208 V and 120/240 V panelboards, and 14,000 A symmetrical for 277/480 V panelboards.

J. In two-section panelboards, the main bus in each section shall be full size. The first section shall be furnished with subfeed lugs on the line side of main lugs only, or through-feed lugs for main breaker type panelboards, and have field-installed cable connections to the second section as shown on the drawings. Panelboard sections with tapped bus or crossover bus are not acceptable.

K. Series-rated panelboards are not permitted.

2.2 ENCLOSURES AND TRIMS

A. Enclosures:

1. Provide galvanized steel enclosures, with NEMA rating as shown on the drawings or as required for the environmental conditions in which installed.
2. Enclosures shall not have ventilating openings.
3. Enclosures may be of one-piece formed steel or of formed sheet steel with end and side panels welded, riveted, or bolted as required.
4. Provide manufacturer's standard option for prepunched knockouts on top and bottom endwalls.

5. Include removable inner dead front cover, independent of the panelboard cover.

B. Trims:
   1. Hinged “door-in-door” type.
   2. Interior hinged door with hand-operated latch or latches, as required to provide access only to circuit breaker operating handles, not to energized parts.
   3. Outer hinged door shall be securely mounted to the panelboard enclosure with factory bolts, screws, clips, or other fasteners, requiring a key or tool for entry. Hand-operated latches are not acceptable.
   4. Inner and outer doors shall open left to right.
   5. Trims shall be flush or surface type as shown on the drawings.

2.3 MOLDED CASE CIRCUIT BREAKERS

A. Circuit breakers shall be per UL, NEC, as shown on the drawings, and as specified.

B. Circuit breakers shall be bolt-on type.

C. Circuit breakers shall have minimum interrupting rating as required to withstand the available fault current, but not less than 120/240 V, Panelboard: 10,000 A symmetrical.

D. Circuit breakers shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for less than 400 A frame. Circuit breakers with 400 A frames and above shall have magnetic trip, adjustable from 5x to 10x. Breaker magnetic trip setting shall be set to maximum, unless otherwise noted.

E. Circuit breaker features shall be as follows:
   1. A rugged, integral housing of molded insulating material.
   2. Silver alloy contacts.
   3. Arc quenchers and phase barriers for each pole.
   4. Quick-make, quick-break, operating mechanisms.
   5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
   6. Electrically and mechanically trip free.
   7. An operating handle which indicates closed, tripped, and open positions.
   8. An overload on one pole of a multi-pole breaker shall automatically cause all the poles of the breaker to open.

9. Ground fault current interrupting breakers, shunt trip breakers, lighting control breakers (including accessories to switch line currents), or other accessory devices or functions shall be provided where shown on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the manufacturer's instructions, the NEC, as shown on the drawings, and as specified.

B. Locate panelboards so that the present and future conduits can be conveniently connected.

C. Install a printed schedule of circuits in each panelboard after approval by the Engineer of Record. Schedules shall reflect final load descriptions and the area of building connected to each circuit breaker. Schedules shall be printed on the panelboard directory cards and be installed in the appropriate panelboards

D. Mount panelboards such that the maximum height of the top circuit breaker above the finished floor shall not exceed 78 inches.

E. Provide blank cover for each unused circuit breaker mounting space.

F. Panelboard enclosures shall not be used for conductors feeding through, spliced, or tapping off to other enclosures or devices.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests:
   a. Compare equipment nameplate data with specifications and approved shop drawings.
   b. Inspect physical, electrical, and mechanical condition.
   c. Verify appropriate anchorage and required area clearances.
   d. Verify that circuit breaker sizes and types correspond to approved shop drawings.
   e. To verify tightness of accessible bolted electrical connections, use the calibrated torque-wrench method or perform thermographic survey after energization.
   f. Vacuum-clean enclosure interior.

3.3 FOLLOW-UP VERIFICATION

A. Upon completion of acceptance checks, settings, and tests, the Contractor shall demonstrate that the panelboards are in good operating condition and properly performing the intended function.

---END---

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of wiring devices.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Cables and wiring.

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents.

D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit and boxes.

E. Section 26 51 00, INTERIOR LIGHTING: Fluorescent ballasts and LED drivers for use with manual dimming controls.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.

B. National Fire Protection Association (NFPA):

70-14.....National Electrical Code (NEC)

99-15.....Health Care Facilities

C. National Electrical Manufacturers Association (NEMA):

WD 1-10.....General Color Requirements for Wiring Devices

WD 6-12 .....Wiring Devices – Dimensional Specifications

D. Underwriter’s Laboratories, Inc. (UL):

5-11.....Surface Metal Raceways and Fittings

20-10.....General-Use Snap Switches

231-08.....Power Outlets

467-13.....Grounding and Bonding Equipment

498-12.....Attachment Plugs and Receptacles

943-15.....Ground-Fault Circuit-Interrupters

1449-14.....Surge Protective Devices

1472-15.....Solid State Dimming Controls

PART 2 - PRODUCTS

2.1 RECEPTACLES

A. General: All receptacles shall comply with NEMA, NFPA, UL, and as shown on the drawings.
   1. Mounting straps shall be nickel plated brass, brass, nickel plated steel or galvanize steel with break-off plaster ears, and shall include a self-grounding feature. Terminal screws shall be brass, brass plated or a copper alloy metal.
   2. Receptacles shall have provisions for back wiring with separate metal clamp type terminals (four minimum) and side wiring from four captively held binding screws.

B. GFI Duplex Receptacles: single phase, 20 ampere, 120 volts, 2-pole, 3-wire, NEMA 5-20R, with break-off feature for two-circuit operation.
   1. Bodies shall be grey in color.
   2. Switched duplex receptacles shall be wired so that only the top receptacle is switched. The lower receptacle shall be unswitched.

C. Receptacles - 20, 30, and 50 ampere, 250 Volts: Shall be complete with appropriate cord grip plug.

D. Weatherproof Receptacles: Shall consist of a duplex receptacle, mounted in box with a gasketed, weatherproof, cast metal cover plate and cap over each receptacle opening. The cap shall be permanently attached to the cover plate by a spring-hinged flap. The weatherproof integrity shall not be affected when heavy duty plug caps are inserted. Cover plates on outlet boxes mounted flush in the wall shall be gasketed to the wall in a watertight manner.

2.2 TOGGLE SWITCHES

A. Toggle switches shall be totally enclosed tumbler type with nylon bodies. Handles shall be grey in color.
   1. Switches installed in hazardous areas shall be explosion-proof type in accordance with the NEC and as shown on the drawings.
   2. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self-grounding mounting strap with break-off plasters ears and provisions for back wiring with separate metal wiring clamps and side wiring with captively held binding screws.

3. Switches shall be rated 20 amperes at 120-277 Volts AC.

2.3 WALL PLATES

A. Wall plates for switches and receptacles shall be type 302 stainless steel. Oversize plates are not acceptable.

B. For receptacles or switches mounted adjacent to each other, wall plates shall be common for each group of receptacles or switches.

C. Duplex Receptacles on Emergency Circuit: Wall plates shall be red nylon with the word "EMERGENCY" engraved in 1/4 inch white letters.

2.4 SURFACE MULTIPLE-OUTLET ASSEMBLIES

A. Shall have the following features:

1. Enclosures:

a. Thickness of steel shall be not less than 0.040 inch for base and cover. Nominal dimensions shall be 1-1/2 inches by 2-3/4 inches with inside cross sectional area not less than 3-1/2 square inches. The enclosures shall be thoroughly cleaned, phosphatized, and painted at the factory with primer and the manufacturer's standard baked enamel finish.

2. Receptacles shall be duplex, standard grade GFI. See paragraph 'RECEPTACLES' in this Section. Device cover plates shall be the manufacturer's standard corrosion resistant finish and shall not exceed the dimensions of the enclosure.

3. Unless otherwise shown on drawings, receptacle spacing shall be 24 inches on centers.

4. Conductors shall be as specified in Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE.

5. Installation fittings shall be the manufacturer’s standard bends, offsets, device brackets, inside couplings, wire clips, elbows, and other components as required for a complete system.

6. Bond the assemblies to the branch circuit conduit system.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC and as shown as on the drawings.

B. Install wiring devices after wall construction and painting is complete.

C. The ground terminal of each wiring device shall be bonded to the outlet box with an approved green bonding jumper, and also connected to the branch circuit equipment grounding conductor.

D. Outlet boxes for toggle switches shall be mounted on the strike side of doors.

E. Provide barriers in multi-gang outlet boxes to comply with the NEC.

F. Coordinate the electrical work with the work of other trades to ensure that wiring device flush outlets are positioned with box openings aligned with the face of the surrounding finish material.

G. Exact field locations of floors, walls, partitions, doors, windows, and equipment may vary from locations shown on the drawings. Prior to locating sleeves, boxes and chases for roughing-in of conduit and equipment, the Contractor shall coordinate exact field location of the above items with other trades.

H. Install wall switches 48 inches above floor, with the toggle OFF position down.

I. Install receptacles 18 inches above floor, and 6 inches above counter backsplash or workbenches.

J. Install horizontally mounted receptacles with the ground pin to the right.

K. When required or recommended by the manufacturer, use a torque screwdriver. Tighten unused terminal screws.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform manufacturer’s required field checks in accordance with the manufacturer's recommendations, and the latest NFPA 99. In addition, include the following:

1. Visual Inspection and Tests:

a. Inspect physical and electrical conditions.

b. Vacuum-clean surface metal raceway interior. Clean metal raceway exterior.

c. Test wiring devices for damaged conductors, high circuit resistance, poor connections, inadequate fault current path, defective devices, or similar problems using a portable receptacle tester. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.

---END---

SECTION 26 29 21
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of fused and unfused disconnect switches (indicated as switches in this section), and separately-enclosed circuit breakers for use in electrical systems rated 600 V and below.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

D. Section 26 24 16, PANELBOARDS: Molded-case circuit breakers.

1.3 SUBMITTALS

A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1. Shop Drawings:
   a. Submit sufficient information to demonstrate compliance with applicable codes and specifications.
   b. Submit the following data for approval:
      1) Electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, fuses, circuit breakers, wiring and connection diagrams, accessories, and device nameplate data.
2. Manuals:
   a. Submit complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering fuses, circuit breakers, and replacement parts.
      1) Include schematic diagrams, with all terminals identified, matching terminal identification in the enclosed switches and circuit breakers.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the

extent referenced. Publications are referenced in the text by designation only.

B. International Code Council (ICC):

IBC-12.....International Building Code

C. National Electrical Manufacturers Association (NEMA):

FU 1-07.....Low Voltage Cartridge Fuses

KS 1-06.....Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)

D. National Fire Protection Association (NFPA):

70-11.....National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. (UL):

98-07.....Enclosed and Dead-Front Switches

248-00.....Low Voltage Fuses

489-09.....Molded Case Circuit Breakers and Circuit Breaker Enclosures

PART 2 - PRODUCTS

2.1 FUSED SWITCHES RATED 600 AMPERES AND LESS

A. Switches shall be in accordance with NEMA, NEC, UL, as specified, and as shown on the drawings.

B. Shall be NEMA classified General Duty (GD) for 240 V switches, and NEMA classified Heavy Duty (HD) for 480 V switches.

C. Shall be horsepower (HP) rated.

D. Shall have the following features:

1. Switch mechanism shall be the quick-make, quick-break type.
2. Copper blades, visible in the open position.
3. An arc chute for each pole.
4. External operating handle shall indicate open and closed positions, and have lock-open padlocking provisions.
5. Mechanical interlock shall permit opening of the door only when the switch is in the open position, defeatable to permit inspection.
6. Fuse holders for the sizes and types of fuses specified.
7. Solid neutral for each switch being installed in a circuit which includes a neutral conductor.
8. Ground lugs for each ground conductor.
9. Enclosures:

a. Shall be the NEMA types shown on the drawings.

b. Where the types of switch enclosures are not shown, they shall be the NEMA types most suitable for the ambient environmental conditions.

c. Shall be finished with manufacturer's standard gray baked enamel paint over pretreated steel.

2.2 UNFUSED SWITCHES RATED 600 AMPERES AND LESS

A. Shall be the same as fused switches, but without provisions for fuses.

2.3 MOTOR RATED TOGGLE SWITCHES

A. Type 1, general purpose for single-phase motors rated up to 1 horsepower.

B. Quick-make, quick-break toggle switch with external reset button and thermal overload protection matched to nameplate full-load current of actual protected motor.

2.4 SEPARATELY-ENCLOSED CIRCUIT BREAKERS

A. Provide circuit breakers in accordance with the applicable requirements in Section 26 24 16, PANELBOARDS.

B. Enclosures shall be the NEMA types shown on the drawings. Where the types are not shown, they shall be the NEMA type most suitable for the ambient environmental conditions.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the manufacturer's instructions, the NEC, as shown on the drawings, and as specified.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests:

a. Compare equipment nameplate data with specifications and approved shop drawings.

b. Inspect physical, electrical, and mechanical condition.

c. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method.

d. Vacuum-clean enclosure interior. Clean enclosure exterior.

---END---

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies the furnishing, installation, and connection of the interior lighting systems. The terms "lighting fixture," "fixture," and "luminaire" are used interchangeably.

1.2 RELATED WORK

A. Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT: Disposal of lamps.

B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

C. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

D. Section 26 27 26, WIRING DEVICES: Wiring devices used for control of the lighting systems.

1.3 SUBMITTALS

A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1. Manuals:

a. Submit, simultaneously with the complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.

2. Certifications: Two weeks prior to final inspection, submit the following.

a. Certification by the Contractor that the interior lighting systems have been properly installed and tested.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American National Standards Institute (ANSI):

C78.1-91.....Fluorescent Lamps - Rapid-Start Types - Dimensional and Electrical Characteristics

C78.376-01.....Chromaticity of Fluorescent Lamps

C. American Society for Testing and Materials (ASTM):

C635-07.....Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings

D. Environmental Protection Agency (EPA):

40 CFR 261.....Identification and Listing of Hazardous Waste

E. Federal Communications Commission (FCC):

CFR Title 47, Part 15...Radio Frequency Devices

CFR Title 47, Part 18...Industrial, Scientific, and Medical Equipment

F. Illuminating Engineering Society (IES):

LM-79-08.....Electrical and Photometric Measurements of Solid-State Lighting Products

LM-80-08.....Measuring Lumen Maintenance of LED Light Sources

LM-82-12.....Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature

G. Institute of Electrical and Electronic Engineers (IEEE):

C62.41-91.....Surge Voltages in Low Voltage AC Power Circuits

H. International Code Council (ICC):

IBC-12.....International Building Code

I. National Fire Protection Association (NFPA):

70-11.....National Electrical Code (NEC)

101-12.....Life Safety Code

J. National Electrical Manufacturer's Association (NEMA):

C82.1-04.....Lamp Ballasts – Line Frequency Fluorescent Lamp Ballasts

C82.2-02.....Method of Measurement of Fluorescent Lamp Ballasts

C82.4-02.....Lamp Ballasts - Ballasts for High-Intensity Discharge and Low-Pressure Sodium (LPS) Lamps (Multiple-Supply Type)

C82.11-11.....Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts

LL-9-09.....Dimming of T8 Fluorescent Lighting Systems

SSL-1-10.....Electronic Drivers for LED Devices, Arrays, or Systems

K. Underwriters Laboratories, Inc. (UL):

496-08.....Lampholders
542-0599.....Fluorescent Lamp Starters
844-12.....Luminaires for Use in Hazardous (Classified) Locations
924-12.....Emergency Lighting and Power Equipment
935-01.....Fluorescent-Lamp Ballasts
1029-94.....High-Intensity-Discharge Lamp Ballasts
1029A-06.....Ignitors and Related Auxiliaries for HID Lamp Ballasts
1598-08.....Luminaires
1574-04.....Track Lighting Systems
2108-04.....Low-Voltage Lighting Systems
8750-09.....Light Emitting Diode (LED) Light Sources for Use in Lighting Products

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES

A. Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by captive screws, chains, aircraft cable, captive hinges, or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.

B. Metal, Interior light reflecting and Exterior Finishes:
   1. See E-conolight Specification for LED Low Bay E-ALB Series Specification, Attachment 'A'.

C. Lighting fixtures shall have a specific means for grounding metallic wireways and housings to an equipment grounding conductor.

2.2 EMERGENCY LIGHTING UNIT / LED EXIT LIGHT FIXTURES

A. Complete, self-contained unit with batteries, battery charger, one or more local or remote lamp heads with lamps, under-voltage relay, and test switch.
   1. Enclosure: Shall be impact-resistant thermoplastic. Enclosure shall be suitable for the environmental conditions in which installed.
   2. Lamp Heads: Horizontally and vertically adjustable, mounted on the face of the unit, except where otherwise indicated.
   3. Lamps: Shall be sealed-beam MR-16 halogen, rated not less than 12 watts at the specified DC voltage.

4. Battery: Shall be maintenance-free nickel-cadmium. Minimum normal life shall be minimum of 10 years.
5. Battery Charger: Dry-type full-wave rectifier with charging rates to maintain the battery in fully-charged condition during normal operation, and to automatically recharge the battery within 12 hours following a 1-1/2 hour continuous discharge.
6. Integral Self-Test: Automatically initiates test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing LED.

B. Exit light fixtures shall meet applicable requirements of NFPA and UL.

C. Housing and door shall be die-cast aluminum.

D. For general purpose exit light fixtures, door frame shall be hinged, with latch. For vandal-resistant exit light fixtures, door frame shall be secured with tamper-resistant screws.

E. Finish shall be satin or fine-grain brushed aluminum.

F. There shall be no radioactive material used in the fixtures.

G. Fixtures:
1. Inscription panels shall be cast or stamped aluminum a minimum of 0.090 inch thick, stenciled with 6 inch high letters, baked with red color stable plastic or fiberglass. Lamps shall be luminous Light Emitting Diodes (LED) mounted in center of letters on red color stable plastic or fiberglass.
2. Double-Faced Fixtures: Provide double-faced fixtures where required or as shown on drawings.
3. Directional Arrows: Provide directional arrows as part of the inscription panel where required or as shown on drawings. Directional arrows shall be the "chevron-type" of similar size and width as the letters and meet the requirements of NFPA 101.

H. Voltage: Multi-voltage (120 – 277V).

2.3 LAMPS

A. High Intensity Discharge Lamps:
1. Pulse-Start, Metal-Halide Lamps: Minimum CRI >/= 70, color temperature 5000°K, and average rated life of 100,000 hours.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, manufacturer's instructions, and as shown on the drawings or specified.

B. Align, mount, and level the lighting fixtures uniformly.

C. Wall-mounted fixtures shall be attached to the studs in the walls, or to a 20 gauge metal backing plate that is attached to the studs in the walls.

D. Lighting Fixture Supports:

1. Shall provide support for all of the fixtures. Supports may be anchored to channels of the ceiling construction, to the structural slab or to structural members within a partition, or above a suspended ceiling.
2. Shall maintain the fixture positions after cleaning and relamping.
3. Shall support the lighting fixtures without causing the ceiling or partition to deflect.
4. Single pendant-mounted lighting fixtures:
   a. Each stem shall be supported by an approved outlet box mounted swivel joint and canopy which holds the stem captive and provides spring load (or approved equivalent) dampening of fixture oscillations. Outlet box shall be supported vertically from the building structure.
5. Outlet boxes for support of lighting fixtures (where permitted) shall be secured directly to the building structure with approved devices or supported vertically in a hung ceiling from the building structure with a nine gauge wire hanger, and be secured by an approved device to a main ceiling runner or cross runner to prevent any horizontal movement relative to the ceiling.//

E. Furnish and install the new lamps as specified for all lighting fixtures installed under this project

F. Bond lighting fixtures to the grounding system as specified in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

G. At completion of project, replace all defective components of the lighting fixtures at no cost to the Town of Riverhead.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform the following:

1. Visual Inspection:
   a. Verify proper operation by operating the lighting controls.
   b. Visually inspect for damage to fixtures, lenses, reflectors, diffusers, and louvers. Clean fixtures, lenses, reflectors, diffusers, and louvers that have accumulated dust, dirt, or fingerprints during construction.

2. Electrical tests:

   b. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by the Town of Riverhead. Burn-in period to be 40 hours minimum, unless specifically recommended otherwise by the lamp manufacturer.

3.3 FOLLOW-UP VERIFICATION

A. Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that the lighting systems are in good operating condition and properly performing the intended function.

---END---

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the furnishing, installation, and connection of exterior fixtures. The terms "lighting fixtures", "fixture" and "luminaire" are used interchangeably.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low voltage power and lighting wiring.

C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings, and boxes for raceway systems.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. Aluminum Association Inc. (AA):

AAH35.1-06.....Alloy and Temper Designation Systems for Aluminum

C. American Association of State Highway and Transportation Officials (AASHTO):

32-LTS-6.....Structural Supports for Highway Signs, Luminaires and Traffic Signals

D. American Concrete Institute (ACI):

318-05 .....Building Code Requirements for Structural Concrete

E. American National Standards Institute (ANSI):

C81.61-09 .....Electrical Lamp Bases – Specifications for Bases (Caps) for Electric Lamps

F. American Society for Testing and Materials (ASTM):

A123/A123M-12 .....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A153/A153M-09.....Zinc Coating (Hot-Dip) on Iron and Steel Hardware

B108-03a-08 .....Aluminum-Alloy Permanent Mold Castings

C1089-13 .....Spun Cast Prestressed Concrete Poles

G. Federal Aviation Administration (FAA):

AC 70/7460-IK-07.....Obstruction Lighting and Marking

AC 150/5345-43F-06.....Obstruction Lighting Equipment

H. Illuminating Engineering Society of North America (IESNA):

HB-9-00.....Lighting Handbook

RP-8-05.....Roadway Lighting

LM-52-03.....Photometric Measurements of Roadway Sign Installations

LM-72-10.....Directional Positioning of Photometric Data

LM-79-08.....Approved Method for the Electrical and Photometric Measurements of Solid-Sate Lighting Products

LM-80-08.....Approved Method for Measuring Lumen Maintenance of LED Light Sources

TM-15-07.....Backlight, Uplight and Glare (BUG) Ratings

I. National Electrical Manufacturers Association (NEMA):

C78.41-06.....Electric Lamps – Guidelines for Low-Pressure Sodium Lamps

C78.42-07 .....Electric Lamps – Guidelines for High-Pressure Sodium Lamps

C78.43-07 .....Electric Lamps – Single-Ended Metal-Halide Lamps

C78.1381-98.....Electric Lamps – 70-Watt M85 Double-Ended Metal-Halide Lamps

C82.4-02 .....Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)

C136.3-05 .....For Roadway and Area Lighting Equipment – Luminaire Attachments

C136.17-05 .....Roadway and Area Lighting Equipment – Enclosed Side-Mounted Luminaires for Horizontal-Burning High-Intensity-Discharge Lamps – Mechanical Interchangeability of Refractors

ICS 2-00 (R2005) .....Controllers, Contactors and Overload Relays Rated 600 Volts

ICS 6-93 (R2006) .....Enclosures

J. National Fire Protection Association (NFPA):

70-11 .....National Electrical Code (NEC)

K. Underwriters Laboratories, Inc. (UL):

496-08 .....Lampholders

773-95.....Plug-In, Locking Type Photocontrols for Use with Area Lighting

773A-06 .....Nonindustrial Photoelectric Switches for Lighting Control

1029-94.....High-Intensity-Discharge Lamp Ballasts

1598-08 .....Luminaires

8750-09.....Light Emitting Diode (LED) Equipment for Use in Lighting Products

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

Luminaires, materials and equipment shall be in accordance with NEC, UL, ANSI, and as shown on the drawings and specified.

2.2 LUMINAIRES

A. Luminaires shall be weatherproof, heavy duty, outdoor types designed for efficient light utilization, adequate dissipation of lamp and ballast heat, and safe cleaning and relamping.

B. Illumination distribution patterns, BUG ratings and cutoff types as defined by the IESNA shall be as shown on the drawings.

C. Incorporate ballasts in the luminaire housing.

D. Lenses shall be frame-mounted, heat-resistant, borosilicate glass, with prismatic refractors, unless otherwise shown on the drawings.

E. Pre-wire internal components to terminal strips at the factory.

G. Faterials shall be rustproof. Latches and fittings shall be non-ferrous metal.

G. Provide manufacturer's standard finish.

H. Luminaires shall carry factory labels, showing complete, specific lamp and ballast information.

2.5 LAMPS

A. Install the proper lamps in every luminaire.

B. Lamps shall be general-service, outdoor lighting types.

C. LED sources shall meet the following requirements:

1. Operating temperature rating shall be between -40 degrees F and 104 degrees F.
2. Correlated Color Temperature (CCT): 200K
3. Color Rendering Index (CRI): ≥ 85.
4. The manufacturer shall have performed reliability tests on the LEDs luminaires complying with Illuminating Engineering Society (IES) LM79 for photometric performance and LM80 for lumen maintenance and L70 life.

D. Mercury vapor lamps shall not be used.

2.9 LED DRIVERS

A. LED drivers shall meet the following requirements:
1. Drivers shall have a minimum efficiency of 85%.
2. Starting Temperature: -40 degrees C (-40 degrees F).
3. Input Voltage: 120 to 480 (±10%) volt.
4. Power Supplies: Class I or II output.
5. Surge Protection: The system must survive 250 repetitive strikes of "C Low" (C Low: 6kV/1.2 x 50 µs, 10kA/8 x 20 µs) waveforms at 1-minute intervals with less than 10% degradation in clamping voltage. "C Low" waveforms are as defined in IEEE/ASNI C62.41.2-2002, Scenario 1 Location Category C.
6. Power Factor (PF): ≥ 0.90.
7. Total Harmonic Distortion (THD): ≤ 20%.
8. Comply with FCC Title 47 CFR Part 18 Non-consumer RFI/EMI Standards.
9. Drivers shall be reduction of hazardous substances (ROHS)-compliant.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lighting in accordance with the NEC, as shown on the drawings, and in accordance with manufacturer's recommendations.

B. Install lamps in each luminaire.

C. Adjust luminaires that require field adjustment or aiming.

3.2 GROUNDING

Ground noncurrent-carrying parts of equipment, including luminaires, mounting arms, brackets, and metallic enclosures, as specified in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS. Where copper grounding conductor is connected to a metal other than copper, provide specially-treated or lined connectors suitable and listed for this purpose.

3.3 ACCEPTANCE CHECKS AND TESTS

Verify operation after installing luminaires and energizing circuits.

- - - E N D - - -

SECTION 31 20 00
EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. This section specifies the requirements for furnishing all equipment, materials, labor, tools, and techniques for earthwork including, but not limited to, the following:
   1. Site preparation.
   2. Excavation.
   3. Filling and backfilling.
   4. Grading.
   5. Soil Disposal
   6. Clean Up.

1.2 DEFINITIONS:

A. Unsuitable Materials:
   1. Fills: Topsoil; frozen materials; construction materials and materials subject to decomposition; clods of clay and stones larger than 3 inches; organic material, including silts, which are unstable; and inorganic materials, including silts, too wet to be stable and any material with a liquid limit and plasticity index exceeding 40 and 15 respectively.
   2. Existing Subgrade (Except Footing Subgrade): Same materials as 1.2.A.1, that are not capable of direct support of slabs, pavement, and similar items with possible exception of improvement by compaction, proofrolling, or similar methods.
   3. Existing Subgrade (Footings Only): Same as paragraph 1, but no fill or backfill. If materials differ from design requirements, excavated to acceptable strata subject to Engineer of Record’s approval.

B. Building Earthwork: Earthwork operations required in area enclosed by a line located 5 feet outside of principal building perimeter.

C. Trench Earthwork: Trench work required for utility lines.

D. Degree of compaction: Degree of compaction is expressed as a percentage of maximum density obtained by laboratory test procedure. This percentage of maximum density is obtained through use of data provided from results of field test procedures presented in ASTM D1556, ASTM D2167, and ASTM D6938.

E. Fill: Satisfactory soil materials used to raise existing grades. In the Construction Documents, the term “fill” means fill or backfill as appropriate.

F. Backfill: Soil materials or controlled low strength material used to fill an excavation.

G. Unauthorized excavation: Removal of materials beyond indicated sub-grade elevations or indicated lines and dimensions without written authorization by the Engineer of Record. No payment will be made for unauthorized excavation or remedial work required to correct unauthorized excavation.

H. Authorized additional excavation: Removal of additional material authorized by the Engineer of Record based on the determination by the Contractor’s soils testing agency that unsuitable bearing materials are encountered at required sub-grade elevations. Removal of unsuitable material and its replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.

I. Subgrade: The undisturbed earth or the compacted soil layer immediately below granular sub-base, drainage fill, or topsoil materials.

J. Structure: Buildings, foundations, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

K. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

L. Drainage course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

M. Bedding course: Layer placed over the excavated sub-grade in a trench before laying pipe. Bedding course shall extend up to the springline of the pipe.

N. Sub-base Course: Layer placed between the sub-grade and base course for asphalt paving or layer placed between the sub-grade and a concrete pavement or walk.

O. Utilities include on-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

P. Debris: Debris includes all materials located within the designated work area not covered in the other definitions and shall include but not be limited to items like vehicles, equipment, appliances, building materials or remains thereof, tires, any solid or liquid chemicals or products stored or found in containers or spilled on the ground.

1.3 RELATED WORK:

A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

B. Safety requirements: Section 00 72 00, CONDITIONS OF CONTRACT, Article 22, PROTECTION OF WORK PERSONAL PROPERTY.

C. Protection of existing utilities, fire protection services, existing equipment, roads, and pavements: Section 00 72 00, CONDITIONS OF CONTRACT, Article 22, PROTECTION OF WORK PERSONAL PROPERTY.

D. Subsurface Investigation: Section 01 00 00, GENERAL REQUIREMENTS, Article, PHYSICAL DATA.

E. Erosion Control: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROL

1.4 CLASSIFICATION OF EXCAVATION:

A. Unclassified Excavation: Removal and disposal of pavements and other man-made obstructions visible on surface; utilities, and other items including underground structures indicated to be demolished and removed; together with any type of materials regardless of character of material and obstructions encountered.

B. Classified Excavation: Removal and disposal of all material not defined as Rock.

C. Furnish to Town of Riverhead Engineer:

1. Contractor shall submit procedure and location for disposal of unused satisfactory material (material usable for fill and grading to be reserved on site – coordinate w/ Town Highway Superintendent for stockpile location).

1.5 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Association of State Highway and Transportation Officials (AASHTO):

T99-10.....Standard Method of Test for Moisture-Density Relations of Soils Using a 5.5lb Rammer and a 12 inch) Drop

T180-10.....Standard Method of Test for Moisture-Density Relations of Soils using a 10lb Rammer and a 18 inch Drop

C. American Society for Testing and Materials (ASTM):

C33-03.....Concrete Aggregate

D448-08.....Standard Classification for Sizes of Aggregate for Road and Bridge Construction

D698-07e1.....Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft. lbf/ft^3 (600 kN m/m^3))

D1140-00.....Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve

D1556-07.....Standard Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method

D1557-09.....Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN m/m^3))

D2167-08.....Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

D2487-11.....Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)

D2940-09.....Standard Specifications for Graded Aggregate Material for Bases or Subbases for Highways or Airports

D6938-10.....Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth

D. Society of Automotive Engineers (SAE):

J732-07.....Specification Definitions - Loaders

J1179-08.....Hydraulic Excavator and Backhoe Digging Forces

PART 2 - PRODUCTS

2.1 MATERIALS:

A. General: Provide borrow soil material when sufficient satisfactory soil materials are not available from excavations.

B. Fills: Material in compliance with ASTM D2487 Soil Classification Groups GW, GP, GM, SW, SP, SM, SC, and ML, or any combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious

matter. Material approved from on site or off site sources having a minimum dry density of 110 pcf, a maximum Plasticity Index of 15, and a maximum Liquid Limit of 40.

C. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 1 inch sieve and not more than 8 percent passing a No. 200 sieve.

D. Granular Fill:

1. Under concrete slab, - granular fill shall consist of clean, poorly graded crushed rock, crushed gravel, or uncrushed gravel placed beneath a building slab with or without a vapor barrier to cut off the capillary flow of pore water to the area immediately below. Fine aggregate grading shall conform to ASTM C 33 with a maximum of 3 percent by weight passing ASTM D 1140, 1-1/2 inches and no more than 2 percent by weight passing the coarse aggregate Size 57.

E. Buried Warning and Identification Tape: Polyethylene plastic, metallic core or metallic-faced, acid- and alkali-resistant polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specific below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, Unaffected by moisture or soil. Warning tape color codes:

Red:	Electric
Yellow:	Gas, Oil, Dangerous Materials
Orange:	Telephone and Other Communications
Blue:	Water Systems
Green:	Sewer Systems
White:	Steam Systems
Gray:	Compressed Air

F. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

G. Detectable Warning Tape for Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

H. Detection Wire for Non-Metallic Piping: Detection wire shall be Insulated single strand, solid copper with a minimum of 12 AWG.

PART 3 - EXECUTION

3.1 SITE PREPARATION:

A. Lines and Grades: Registered Professional Land Surveyor, specified in Section 01 00 00, GENERAL REQUIREMENTS, shall establish lines and grades.

1. Grades shall conform to elevations indicated on plans within the tolerances herein specified. Generally grades shall be established to provide a smooth surface, free from irregular surface changes. Grading shall comply with compaction requirements and grade cross sections, lines, and elevations indicated. Where spot grades are indicated the grade shall be established based on interpolation of the elevations between the spot grades while maintaining appropriate transition at structures and paving and uninterrupted drainage flow into inlets.
2. Locations of existing topographic contour elevations indicated on plans are accurate to the best of the Engineer of Records' knowledge. Contractor is responsible to notify Engineer of Record of any differences between existing elevations shown on plans and those encountered on site by Surveyor/Engineer described above.
3. Subsequent to establishment of lines and grades, Contractor will be responsible for any additional cut and/or fill required to ensure that site is graded to conform to elevations indicated on plans.

B. Disposal: All materials removed from the property shall be disposed of at a legally approved site, for the specific materials, and all removals shall be in accordance with all applicable Federal, State and local regulations.

3.2 EXCAVATION:

A. Subgrade Protection: Protect subgrades from softening, undermining, washout, or damage by rain or water accumulation. Reroute surface water runoff from excavated areas and not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches. When subgrade for foundations has been disturbed by water, remove disturbed material to firm undisturbed material after water is brought under control. Replace disturbed subgrade in trenches with concrete or material approved by the Engineer of Record.

B. Building Earthwork:

1. Excavation shall be accomplished as required by drawings and specifications.
2. Excavate foundation excavations to solid undisturbed subgrade.
3. Remove loose or soft materials to a solid bottom.
4. Fill excess cut under footings or foundations with 3000 psi concrete poured separately from the footings.
5. Do not tamp earth for backfilling in footing bottoms, except as specified.
6. Slope grades to direct water away from excavations and to prevent ponding.
7. Capillary water barrier (granular fill) under concrete floor and area-way slabs on grade shall be placed directly on the subgrade and shall be compacted with a minimum of two passes of a hand-operated plate-type vibratory compactor.
8. Ensure that footing subgrades have been inspected and approved by the Engineer of Record prior to concrete placement.

C. Trench Earthwork:

1. Utility trenches (except sanitary and storm sewer):
   a. Excavate to a width as necessary for sheeting and bracing and proper performance of the work.
   b. Grade bottom of trenches with bell holes scooped out to provide a uniform bearing.
   c. Support piping on suitable undisturbed earth unless a mechanical support is shown. Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 6 inches loose thickness.
   d. Length of open trench in advance of piping laying shall not be greater than is authorized by the Engineer of Record.

e. Provide buried utility lines with utility identification tape. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade

f. Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inches above the top of pipe. The wire shall extend continuously and unbroken, from building to building. The ends of the wire shall terminate inside the building at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each building.

g. Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above the utility pipe or conduit. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Backfill to top of pipe shall be compacted to 95 percent of ASTM D 698 maximum density. Plastic piping shall have bedding to spring line of pipe. Provide materials as follows:

1) Class I: Angular, 0.25 to 1.5 inches, graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.

2) Class II: Course sands and gravels with maximum particle size of 1.5 inches, including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D2487.

3.3 FILLING AND BACKFILLING:

A. General: Do not fill or backfill until all debris, water, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from excavation. For fill and backfill, use excavated materials and borrow meeting the criteria specified herein, as applicable. Borrow will be supplied at no additional cost to the Town. Do not use unsuitable excavated materials. Do not backfill until foundation walls have been completed above grade and adequately braced, waterproofing or dampproofing applied, foundation drainage, and pipes

coming in contact with backfill have been installed and work inspected and approved by the Engineer of Record.

B. Placing: Place materials in horizontal layers not exceeding 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers and then compacted. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure. Place no material on surfaces that are muddy, frozen, or contain frost.

C. Compaction: Compact with approved tamping rollers, sheepsfoot rollers, pneumatic tired rollers, steel wheeled rollers, vibrator compactors, or other approved equipment (hand or mechanized) well suited to soil being compacted. Do not operate mechanized vibratory compaction equipment within 10 feet of new or existing building walls without prior approval from the Engineer of Record. Moisten or aerate material as necessary to provide moisture content that will readily facilitate obtaining specified compaction with equipment used. Backfill adjacent to any and all types of structures shall be placed and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials to prevent wedging action or eccentric loading upon or against the structure. Compact soil to not less than the following percentages of maximum dry density, according to ASTM D698 or ASTM D1557 as specified below:

1. Fills, Embankments, and Backfill
   a. Under proposed structures, building slabs, steps, and paved areas, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material in accordance with AASHTO (or 95 percent).
2. Natural Ground (Cut or Existing)
   a. Under building slabs, steps and paved areas, top 6 inches, in accordance with AASHTO (or 95 percent).

3.4 GRADING:

A. General: Uniformly grade the areas within the limits of this section, including adjacent transition areas. Smooth the finished surface within specified tolerance. Provide uniform levels or slopes between points where elevations are indicated, or between such points and existing finished grades. Provide a smooth transition between abrupt changes in slope.

B. Slope backfill outside building away from building walls for a minimum distance of 6 feet.

C. Finished grade shall be at least 6 inches below bottom line of window or other building wall openings unless greater depth is shown.

3.5 DISPOSAL OF UNSUITABLE AND EXCESS EXCAVATED MATERIAL:

A. Disposal: Remove surplus waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off property.

B. Place excess excavated materials suitable for fill and/or backfill on site where directed by the Town Highway Superintendent.

3.6 CLEAN UP:

Upon completion of earthwork operations, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, free of debris, and suitable for subsequent construction operations. Remove all debris, rubbish, and excess material from area of work.

----- E N D -----

TOWN OF RIVERHEAD (PF-9)

HIGHWAY DEPT STORAGE BUILDING **BID SHEET** - XX/ XX/2016 - 11:00AM

Contractor Name:

ITEM #1-BUILDING AND RELATED COMPONENTS (PER PLAN SCOPE/SPECS)

	Estimated Quantity	Unit Price	Bid Price
Base Bid: BUILDING AND RELATED COMPONENTS			
Mobilization/Bonds/Insurances	Lump Sum	N/A	
PURCHASE AND DELIVER BUILDING TO SITE (COMPLETE)	Lump Sum	N/A	
EXCAVATION/BACKFILL/FINAL GRADE	Lump Sum	N/A	
FOOTINGS/FOUNDATION/SLAB PREP AND SLAB	Lump Sum	N/A	
ERECT BUILDING (COMPLETE)	Lump Sum	N/A	
ELECTRIC	Lump Sum	N/A	
HEATING	Lump Sum	N/A	
SOIL TESTING AND CERTIFICATION	Lump Sum	N/A	
SURVEYING	Lump Sum	N/A	
SITE DRAINAGE	Lump Sum	N/A	
TOTAL BASE BID: BUILDING AND RELATED COMPONENTS			

Alternate 1: Required for Item #1			
CREDIT FOR EXCAVATION, BACKFILL, GRADING BY OTHERS	Lump Sum	N/A	
CREDIT FOR SUBSURFACE DRAINAGE BY OTHERS	Lump Sum	N/A	

BID NOTE: CONTRACTOR REQUIRED TO FILE FOR AND OBTAIN BUILDING PERMIT

Bid Bond ☐
Proposal ☐
Non Collusion ☐

Affidavits ☐
Disclosure ☐
☐

GENERAL NOTES:

1. Drawings are not to be scaled, dimensions to govern. The Engineer of Record shall be notified of any discrepancies.

2. Special care shall be taken to assure minimum disruption of all occupied premises, existing improvements and utilities.

3. General Contractor shall protect the safety of the general public by erecting all required barricades to permit safe passage during construction.

4. No material substitution shall be made without informing the engineer prior to commencement of work.

5. All materials are to be new as specified per construction documents. Any used fixtures or used materials are not acceptable except as noted.

6. General Contractor shall coordinate his work with the work of all other contractors, and Town Highway Superintendent.

7. General Contractor shall make good at his own expense for glass broken during construction. reasonable care shall be taken to protect all areas to remain as is.

8. Upon completing of all work by GC, and others, general contractor shall clean entire area including glass, mirror, interior and exterior windows, vinyl base, flooring, carpeting and all other finished surfaces.

9. All windows to be cleaned and any paint or residue on the glass to be removed.

10. All materials will be inspected and all defects and irregularities in materials and color matches or other special situations which require additional consideration shall be brought to the attention of the Engineer of Record for approval prior to installation.

11. All manufacturer's instructions shall be followed completely.

12. Remove all debris at end of each work day in order to assure a clean and well kept environment.

13. HVAC, Plumbing and Electrical Contractors are responsible for sign-off from building department upon completion of job.

14. Contractor shall level all floor surfaces and flash patch as required to receive new scheduled finish.

15. All work shall be guaranteed for a period of of one year unless otherwise noted. all contractors shall submit this guarantee in writing with request for final payment.

16. All materials used shall be of fire retardent quality.

17. General Contractor shall visit the site and verify all job conditions, dimensions and details prior to construction. The Engineer of Record shall be notified of any discrepancies or omissions which would interfere with the satisfactory completion of the work, prior to the start of construction.

18. Interior finish shall be class a per part 7.7.2.

19. Concealed spaces within wall, ceiling, partition, floor, stair, attic or cornice construction and around chimney, pipe and duct openings shall be fire-stopped in accordance with part 7.7.1.5.

20. General Contractor shall furnish the following insurance coverage: public liability, property damage, automobile liability, workman's compensation, etc., in amounts as specified by the local department of buildings and landlord. general contractor shall obtain and pay for all required permits, prior to commencing any work.

21. All work shall comply with state and local codes and regulations, (latest edition), and shall be subject to inspection and approval by all authorities having jurisdiction.

GENERAL MECHANICAL NOTES

1. Mechanical (heating, ventilating , air conditioning and plumbing Contractors shall coordinate all ductwork, piping, air distribution devices and other mechanical and plumbing work with other building trades such as Architectural, Electrical, Plumbing, and Building Structure to avoid conflicts and delays.

2. All duct connections to all air moving equipment shall be made with asbestos free flexible connections.

3. It is the responsibility of the Contractor to submit the size and design and the types of mechanical systems that will be used in sufficient detail as required by the Building Department.

4. The room thermostats shall be installed at same elevation as light switches.

5. All refrigerant suction lines and condensate drain lines, inside the building, shall be insulated with fiberglass insulation Johns Manville Micro Lok 650 or approved equal. Outdoor suction line shall be insulated with Johns Manville Aerotube Foamed Plastic insulation.

Pipe Sizes	Insulation Thickness
Suction Lines	1"
Condensate Drain Lines . .	1/2"

6. All ductwork shall be fabricated of galvanized steel sheets. They shall be fabricated and installed as per latest SMACNA Standards unless shown or rated otherwise. All transverse joints shall be pocket locks. All longitudinal joints shall be Pittsburgh locks. All internal and external duct insulation shall be applied as per latest SMACNA Standards.

7. All insulation and accessories, except aerotube, shall comply with all requirements of ASTM E-84, NFPA 225 and UL 723 and flame spread rating shall not be greater than 25 and smoke developed not to exceed 50.

8. All refrigerant lines shall be properly supported.

9. All air systems shall be cleaned after installation and shall be properly balanced using properly calibrated balancing devices. Type written balancing reports shall be submitted to the Engineer of Record.

10. After installation, all refrigerant systems shall be cleaned and charged with refrigerant and lubrication oil, and shall be put in satisfactorily operation conditions.

11. Refrigerant lines shall be Type - L copper tubing with sweat-type wrought copper fittings.

12. Mechanical and Plumbing Contractors shall apply for all required permits. They shall pay for all permit fees and other associated charges. The Contractors shall also provide all required cost estimates to Town and to local authorities to determine permit fees, if required.

13. The condensate drain lines shall be of Sch. 40 PVC.

14. Exact locations of all grilles and diffusers shall be field coordinated.

15. All rigid round ductwork shall be externally insulated with 1 1/2" thick external insulation. The insulation shall be Johns Manville Series "R" Microlite Fiberglass Duct Wrap with Kraft-Scrim-Foil vapor barrier jacket.

16. Where metal ducts pass through a fire rated assembly, U.L. listed fire dampers shall be properly installed.

17. All ceiling supply air diffusers shall have four-way throws unless shown otherwise.

18. All ductwork shall be installed in bays, and exposed where there is no ceiling.

19. Flexible ducts and connectors shall not pass through any wall, floor, ceiling or fire rated assembly.

20. Flexible duct (10' limit) shall be insulated type and rated for 6 inches of positive, 1 1/4 inches of negative pressure, and 4000 FPM maximum velocity and shall comply with all requirements of City, UL-181, and NFPA 90A and 90B. Flexible duct shall be Certainteed Certaflex-25 or approved equal Thermaflex, or Flexmaster.

21. All insulation and accessories shall comply with all requirements of ASTM E-84, NFPA 225, and UL 723 and flame spread rating shall not be greater than 25 and smoke developed not to exceed 50.

22. The Contractors shall supply for approval six (6) copies of shop drawings to completely identify the quality of materials and/or equipment intended for installation.

23. The submission of a bid or proposal will be construed as evidence that the Contractor has familiarized himself with the plans and building site. Claims made subsequent to the proposal for materials and/or labor due to difficulties encountered will not be recognized unless the difficulties could not have been foreseen even though proper examination had been made.

24. All condensate lines shall be sloped minimum 1/8" per linear foot of run. All drain exits from A/C units shall include a trap and clean-out plug. Condensate drain line shall be mounted on 4" x 4" wood blocks.

25. The equipment rough-ins as shown are accurate to the best of our knowledge. However, in some instances the Town or supplier may substitute or the equipment item may vary from what is shown. Therefore the Contractor shall verify all critical dimensions prior to construction. Failure to verify dimensions shall place the responsibility for any subsequent relocation directly upon the Contractor.

GENERAL ELECTRICAL NOTES

1. The equipment rough-ins as shown are accurate to the best of our knowledge. However, in some instances the Town or Supplier may substitute or the equipment may vary from what is shown. Therefore, the Contractor shall verify all critical dimensions with the Town prior to construction. Failure of the Contractor to verify those dimensions shall place the responsibility for any subsequent relocation directly upon the Contractor.

2. All work shall be done in accordance with the latest edition of the N.E.C. and state and local codes as they apply.

3. Starters and related wiring shall be installed by Electrical Contractor. Overload units shall be installed as per given name plate data on equipment. Except for such items as are normally supplied with starters installed at their point of manufacture, all starters shall be supplied and installed by the Electrical Contractor. The Electrical Contractor shall mount all such starters as directed; and shall furnish supporting structures where necessary.

4. All fees associated with construction and inspection shall be borne by the Contractor in order to deliver to the Owner a finished building ready for occupancy and 100% operational.

5. Two (2) copies of operation and maintenance manuals for equipment herein installed shall be given to the Town prior to acceptance of the building for occupancy.

6. All panelboards and disconnect switches shall be labeled with respect to their title, voltage, amps and phase: i.e. "Panel A" 120/208/3PH,4W,100 AMP Label shall be phenolic plastic with white letters and black background. Labels shall be permanently fixed to equipment.

7. Panelboards shall contain a typewritten directory with a plastic cover affixed to the inside door.

8. Contractor shall submit six (6) of shop drawings to the Engineer of Record for approval for all equipment and devices installed.

9. Any deviation from plans without prior approval of the Engineer of Record shall be cause for the rejection of materials and/or methods, and any cost incurred to correct such deviation to the satisfaction of the Engineer of Record shall be borne by the Contractor.

10. Any costs incurred due to the lack of cooperation among trades shall be borne the Contractors.

11. The submission of a proposal shall be construed as evidence that the Contractor has familiarized himself with the plans and building site. Claims made subsequent to the proposal for materials and labor, because of difficulties encountered will not be recognized.

12. Trade names are given to clarify type of product and quality desired. Substitutions may be made pending approval of the Engineer of Record, unless other wise noted.

13. Contractors shall verify service voltage with utility company and revise service and balance load as required. If contractor is not qualified to revise service, contact the Town.

14. All remote equipment on roof or grounds shall have a disconnect switch at each piece of equipment.

15. All exterior receptacles, junction boxes, and equipment shall be weatherproof.

16. It shall be this Contractor's responsibility prior to any individual circuit's installation, to verify with all other trades concerned that the circuit with devices as drawn is adequate in size and make-up for the mechanical equipment to be installed. If any conflict in voltage, phase , or load is encountered that would alter the circuit size, this Contractor shall notify the Engineer of Record and/or the Town immediately. Failure to verify these requirements shall place the responsibility for any subsequent circuit change directly upon the Contractor.

17. All exterior conduit for wiring should be minimized by routing in ceiling space. No exterior conduit will be accepted unless noted otherwise.

18. Refer to the mechanical drawings for the location of thermostats, air conditioning units, and other special equipment. Electrical Contractor is responsible for the installation of all conduits, junction boxes, disconnect switches, and control and power wiring for thermostats.

19. Contractor shall be responsible to verify the available short circuit current at the supply terminals from the Power Company. If let through current at service disconnect switch is greater than 10,000 AIC, contact the Engineer of Record.

20. All equipment identified as optional must be coordinated with construction representative prior to bidding.

21. All locations for receptacles, telephone outlets, etc.. shall be coordinated with Owner prior to installation.

22. All wiring along CMU walls shall be surface mounted. Coordinate with Engineer of Record for location of C.M.U. walls.

23. All conductors shall be copper Type THHN or THWN, Minimum size shall be #12 unless otherwise noted.

24. All conduits shall be a minimum of 1/2" Diameter unless otherwise noted.

25. All branch circuit conduits in slab shall be of 3/4" diameter rigid galvanized steel with rigid galv. steel fittings.

26. Contractor may use armored cables with CU ground wires for final connections between J-boxes and light fixtures and receptacles in concealed ceiling areas and in walls. Length of armored cables shall not be longer than 6'. Check with Riverhead Town Building Department authorities for their approval and comply with their requirements.

27. All wiring exposed to weather shall be in rigid galv. steel conduits with rigid galv. steel NEMA-3R fittings.

28. All underground wiring shall be in Sch. 40 PVC heavy wall Type II Conduits with green ground wires back to panel boards except as noted otherwise on drawings.

29. All wiring shall be in EMT rigid galv. steel or pvc conduits as noted here except noted in Note - 28.

30. All electrical installations shall be as per latest NEC and local codes.

31. All conduits shall be tested with a "Megger" Tester to determine that all systems are free of shorts and phase conductors are not grounded.

32. E.C. may combine electrical circuits per latest NEC. The circuits shall not be loaded beyond the permitted capacity allowed by the latest NEC and local codes.

33. All exit lights and night lights must not be switched.

34. E.C. shall coordinate all his work with other building trades to avoid conflicts and delays. E.C. shall also refer to Mechanical, Architectural, and Plumbing drawings and Specifications for his part of work and for exact locations of all equipment provided by them and provide power and final connections as required.

35. All disconnect switches shall be Square - D or approved equal by G.E. or Westinghouse.

36. All fuses shall be Bussman Dual Element Time Delay Fuses unless noted otherwise.

37. A dedicated receptacle served by a 20 Amp Circuit shall be rated for 20 Amp.

38. All equipment ground wires shall be copper and sized as per latest NEC Art. 250-45.

39. It shall be Contractor's responsibilities to furnish and install all mechanical and electrical systems per plans. All installations shall be carried out safely and properly without any injury to their employees. All work shall be done in full compliance with all requirements of local codes, OSHA, and NEC. The Town and/or Engineer of Record will not be held responsible for any injury to Contractor's employees or vendors because of poor installation practices and safety negligences.

40. Extra safety precautions must be taken while working near or with the live-electrically energized) components or new switchboards, panel boards, wireways, disconnect switches, starters, and other similar electrical equipment in the building or on the site.

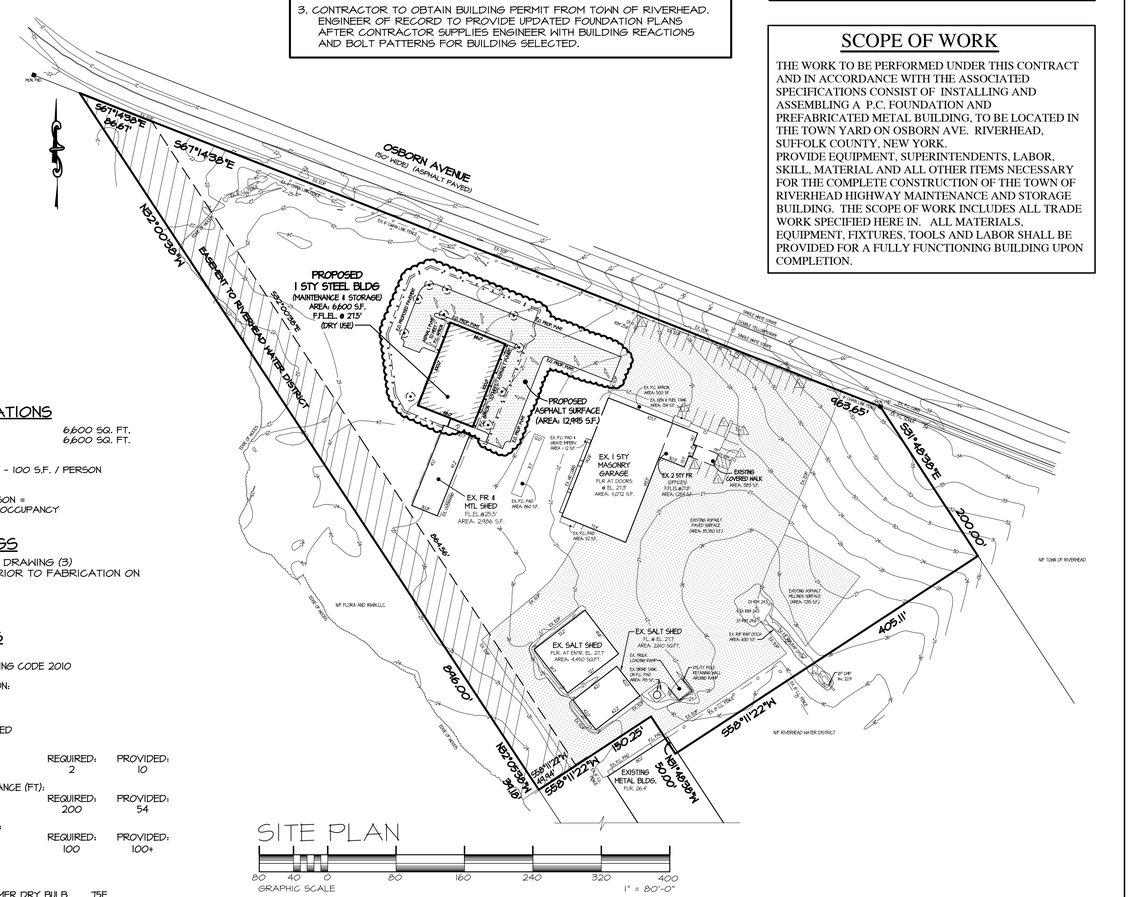
41. Check all magnetic motor starters for proper size overload relays.

42. The electrical contractor shall apply and obtain all required permits as required by the Riverhead Building Department. He shall provide cost estimates when required by local authorities.

43. All electrical conduits in equipment wash bay shall be Sch 40 heavy wall, Type II w/ water tight NEMA-3R fittings. Where PVC conduits are not acceptable by local authorities having jurisdictions, the conduits shall be rigid galvanized steel (RGS) with NEMA-3R-RGS fittings.

NOTES TO CONTRACTOR:

1. CONTRACTOR TO ENGAGE A LICENCED SURVEYOR FOR STAKE OUT PRIOR TO EXCAVATION. CONTRACTOR TO PROVIDE AS BUILT FOUNDATION PLAN TO TOWN OF RIVERHEAD PRIOR TO ERECTION OF BUILDING. CONTRACTOR TO PROVIDE AS BUILT SURVEY AT THE CONCLUSION OF JOB.
2. CONTRACTOR TO PROVIDE TOWN OF RIVERHEAD SIGNED AND SEALED (NEW YORK STATE) DRAWINGS FOR BUILDING FROM BUILDING MANUFACTURER ALONG WITH PROOF OF COMPLANCE WITH LOAD AS REQUIRED WITHIN 2015 NEW YORK STATE BUILDING CODE (130 MPH).
3. CONTRACTOR TO OBTAIN BUILDING PERMIT FROM TOWN OF RIVERHEAD. ENGINEER OF RECORD TO PROVIDE UPDATED FOUNDATION PLANS AFTER CONTRACTOR SUPPLIES ENGINEER WITH BUILDING REACTIONS AND BOLT PATTERNS FOR BUILDING SELECTED.



SITE PLAN

80 40 0 80 160 240 320 400

GRAPHIC SCALE

1" = 80'-0"

AREA CALCULATIONS

PROPOSED:	6,600 SQ. FT.
TOTAL:	6,600 SQ. FT.

OCCUPANCY: BUSINESS 'B' - 100 S.F. / PERSON

ALLOWABLE:
6,600 S.F. / 100 S.F./PERSON =
66 PERSON MAX. DESIGN OCCUPANCY

SHOP DRAWINGS

G.C. TO PROVIDE SHOP DRAWING (3) B/W FOR APPROVAL PRIOR TO FABRICATION ON ANY CUSTOM WORK.

CODE SYNOPSIS

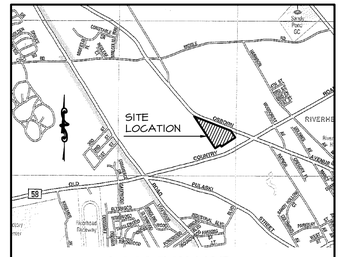
CODE:
NEW YORK STATE BUILDING CODE 2010

USER GROUP CLASSIFICATION:
GROUP 2b

CONSTRUCTION TYPE:
TYPE IIB - UNSPRINKLERED

NUMBER OF EXITS:		
LOCATION:	REQUIRED:	PROVIDED:
MAIN FLOOR	2	10
EXIT ACCESS TRAVEL DISTANCE (FT):		
LOCATION:	REQUIRED:	PROVIDED:
MAIN FLOOR	200	54
STRUCTURAL FLOOR LOADS:		
LOCATION:	REQUIRED:	PROVIDED:
MAIN FLOOR	100	100+

HEATING AND COOLING:		
COOLING	INDOOR SUMMER DRY BULB	75F
	RELATIVE HUMIDITY	50%
HEATING	INDOOR WINTER DRY BULB	75F



LOCATION MAP
NO SCALE

SCOPE OF WORK

THE WORK TO BE PERFORMED UNDER THIS CONTRACT AND IN ACCORDANCE WITH THE ASSOCIATED SPECIFICATIONS CONSIST OF INSTALLING AND ASSEMBLING A P.C. FOUNDATION AND PREFABRICATED METAL BUILDING, TO BE LOCATED IN THE TOWN YARD ON OSBORN AVE. RIVERHEAD, SUFFOLK COUNTY, NEW YORK.
PROVIDE EQUIPMENT, SUPERINTENDENTS, LABOR, SKILL, MATERIAL AND ALL OTHER ITEMS NECESSARY FOR THE COMPLETE CONSTRUCTION OF THE TOWN OF RIVERHEAD HIGHWAY MAINTENANCE AND STORAGE BUILDING. THE SCOPE OF WORK INCLUDES ALL TRADE WORK SPECIFIED HERE IN. ALL MATERIALS, EQUIPMENT, FIXTURES, TOOLS AND LABOR SHALL BE PROVIDED FOR A FULLY FUNCTIONING BUILDING UPON COMPLETION.

INDEX OF DRAWINGS

REVISIONS:
11-16-2016 REVISED PER TOWN OF RIVERHEAD COMMENTS

JEFFREY T. BUTLER, P.E., P.C.
P.O. BOX 634
SHOREHAM, NEW YORK
TEL.: 631.208.8850 FAX: 631.727.8033

ENGINEER:
JEFFREY T. BUTLER, P.E.

COVER SHEET FOR:
HIGHWAY DEPARTMENT METAL BUILDING
TOWN OF RIVERHEAD
1177 OSBORN AVE RIVERHEAD, N.Y. 11901
S.C.T.M.# 0600-108-02-01
COUNTY OF SUFFOLK TOWN OF RIVERHEAD

JOB No.: 160041 DRAWN BY: RAC
DATE: 06.20.2016 APPROVED BY: JTB

PAGE:
T1.0
1 of 12

SECTION 1905 - CONCRETE QUALITY, MIXING AND PLACING

SECTION 1905.1 GENERAL. THE REQUIRED STRENGTH AND DURABILITY OF CONCRETE SHALL BE DETERMINED BY COMPLIANCE WITH THE PROPORTIONING, TESTING, MIXING AND PLACING PROVISIONS OF SECTION 1905.1.1 THROUGH SECTION 1905.13.

SECTION 1905.1.1 STRENGTH. CONCRETE SHALL BE PROPORTIONED TO PROVIDE AN AVERAGE COMPRESSIVE STRENGTH AS PRESCRIBED IN SECTION 1905.3, AS WELL AS SATISFY THE DURABILITY CRITERIA OF SECTION 1904. CONCRETE SHALL BE PRODUCED TO MINIMIZE FREQUENCY OF STRENGTHS BELOW F'C AS PRESCRIBED IN SECTION 1905.6.3.3. FOR CONCRETE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THIS CHAPTER, F'C SHALL NOT BE LESS THAN 2,500 PSI (17.22 MPA).

SECTION 1905.1.2 CYLINDER TESTS. REQUIREMENTS FOR F'C SHALL BE BASED ON TESTS OF CYLINDERS MADE AND TESTED AS PRESCRIBED IN SECTION 1905.6.3.

SECTION 1905.1.3 BASIS OF F'C. UNLESS OTHERWISE SPECIFIED, FC SHALL BE BASED ON 28-DAY TESTS. IF OTHER THAN 28 DAYS, TEST AGE FOR F'C SHALL BE AS INDICATED IN CONSTRUCTION DOCUMENTS.

SECTION 1905.1.4 LIGHTWEIGHT AGGREGATE CONCRETE. WHERE DESIGN CRITERIA IN ACI 318, SECTION 9.5.2.3, SECTION 11.2 AND SECTION 12.2.4, PROVIDE FOR USE OF A SPLITTING TENSILE STRENGTH VALUE OF CONCRETE (FCT), LABORATORY TESTS SHALL BE MADE IN ACCORDANCE WITH ASTM C 330 TO ESTABLISH THE VALUE OF FCT CORRESPONDING TO THE SPECIFIED VALUE OF F'C.

SECTION 1905.1.5 FIELD ACCEPTANCE. SPLITTING TENSILE STRENGTH TESTS SHALL NOT BE USED AS A BASIS FOR FIELD ACCEPTANCE OF CONCRETE.

SECTION 1905.2 SELECTION OF CONCRETE PROPORTIONS. CONCRETE PROPORTIONS SHALL BE DETERMINED IN ACCORDANCE WITH THE PROVISIONS OF SECTION 1905.2.1 THROUGH SECTION 1905.2.3.

SECTION 1905.2.1 GENERAL. PROPORTIONS OF MATERIALS FOR CONCRETE SHALL BE ESTABLISHED TO PROVIDE:

1. WORKABILITY AND CONSISTENCY TO PERMIT CONCRETE TO BE WORKED READILY INTO FORMS AND AROUND REINFORCEMENT UNDER THE CONDITIONS OF PLACEMENT TO BE EMPLOYED, WITHOUT SEGREGATION OR EXCESSIVE BLEEDING.

2. RESISTANCE TO SPECIAL EXPOSURES AS REQUIRED BY SECTION 1904.

3. CONFORMANCE WITH THE STRENGTH TEST REQUIREMENTS OF SECTION 1905.6.

SECTION 1905.2.2 DIFFERENT MATERIALS. WHERE DIFFERENT MATERIALS ARE TO BE USED FOR DIFFERENT PORTIONS OF PROPOSED WORK, EACH COMBINATION SHALL BE EVALUATED.

SECTION 1905.2.3 BASIS OF PROPORTIONS. CONCRETE PROPORTIONS, INCLUDING WATER-CEMENTITIOUS MATERIALS RATIO, SHALL BE ESTABLISHED ON THE BASIS OF FIELD EXPERIENCE AND/OR TRIAL MIXTURES WITH MATERIALS TO BE EMPLOYED IN ACCORDANCE WITH SECTION 1905.3, EXCEPT AS PERMITTED IN SECTION 1905.4, OR REQUIRED BY SECTION 1904.

SECTION 1905.3 PROPORTIONING ON THE BASIS OF FIELD EXPERIENCE AND/OR TRIAL MIXTURES. CONCRETE PROPORTIONING DETERMINED ON THE BASIS OF FIELD EXPERIENCE AND/OR TRIAL MIXTURES SHALL BE DONE IN ACCORDANCE WITH ACI 318, SECTION 5.3.

SECTION 1905.4 PROPORTIONING WITHOUT FIELD EXPERIENCE OR TRIAL MIXTURES. CONCRETE PROPORTIONING DETERMINED WITHOUT FIELD EXPERIENCE OR TRIAL MIXTURES SHALL BE DONE IN ACCORDANCE WITH ACI 318, SECTION 5.4.

SECTION 1905.5 AVERAGE STRENGTH REDUCTION. AS DATA BECOME AVAILABLE DURING CONSTRUCTION, IT IS PERMISSIBLE TO REDUCE THE AMOUNT BY WHICH THE AVERAGE COMPRESSIVE STRENGTH (F'CR) IS REQUIRED TO EXCEED THE SPECIFIED VALUE OF F'C IN ACCORDANCE WITH ACI 318, SECTION 5.5.

SECTION 1905.6 EVALUATION AND ACCEPTANCE OF CONCRETE. THE CRITERIA FOR EVALUATION AND ACCEPTANCE OF CONCRETE SHALL BE AS SPECIFIED IN SECTION 1905.6.2 THROUGH SECTION 1905.6.5.5.

SECTION 1905.6.1 QUALIFIED TECHNICIANS. CONCRETE SHALL BE TESTED IN ACCORDANCE WITH THE REQUIREMENTS IN SECTION 1905.6.2 THROUGH SECTION 1905.6.5. QUALIFIED FIELD TESTING TECHNICIANS SHALL PERFORM TESTS ON FRESH CONCRETE AT THE JOB SITE, PREPARE SPECIMENS REQUIRED FOR CURING UNDER FIELD CONDITIONS, PREPARE SPECIMENS REQUIRED FOR TESTING IN THE LABORATORY, AND RECORD THE TEMPERATURE OF THE FRESH CONCRETE WHEN PREPARING SPECIMENS FOR STRENGTH TESTS. QUALIFIED LABORATORY TECHNICIANS SHALL PERFORM ALL REQUIRED LABORATORY TESTS.

SECTION 1905.6.2 FREQUENCY OF TESTING. THE FREQUENCY OF CONDUCTING STRENGTH TESTS OF CONCRETE SHALL BE AS SPECIFIED IN SECTION 1905.6.2.1 THROUGH SECTION 1905.6.2.4.

SECTION 1905.6.2.1 MINIMUM FREQUENCY. SAMPLES FOR STRENGTH TESTS OF EACH CLASS OF CONCRETE PLACED EACH DAY SHALL BE TAKEN NOT LESS THAN ONCE A DAY, NOR LESS THAN ONCE FOR EACH 150 CUBIC YARDS (115 M3) OF CONCRETE, NOR LESS THAN ONCE FOR EACH 5,000 SQUARE FEET (465 M2) OF SURFACE AREA FOR SLABS OR WALLS.

SECTION 1905.6.2.2 MINIMUM NUMBER. ON A GIVEN PROJECT, IF THE TOTAL VOLUME OF CONCRETE IS SUCH THAT THE FREQUENCY OF TESTING REQUIRED BY SECTION 1905.6.2.1 WOULD PROVIDE LESS THAN FIVE STRENGTH TESTS FOR A GIVEN CLASS OF CONCRETE, TESTS SHALL BE MADE FROM AT LEAST FIVE RANDOMLY SELECTED BATCHES OR FROM EACH BATCH IF FEWER THAN FIVE BATCHES ARE USED.

SECTION 1905.6.2.3 SMALL VOLUME. WHEN THE TOTAL VOLUME OF A GIVEN CLASS OF CONCRETE IS LESS THAN 50 CUBIC YARDS (38 M3), STRENGTH TESTS ARE NOT REQUIRED WHEN EVIDENCE OF SATISFACTORY STRENGTH IS SUBMITTED TO AND APPROVED BY THE CODE ENFORCEMENT OFFICIAL.

SECTION 1905.6.2.4 STRENGTH TEST. A STRENGTH TEST SHALL BE THE AVERAGE OF THE STRENGTHS OF TWO CYLINDERS MADE FROM THE SAME SAMPLE OF CONCRETE AND TESTED AT 28 DAYS OR AT THE TEST AGE DESIGNATED FOR THE DETERMINATION OF F'C.

SECTION 1905.6.3 LABORATORY-CURED SPECIMENS. LABORATORY-CURED SPECIMENS SHALL COMPLY WITH THE PROVISIONS OF SECTION 1905.6.3.1 THROUGH SECTION 1905.6.3.4.

SECTION 1905.6.3.1 SAMPLING. SAMPLES FOR STRENGTH TESTS SHALL BE TAKEN IN ACCORDANCE WITH ASTM C 172.

SECTION 1905.6.3.2 CYLINDERS. CYLINDERS FOR STRENGTH TESTS SHALL BE MOLDED AND LABORATORY CURED IN ACCORDANCE WITH ASTM C 31 AND TESTED IN ACCORDANCE WITH ASTM C 39.

SECTION 1905.6.3.3 ACCEPTANCE OF RESULTS. THE STRENGTH LEVEL OF AN INDIVIDUAL CLASS OF CONCRETE SHALL BE CONSIDERED SATISFACTORY IF BOTH OF THE FOLLOWING REQUIREMENTS ARE MET:

1. EVERY ARITHMETIC AVERAGE OF ANY THREE CONSECUTIVE STRENGTH TESTS EQUALS OR EXCEEDS F'C.

2. NO INDIVIDUAL STRENGTH TEST (AVERAGE OF TWO CYLINDERS) FALLS BELOW F'C BY MORE THAN 500 PSI (3.45 MPA).

SECTION 1905.6.3.4 CORRECTION. IF EITHER OF THE REQUIREMENTS OF SECTION 1905.6.3.3 ARE NOT MET, STEPS SHALL BE TAKEN TO INCREASE THE AVERAGE OF SUBSEQUENT STRENGTH TEST RESULTS. THE REQUIREMENTS OF SECTION 1905.6.5 SHALL BE OBSERVED IF THE REQUIREMENT OF SECTION 1905.6.3.3, ITEM 2 IS NOT MET.

SECTION 1905.6.4 FIELD-CURED SPECIMENS. FIELD-CURED SPECIMENS SHALL COMPLY WITH THE PROVISIONS OF SECTION 1905.6.4.1 THROUGH SECTION 1905.6.4.4.

SECTION 1905.6.4.1 WHEN REQUIRED. WHERE REQUIRED BY THE CODE ENFORCEMENT OFFICIAL, THE RESULTS OF STRENGTH TESTS OF CYLINDERS CURED UNDER FIELD CONDITIONS SHALL BE PROVIDED.

SECTION 1905.6.4.2 CURING. FIELD-CURED CYLINDERS SHALL BE CURED UNDER FIELD CONDITIONS IN ACCORDANCE WITH ASTM C 31.

SECTION 1905.6.4.3 SAMPLING. FIELD-CURED TEST CYLINDERS SHALL BE MOLDED AT THE SAME TIME AND FROM THE SAME SAMPLES AS LABORATORY-CURED TEST CYLINDERS.

SECTION 1905.6.4.4 CORRECTION. PROCEDURES FOR PROTECTING AND CURING CONCRETE SHALL BE IMPROVED WHEN THE STRENGTH OF FIELD-CURED CYLINDERS AT THE TEST AGE DESIGNATED FOR DETERMINATION OF F'C IS LESS THAN 85 PERCENT OF THAT OF COMPANION LABORATORY-CURED CYLINDERS. THE 85 PERCENT LIMITATION SHALL NOT APPLY IF THE FIELD-CURED STRENGTH EXCEEDS F'C BY MORE THAN 500 PSI (3.45 MPA).

SECTION 1905.6.5 LOW-STRENGTH TEST RESULTS. THE INVESTIGATION OF LOW-STRENGTH TEST RESULTS SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF SECTION 1905.6.5.1 THROUGH SECTION 1905.6.5.5.

SECTION 1905.6.5.1 PRECAUTION. IF ANY STRENGTH TEST (SEE SECTION 1905.6.2.4) OF LABORATORY-CURED CYLINDERS FALLS BELOW THE SPECIFIED VALUE OF F'C BY MORE THAN 500 PSI (3.45 MPA) (SEE SECTION 1905.6.3.3, ITEM 2), OR IF TESTS OF FIELD-CURED CYLINDERS INDICATE DEFICIENCIES IN PROTECTION AND CURING (SEE SECTION 1905.6.4.4), STEPS SHALL BE TAKEN TO ASSURE THAT THE LOAD-CARRYING CAPACITY OF THE STRUCTURE IS NOT JEOPARDIZED.

SECTION 1905.6.5.2 CORE TESTS. IF THE LIKELIHOOD OF LOW-STRENGTH CONCRETE IS CONFIRMED AND CALCULATIONS INDICATE THAT LOAD-CARRYING CAPACITY IS SIGNIFICANTLY REDUCED, TESTS OF CORES DRILLED FROM THE AREA IN QUESTION IN ACCORDANCE WITH ASTM C 42 IS PERMITTED. IN SUCH CASES, THREE CORES SHALL BE TAKEN FOR EACH STRENGTH TEST MORE THAN 500 PSI (3.45 MPA) BELOW THE SPECIFIED VALUE OF F'C.

SECTION 1905.6.5.3 CONDITION OF CORES. IF CONCRETE IN THE STRUCTURE WILL BE DRY UNDER SERVICE CONDITIONS, CORES SHALL BE AIR DRIED AT TEMPERATURES BETWEEN 60°F (16°C) AND 80°F (27°C) AND RELATIVE HUMIDITY LESS THAN 60 PERCENT FOR SEVEN DAYS BEFORE TESTING AND SHALL BE TESTED DRY. IF CONCRETE IN THE STRUCTURE WILL BE MORE THAN SUPERFICIALLY WET UNDER SERVICE CONDITIONS, CORES SHALL BE IMMERSED IN WATER FOR AT LEAST 40 HOURS AND BE TESTED WET.

SECTION 1905.6.5.4 TEST RESULTS. CONCRETE IN AN AREA REPRESENTED BY CORE TESTS SHALL BE CONSIDERED STRUCTURALLY ADEQUATE IF THE AVERAGE OF THREE CORES IS EQUAL TO AT LEAST 85 PERCENT OF F'C AND IF NO SINGLE CORE IS LESS THAN 75 PERCENT OF F'C. ADDITIONAL TESTING OF CORES EXTRACTED FROM LOCATIONS REPRESENTED BY ERRATIC CORE STRENGTH RESULTS IS PERMITTED.

SECTION 1905.6.5.5 STRENGTH EVALUATION. IF THE CRITERIA OF SECTION 1905.6.5.4 ARE NOT MET AND IF THE STRUCTURAL ADEQUACY REMAINS IN DOUBT, THE CODE ENFORCEMENT OFFICIAL IS PERMITTED TO ORDER A STRENGTH EVALUATION IN ACCORDANCE WITH ACI 318, CHAPTER 20, FOR THE QUESTIONABLE PORTION OF THE STRUCTURE, OR TAKE OTHER APPROPRIATE ACTION.

SECTION 1905.7 PREPARATION OF EQUIPMENT AND PLACE OF DEPOSIT. PREPARATION BEFORE CONCRETE PLACEMENT SHALL INCLUDE THE FOLLOWING:

1. EQUIPMENT FOR MIXING AND TRANSPORTING CONCRETE SHALL BE CLEAN.

2. DEBRIS AND ICE SHALL BE REMOVED FROM SPACES TO BE OCCUPIED BY CONCRETE.

3. FORMS SHALL BE PROPERLY COATED.

4. MASONRY FILLER UNITS THAT WILL BE IN CONTACT WITH CONCRETE SHALL BE WELL DRENCHED.

5. REINFORCEMENT SHALL BE THOROUGHLY CLEAN OF ICE OR OTHER DELETERIOUS COATINGS.

6. WATER SHALL BE REMOVED FROM THE PLACE OF DEPOSIT BEFORE CONCRETE IS PLACED UNLESS A TREMIE IS TO BE USED OR UNLESS OTHERWISE PERMITTED BY THE RIVERHEAD BUILDING DEPARTMENT.

7. LAITANCE AND OTHER UNSOUND MATERIAL SHALL BE REMOVED BEFORE ADDITIONAL CONCRETE IS PLACED AGAINST HARDENED CONCRETE.

SECTION 1905.8 MIXING. MIXING OF CONCRETE SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 1905.8.1 THROUGH SECTION 1905.8.3.

SECTION 1905.8.1 GENERAL. CONCRETE SHALL BE MIXED UNTIL THERE IS A UNIFORM DISTRIBUTION OF MATERIALS AND SHALL BE DISCHARGED COMPLETELY BEFORE THE MIXER IS RECHARGED.

SECTION 1905.8.2 READY-MIXED CONCRETE. READY-MIXED CONCRETE SHALL BE MIXED AND DELIVERED IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM C 94 OR ASTM C 685.

SECTION 1905.8.3 JOB-MIXED CONCRETE. JOB-MIXED CONCRETE SHALL COMPLY WITH ACI 318, SECTION 5.8.3.

SECTION 1905.9 CONVEYING. THE METHOD AND EQUIPMENT FOR CONVEYING CONCRETE TO THE PLACE OF DEPOSIT SHALL COMPLY WITH SECTION 1905.9.1 AND SECTION 1905.9.2.

SECTION 1905.9.1 METHOD OF CONVEYANCE. CONCRETE SHALL BE CONVEYED FROM THE MIXER TO THE PLACE OF FINAL DEPOSIT BY METHODS THAT WILL PREVENT SEPARATION OR LOSS OF MATERIALS.

SECTION 1905.9.2 CONVEYING EQUIPMENT. THE CONVEYING EQUIPMENT SHALL BE CAPABLE OF PROVIDING A SUPPLY OF CONCRETE AT THE SITE OF PLACEMENT WITHOUT SEPARATION OF INGREDIENTS AND WITHOUT INTERRUPTIONS SUFFICIENT TO PERMIT THE LOSS OF PLASTICITY BETWEEN SUCCESSIVE INCREMENTS.

SECTION 1905.10 DEPOSITING. THE DEPOSITING OF CONCRETE SHALL COMPLY WITH THE PROVISIONS OF SECTION 1905.10.1 THROUGH SECTION 1905.10.8.

SECTION 1905.10.1 SEGREGATION. CONCRETE SHALL BE DEPOSITED AS NEARLY AS PRACTICABLE TO ITS FINAL POSITION TO AVOID SEGREGATION DUE TO REHANDLING OR FLOWING.

SECTION 1905.10.2 PLACEMENT TIMING. CONCRETING OPERATIONS SHALL BE CARRIED ON AT SUCH A RATE THAT THE CONCRETE IS AT ALL TIMES PLASTIC AND FLOWS READILY INTO SPACES BETWEEN REINFORCEMENT.

SECTION 1905.10.3 UNACCEPTABLE CONCRETE. CONCRETE THAT HAS PARTIALLY HARDENED OR BEEN CONTAMINATED BY FOREIGN MATERIALS SHALL NOT BE DEPOSITED IN THE STRUCTURE.

SECTION 1905.10.4 RETEMPERING. RETEMPERED CONCRETE OR CONCRETE THAT HAS BEEN REMIXED AFTER INITIAL SET SHALL NOT BE USED UNLESS APPROVED BY THE REGISTERED DESIGN PROFESSIONAL.

SECTION 1905.10.5 CONTINUOUS OPERATION. AFTER CONCRETING HAS STARTED, IT SHALL BE CARRIED ON AS A CONTINUOUS OPERATION UNTIL PLACING OF A PANEL OR SECTION, AS DEFINED BY ITS BOUNDARIES OR PREDETERMINED JOINTS, IS COMPLETED, EXCEPT AS PERMITTED OR PROHIBITED BY SECTION 1906.4.

SECTION 1905.10.6 PLACEMENT IN VERTICAL LIFTS. THE TOP SURFACES OF VERTICALLY FORMED LIFTS SHALL BE GENERALLY LEVEL.

SECTION 1905.10.7 CONSTRUCTION JOINTS. WHEN CONSTRUCTION JOINTS ARE REQUIRED, THEY SHALL BE MADE IN ACCORDANCE WITH SECTION 1906.4.

SECTION 1905.10.8 CONSOLIDATION. CONCRETE SHALL BE THOROUGHLY CONSOLIDATED BY SUITABLE MEANS DURING PLACEMENT AND SHALL BE THOROUGHLY WORKED AROUND REINFORCEMENT AND EMBEDDED FIXTURES AND INTO CORNERS OF THE FORMS.

SECTION 1905.11 CURING. THE CURING OF CONCRETE SHALL BE IN ACCORDANCE WITH SECTION 1905.11.1 THROUGH SECTION 1905.11.3.

SECTION 1905.11.1 REGULAR. CONCRETE (OTHER THAN HIGH-EARLY-STRENGTH) SHALL BE MAINTAINED ABOVE 50°F (10°C) AND IN A MOIST CONDITION FOR AT LEAST THE FIRST SEVEN DAYS AFTER PLACEMENT, EXCEPT WHEN CURED IN ACCORDANCE WITH SECTION 1905.11.3.

SECTION 1905.11.2 HIGH-EARLY-STRENGTH. HIGH-EARLY-STRENGTH CONCRETE SHALL BE MAINTAINED ABOVE 50°F (10°C) AND IN A MOIST CONDITION FOR AT LEAST THE FIRST THREE DAYS, EXCEPT WHEN CURED IN ACCORDANCE WITH SECTION 1905.11.3.

SECTION 1905.11.3 ACCELERATED CURING. ACCELERATED CURING OF CONCRETE SHALL COMPLY WITH ACI 318, SECTION 5.11.3.

SECTION 1905.12 COLD WEATHER REQUIREMENTS. CONCRETE THAT IS TO BE PLACED DURING FREEZING OR NEAR-FREEZING WEATHER SHALL COMPLY WITH THE FOLLOWING:

1. ADEQUATE EQUIPMENT SHALL BE PROVIDED FOR HEATING CONCRETE MATERIALS AND PROTECTING CONCRETE DURING FREEZING OR NEAR-FREEZING WEATHER.

2. CONCRETE MATERIALS AND REINFORCEMENT, FORMS, FILLERS AND GROUND WITH WHICH CONCRETE IS TO COME IN CONTACT SHALL BE FREE FROM FROST.

3. FROZEN MATERIALS OR MATERIALS CONTAINING ICE SHALL NOT BE USED.

SECTION 1905.13 HOT WEATHER REQUIREMENTS. DURING HOT WEATHER, PROPER ATTENTION SHALL BE GIVEN TO INGREDIENTS, PRODUCTION METHODS, HANDLING, PLACING, PROTECTION AND CURING TO PREVENT EXCESSIVE CONCRETE TEMPERATURES OR WATER EVAPORATION THAT COULD IMPAIR THE REQUIRED STRENGTH OR SERVICEABILITY OF THE MEMBER OR STRUCTURE.

SECTION 1907 - DETAILS OF REINFORCEMENT

SECTION 1907.1 HOOKS. STANDARD HOOKS ON REINFORCING BARS USED IN CONCRETE CONSTRUCTION SHALL COMPLY WITH ACI 318, SECTION 7.1.

SECTION 1907.2 MINIMUM BEND DIAMETERS. MINIMUM REINFORCEMENT BEND DIAMETERS UTILIZED IN CONCRETE CONSTRUCTION SHALL COMPLY WITH ACI 318, SECTION 7.2.

SECTION 1907.3 BENDING. THE BENDING OF REINFORCEMENT SHALL COMPLY WITH SECTION 1907.3.1 AND SECTION 1907.3.2.

SECTION 1907.3.1 COLD BENDING. REINFORCEMENT SHALL BE BENT COLD, UNLESS OTHERWISE PERMITTED BY THE REGISTERED DESIGN PROFESSIONAL.

SECTION 1907.3.2 EMBEDDED REINFORCEMENT. REINFORCEMENT PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT, EXCEPT AS SHOWN ON THE CONSTRUCTION DOCUMENTS OR PERMITTED BY THE REGISTERED DESIGN PROFESSIONAL.

SECTION 1907.4 SURFACE CONDITIONS OF REINFORCEMENT. THE SURFACE CONDITIONS OF REINFORCEMENT SHALL COMPLY WITH THE PROVISIONS OF SECTION 1907.4.1 THROUGH SECTION 1907.4.3.

SECTION 1907.4.1 COATINGS. AT THE TIME CONCRETE IS PLACED, REINFORCEMENT SHALL BE FREE FROM MUD, OIL OR OTHER NONMETALLIC COATINGS THAT DECREASE BOND. EPOXY COATINGS OF STEEL REINFORCEMENT IN ACCORDANCE WITH ACI 318, SECTION 3.5.3.7 AND SECTION 3.5.3.8 IS PERMITTED.

SECTION 1907.4.2 RUST OR MILL SCALE. EXCEPT FOR PRESTRESSING TENDONS, STEEL REINFORCEMENT WITH RUST, MILL SCALE OR A COMBINATION OF BOTH, SHALL BE CONSIDERED SATISFACTORY, PROVIDED THE MINIMUM DIMENSIONS, INCLUDING HEIGHT OF DEFORMATIONS AND WEIGHT OF A HAND-WIRE-BRUSHED TEST SPECIMEN, COMPLY WITH APPLICABLE ASTM SPECIFICATIONS. SEE SECTION 1903.5.

SECTION 1907.4.3 PRESTRESSING TENDONS. PRESTRESSING TENDONS SHALL BE CLEAN AND FREE OF OIL, DIRT, SCALE, PITTING AND EXCESSIVE RUST. A LIGHT COATING OF RUST IS PERMITTED.

SECTION 1907.5 PLACING REINFORCEMENT. THE PLACEMENT OF CONCRETE REINFORCEMENT SHALL COMPLY WITH THE PROVISIONS OF SECTION 1907.5.1 THROUGH SECTION 1907.5.4.

SECTION 1907.5.1 SUPPORT. REINFORCEMENT, PRESTRESSING TENDONS, AND DUCTS SHALL BE ACCURATELY PLACED AND ADEQUATELY SUPPORTED BEFORE CONCRETE IS PLACED, AND SHALL BE SECURED AGAINST DISPLACEMENT WITHIN TOLERANCES PERMITTED IN SECTION 1907.5.2. WHERE APPROVED BY THE REGISTERED DESIGN PROFESSIONAL, EMBEDDED ITEMS (SUCH AS DOWELS OR INSERTS) THAT EITHER PROTRUDE FROM PRECAST CONCRETE MEMBERS OR REMAIN EXPOSED FOR INSPECTION ARE PERMITTED TO BE EMBEDDED WHILE THE CONCRETE IS IN A PLASTIC STATE, PROVIDED THE FOLLOWING CONDITIONS ARE MET:

1. EMBEDDED ITEMS ARE NOT REQUIRED TO BE HOOKED OR TIED TO REINFORCEMENT WITHIN THE CONCRETE.

2. EMBEDDED ITEMS ARE MAINTAINED IN THE CORRECT POSITION WHILE THE CONCRETE REMAINS PLASTIC.

3. THE CONCRETE IS PROPERLY CONSOLIDATED AROUND THE EMBEDDED ITEM.

SECTION 1907.5.2 TOLERANCES. UNLESS OTHERWISE SPECIFIED BY THE REGISTERED DESIGN PROFESSIONAL, REINFORCEMENT, PRESTRESSING TENDONS AND PRESTRESSING DUCTS SHALL BE PLACED WITHIN THE TOLERANCES SPECIFIED IN SECTION 1907.5.2.1 AND SECTION 1907.5.2.2.

SECTION 1907.5.2.1 DEPTH AND COVER. TOLERANCE FOR DEPTH D, AND MINIMUM CONCRETE COVER IN FLEXURAL MEMBERS, WALLS AND COMPRESSION MEMBERS SHALL BE AS SHOWN IN TABLE 1907.5.2.1, EXCEPT THAT TOLERANCE FOR THE CLEAR DISTANCE TO FORMED SOFFITS SHALL BE MINUS 1/4 INCH (6.4 MM) AND TOLERANCE FOR COVER SHALL NOT EXCEED MINUS ONE-THIRD THE MINIMUM CONCRETE COVER REQUIRED IN THE DESIGN DRAWINGS OR SPECIFICATIONS.

TABLE 1907.5.2.1
TOLERANCES

DEPTH (d) (INCHES)	TOLERANCE ON d (INCH)	TOLERANCE ON MINIMUM CONCRETE COVER (INCH)
d > 8	± 3/8	- 3/8
d > 8	± 1/2	- 1/2

FOR SI: 1 INCH = 25.4 MM.

SECTION 1907.5.2.2 BENDS AND ENDS. TOLERANCE FOR LONGITUDINAL LOCATION OF BENDS AND ENDS OF REINFORCEMENT SHALL BE ± 2 INCHES (± 51 MM) EXCEPT AT DISCONTINUOUS ENDS OF MEMBERS WHERE THE TOLERANCE SHALL BE ± 1/2 INCH (± 12.7 MM).

SECTION 1907.5.3 WELDED WIRE FABRIC. WELDED WIRE FABRIC WITH WIRE SIZE NOT GREATER THAN W5 OR D5 USED IN SLABS NOT EXCEEDING 10 FEET (3048 MM) IN SPAN IS PERMITTED TO BE CURVED FROM A POINT NEAR THE TOP OF THE SLAB OVER THE SUPPORT TO A POINT NEAR THE BOTTOM OF THE SLAB AT MIDSPAN, PROVIDED SUCH REINFORCEMENT IS EITHER CONTINUOUS OVER, OR SECURELY ANCHORED AT SUPPORT.

SECTION 1907.5.4 WELDING. WELDING OF CROSSING BARS SHALL NOT BE PERMITTED FOR ASSEMBLY OF REINFORCEMENT UNLESS AUTHORIZED BY THE REGISTERED DESIGN PROFESSIONAL.

SECTION 1907.6 SPACING LIMITS FOR REINFORCEMENT. THE CLEAR DISTANCE BETWEEN REINFORCING BARS, BUNDLED BARS, PRESTRESSING TENDONS AND DUCTS SHALL COMPLY WITH ACI 318, SECTION 7.6.

SECTION 1907.7 CONCRETE PROTECTION FOR REINFORCEMENT. THE MINIMUM CONCRETE COVER FOR REINFORCEMENT SHALL COMPLY WITH SECTION 1907.7.1 THROUGH SECTION 1907.7.7.

SECTION 1907.7.1 CAST-IN-PLACE CONCRETE (NONPRESTRESSED). MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCEMENT IN NONPRESTRESSED, CAST-IN-PLACE CONCRETE CONSTRUCTION IN ACCORDANCE WITH TABLE 1907.7.1.

TABLE 1907.7.1
MINIMUM CONCRETE COVER

CONCRETE EXPOSURE	MINIMUM COVER INCHES
1. CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH	3
2. CONCRETE EXPOSED TO EARTH OR WEATHER NO. 6 THROUGH NO. 18 BAR NO. 5 BAR, W31 OR D31 WIRE, AND SMALLER	 2 1-1/2
3. CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND SLABS, WALLS, JOISTS: NO. 14 AND NO. 18 BARS NO. 11 BAR AND SMALLER BEAMS, COLUMNS: PRIMARY REINFORCEMENT, TIES, STIRRUPS, SPIRALS SHELLS, FOLDED PLATE MEMBERS: NO. 6 BAR AND LARGER NO. 5 BAR, W31 OR D31 WIRE, AND SMALLER	 1-1/2 3/4 1-1/2 3/4 1/2

FOR SI: 1 INCH = 25.4 MM.

SECTION 1907.7.2 PRECAST CONCRETE (MANUFACTURED UNDER PLANT CONTROL CONDITIONS). THE MINIMUM CONCRETE COVER FOR REINFORCEMENT IN PRECAST CONCRETE MANUFACTURED UNDER PLANT CONTROL CONDITIONS SHALL COMPLY WITH ACI 318, SECTION 7.7.2.

SECTION 1907.7.3 PRESTRESSED CONCRETE. THE MINIMUM CONCRETE COVER FOR REINFORCEMENT IN PRESTRESSED CONCRETE SHALL COMPLY WITH ACI 318, SECTION 7.7.3.

SECTION 1907.7.4 BUNDLED BARS. THE MINIMUM CONCRETE COVER FOR BUNDLED BARS SHALL COMPLY WITH ACI 318, SECTION 7.7.4.

SECTION 1907.7.5 CORROSIVE ENVIRONMENTS. IN CORROSIVE ENVIRONMENTS OR OTHER SEVERE EXPOSURE CONDITIONS, THE AMOUNT OF CONCRETE PROTECTION SHALL BE SUITABLY INCREASED, AND THE DENSENESS AND NONPOROSITY OF THE PROTECTING CONCRETE SHALL BE CONSIDERED, OR OTHER PROTECTION SHALL BE PROVIDED.

SECTION 1907.7.6 FUTURE EXTENSIONS. EXPOSED REINFORCEMENT, INSERTS AND PLATES INTENDED FOR BONDING WITH FUTURE EXTENSIONS SHALL BE PROTECTED FROM CORROSION.

SECTION 1907.7.7 FIRE PROTECTION. WHEN THIS CODE REQUIRES A THICKNESS OF COVER FOR FIRE PROTECTION GREATER THAN THE MINIMUM CONCRETE COVER SPECIFIED IN SECTION 1907.7, SUCH GREATER THICKNESS SHALL BE USED.

SECTION 1907.8 SPECIAL REINFORCEMENT DETAILS FOR COLUMNS. OFFSET BENT LONGITUDINAL BARS IN COLUMNS AND LOAD TRANSFER IN STRUCTURAL STEEL CORES OF COMPOSITE COMPRESSION MEMBERS SHALL COMPLY WITH THE PROVISIONS OF ACI 318, SECTION 7.8.

SECTION 1907.9 CONNECTIONS. CONNECTIONS BETWEEN CONCRETE FRAMING MEMBERS SHALL COMPLY WITH THE PROVISIONS OF ACI 318, SECTION 7.9.

SECTION 1907.10 LATERAL REINFORCEMENT FOR COMPRESSION MEMBERS. LATERAL REINFORCEMENT FOR CONCRETE COMPRESSION MEMBERS SHALL COMPLY WITH THE PROVISIONS OF ACI 318, SECTION 7.10.

SECTION 1907.11 LATERAL REINFORCEMENT FOR FLEXURAL MEMBERS. LATERAL REINFORCEMENT FOR COMPRESSION REINFORCEMENT IN CONCRETE FLEXURAL MEMBERS SHALL COMPLY WITH THE PROVISIONS OF ACI 318, SECTION 7.11.

SECTION 1907.12 SHRINKAGE AND TEMPERATURE REINFORCEMENT. REINFORCEMENT FOR SHRINKAGE AND TEMPERATURE STRESSES IN CONCRETE MEMBERS SHALL COMPLY WITH THE PROVISIONS OF ACI 318, SECTION 7.12.

SECTION 1907.13 REQUIREMENTS FOR STRUCTURAL INTEGRITY. THE DETAILING OF REINFORCEMENT AND CONNECTIONS BETWEEN CONCRETE MEMBERS SHALL COMPLY WITH THE PROVISIONS OF ACI 318, SECTION 7.13 TO IMPROVE STRUCTURAL INTEGRITY.

NOTE:
PROTECT TOPS OF EXPOSED REBAR PER OSHA REQUIREMENTS.

NOTE:
FOUNDATION WALLS ARE DESIGNED IN ACCORDANCE WITH TABLE 1805.5 (2) OF THE NEW YORK STATE BUILDING CODE.
WALL HEIGHT = 3'-8"
FOOTING HEIGHT = 8"
SOIL CLASS = LOAM, SP AND GW

1905.8.2 READY-MIXED CONCRETE. READY-MIXED CONCRETE SHALL BE MIXED AND DELIVERED IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM C 94 OR ASTM C 685.

CONCRETE MIXTURES [NYSBC - CHAPTER 19 (TABLE 1904.2.1 (JOB MIXED)]

CLASS	APPLICATION	EXPOSURE	F'C	NOMINAL MAXIMUM AGGREGATE SIZE 1	AIR CONTENT	MAXIMUM WATER CEMENTITIOUS MATERIAL RATIO BY WEIGHT	CEMENTITIOUS MATERIALS	ADMIXTURES	MAXIMUM WATER SOLUBLE CHLORIDE ICON (CI-) IN CONCRETE, BY WEIGHT OF CEMENT
3	SLABS ON GRADE	FREEZE/THAW, DEICING CHEMICALS, SULFATE (SEVERE)	3,500 PSI	1-1/2"	5-1/2 % 2	0.45	LIMITS ON HYDRAULIC CEMENT 3 LIMITS ON FLY ASH, SLAG, AND SILICA FUME 4	NO CALCIUM CHLORIDE ADMIXTURES	0.15
3	FOUNDATION WALLS	FREEZE/THAW, DEICING CHEMICALS, SULFATE (SEVERE)	3,000 PSI	1-1/2"	5-1/2 % 2	0.45	LIMITS ON HYDRAULIC CEMENT 3 LIMITS ON FLY ASH, SLAG, AND SILICA FUME 4	NO CALCIUM CHLORIDE ADMIXTURES	0.15
4	FOOTINGS	SULFATE (SEVERE)	3,500 PSI	1-1/2"	5-1/2 % 2	0.45	LIMITS ON HYDRAULIC CEMENT3	NO CALCIUM CHLORIDE ADMIXTURES	0.15

1. A SMALLER NOMINAL MAXIMUM AGGREGATE SIZE MAY BE USED AT THE DISCRETION OF THE CONTRACTOR, INSTALLER AND MANUFACTURER.
2. AIR CONTENT INDICATED INT EH TABLE IS FOR CONCRETE WITH MATCHING NOMINAL MAXIMUM AGGREGATE SIZE INDICATED. IF SMALLER MAXIMUM AGGREGATE SIZE IS SELECTED AIR CONTENT SHALL BE ADJUSTED UPWARDS IN ACCORDANCE WITH ACI 318 TABLE 4.2.1.
3. HYDRAULIC CEMENT: ASTM C 150 TYPE V.
4. LIMITS ON THE AMOUNT OF FLY ASH, SLAG, AND SILICA FUME BY MASS OF TOTAL CEMENTITIOUS MATERIALS:
   A. FLY ASH: MAXIMUM 25%
   B. SLAG: MAXIMUM 50%
   C. SILICA FUME: MAXIMUM 10%
   D. TOTAL OF FLY ASH, SLAG, AND SILICA FUME: MAXIMUM 50%
   E. TOTAL OF FLY ASH AND SILICA FUME: MAXIMUM 35%

22.6.7.2 - REINFORCEMENT SHALL BE PROVIDED AS FOLLOWS:
(A) VERTICAL REINFORCEMENT OF AT LEAST 0.20 SQUARE INCH (129 mm2) IN CROSS-SECTIONAL AREA SHALL BE PROVIDED CONTINUOUSLY FROM SUPPORT TO SUPPORT AT EACH CORNER, AT EACH SIDE OF EACH OPENING AND AT THE ENDS OF WALLS. THE CONTINUOUS VERTICAL BAR REQUIRED BESIDE AN OPENING IS PERMITTED TO SUBSTITUTE FOR ONE OF THE TWO NO. 5 BARS REQUIRED BY 22.6.6.5.
(B) HORIZONTAL REINFORCEMENT AT LEAST 0.20 SQUARE INCH (129 mm2) IN CROSS-SECTIONAL AREA SHALL BE PROVIDED:
CONTINUOUSLY AT STRUCTURALLY CONNECTED ROOF AND FLOOR LEVELS AND AT THE TOP OF WALLS; AT THE BOTTOM OF LOAD-BEARING WALLS OR IN THE TOP OF FOUNDATIONS WHERE DOWELED TO THE WALL; AND AT A MAXIMUM SPACING OF 120 INCHES (3048 mm).
REINFORCEMENT AT THE TOP AND BOTTOM OF OPENINGS, WHERE USED IN DETERMINING THE MAXIMUM SPACING SPECIFIED IN ITEM 3 ABOVE, SHALL BE CONTINUOUS IN THE WALL.

1908.1.15 ACI 318, SECTION 22.10.
DELETE ACI 318, SECTION 22.10, AND REPLACE WITH THE FOLLOWING:
22.10 - PLAIN CONCRETE IN STRUCTURES ASSIGNED TO SEISMIC DESIGN CATEGORY C, D, E OR F.
22.10.1 - STRUCTURES ASSIGNED TO SEISMIC DESIGN CATEGORY C, D, E OR F SHALL NOT HAVE ELEMENTS OF STRUCTURAL PLAIN CONCRETE, EXCEPT AS FOLLOWS:
STRUCTURAL PLAIN CONCRETE BASEMENT, FOUNDATION OR OTHER WALLS BELOW THE BASE ARE PERMITTED IN DETACHED ONE- AND TWO-FAMILY DWELLINGS THREE STORIES OR LESS IN HEIGHT CONSTRUCTED WITH STUD-BEARING WALLS. IN DWELLINGS ASSIGNED TO SEISMIC DESIGN CATEGORY D OR E, THE HEIGHT OF THE WALL SHALL NOT EXCEED 8 FEET (2438 mm), THE THICKNESS SHALL NOT BE LESS THAN 7 1/2 INCHES (190 mm), AND THE WALL SHALL RETAIN NO MORE THAN 4 FEET (1219 mm) OF UNBALANCED FILL. WALLS SHALL HAVE REINFORCEMENT IN ACCORDANCE WITH 22.6.6.5.

ISOLATED FOOTINGS OF PLAIN CONCRETE SUPPORTING PEDESTALS OR COLUMNS ARE PERMITTED, PROVIDED THE PROJECTION OF THE FOOTING BEYOND THE FACE OF THE SUPPORTED MEMBER DOES NOT EXCEED THE FOOTING THICKNESS.

EXCEPTION: IN DETACHED ONE- AND TWO-FAMILY DWELLINGS THREE STORIES OR LESS IN HEIGHT, THE PROJECTION OF THE FOOTING BEYOND THE FACE OF THE SUPPORTED MEMBER IS PERMITTED TO EXCEED THE FOOTING THICKNESS.

PLAIN CONCRETE FOOTINGS SUPPORTING WALLS ARE PERMITTED, PROVIDED THE FOOTINGS HAVE AT LEAST TWO CONTINUOUS LONGITUDINAL REINFORCING BARS. BARS SHALL NOT BE SMALLER THAN NO.4 AND SHALL HAVE A TOTAL AREA OF NOT LESS THAN 0.002 TIMES THE GROSS CROSS-SECTIONAL AREA OF THE FOOTING. FOR FOOTINGS THAT EXCEED 8 INCHES (203 mm) IN THICKNESS, A MINIMUM OF ONE BAR SHALL BE PROVIDED AT THE TOP AND BOTTOM OF THE FOOTING. CONTINUITY OF REINFORCEMENT SHALL BE PROVIDED AT CORNERS AND INTERSECTIONS.

EXCEPTIONS:
IN DETACHED ONE- AND TWO-FAMILY DWELLINGS THREE STORIES OR LESS IN HEIGHT AND CONSTRUCTED WITH STUD-BEARING WALLS, PLAIN CONCRETE FOOTINGS WITHOUT LONGITUDINAL REINFORCEMENT SUPPORTING WALLS ARE PERMITTED.

FOR FOUNDATION SYSTEMS CONSISTING OF A PLAIN CONCRETE FOOTING AND A PLAIN CONCRETE STEMWALL, A MINIMUM OF ONE BAR SHALL BE PROVIDED AT THE TOP OF THE STEMWALL AND AT THE BOTTOM OF THE FOOTING.

WHERE A SLAB ON GROUND IS CAST MONOLITHICALLY WITH THE FOOTING, ONE NO. 5 BAR IS PERMITTED TO BE LOCATED AT EITHER THE TOP OF THE SLAB OR BOTTOM OF THE FOOTING.

1908.1.16 ACI 318, SECTION D.3.3.
MODIFY ACI 318, SECTIONS D.3.3.2 THROUGH D.3.3.5, TO READ AS FOLLOWS:
D.3.3.2 - IN STRUCTURES ASSIGNED TO SEISMIC DESIGN CATEGORY C, D, E OR F, POST-INSTALLED ANCHORS FOR USE UNDER D.2.3 SHALL HAVE PASSED THE SIMULATED SEISMIC TESTS OF ACI 355.2.

D.3.3.3 - IN STRUCTURES ASSIGNED TO SEISMIC DESIGN CATEGORY C, D, E OR F, THE DESIGN STRENGTH OF ANCHORS SHALL BE TAKEN AS 0.75rNn AND 0.75rVn , WHERE r IS GIVEN IN D.4.4 OR D.4.5, AND Nn AND Vn ARE DETERMINED IN ACCORDANCE WITH D.4.1.

D.3.3.4 - IN STRUCTURES ASSIGNED TO SEISMIC DESIGN CATEGORY C, D, E OR F, ANCHORS SHALL BE DESIGNED TO BE GOVERNED BY TENSILE OR SHEAR STRENGTH OF A DUCTILE STEEL ELEMENT, UNLESS D.3.3.5 IS SATISFIED.

D.3.3.5 - INSTEAD OF D.3.3.4, THE ATTACHMENT THAT THE ANCHOR IS CONNECTING TO THE STRUCTURE SHALL BE DESIGNED SO THAT THE ATTACHMENT WILL UNDERGO DUCTILE YIELDING AT A LOAD LEVEL CORRESPONDING TO ANCHOR FORCES NO GREATER THAN THE DESIGN STRENGTH OF ANCHORS SPECIFIED IN D.3.3.3, OR THE MINIMUM DESIGN STRENGTH OF THE ANCHORS SHALL BE AT LEAST 2.5 TIMES THE FACTORED FORCES TRANSMITTED BY THE ATTACHMENT.

SECTION 1912
ANCHORAGE TO CONCRETE-STRENGTH DESIGN

1912.1 SCOPE.
THE PROVISIONS OF THIS SECTION SHALL GOVERN THE STRENGTH DESIGN OF ANCHORS INSTALLED IN CONCRETE FOR PURPOSES OF TRANSMITTING STRUCTURAL LOADS FROM ONE CONNECTED ELEMENT TO THE OTHER. HEADED BOLTS, HEADED STUDS AND HOOKED (J- OR L-) BOLTS CAST IN CONCRETE AND EXPANSION ANCHORS AND UNDERCUT ANCHORS INSTALLED IN HARDENED CONCRETE SHALL BE DESIGNED IN ACCORDANCE WITH APPENDIX D OF ACI 318 AS MODIFIED BY SECTION 1908.1.16, PROVIDED THEY ARE WITHIN THE SCOPE OF APPENDIX D.

EXCEPTION: WHERE THE BASIC CONCRETE BREAKOUT STRENGTH IN TENSION OF A SINGLE ANCHOR, Nb , IS DETERMINED IN ACCORDANCE WITH EQUATION (D-7), THE CONCRETE BREAKOUT STRENGTH REQUIREMENTS OF SECTION D.4.2.2 SHALL BE CONSIDERED SATISFIED BY THE DESIGN PROCEDURES OF SECTIONS D.5.2 AND D.6.2 FOR ANCHORS EXCEEDING 2 INCHES (51 mm) IN DIAMETER OR 25 INCHES (635 mm) TENSILE EMBEDMENT DEPTH.
THE STRENGTH DESIGN OF ANCHORS THAT ARE NOT WITHIN THE SCOPE OF APPENDIX D OF ACI 318, AND AS AMENDED ABOVE, SHALL BE IN ACCORDANCE WITH AN APPROVED PROCEDURE.

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JEFFREY T. BUTLER, P.E., P.C.
P.O. BOX 634
SHOREHAM, NEW YORK
TEL.: 631.208.8850 FAX: 631.727.8033

ENGINEER:
JEFFREY T. BUTLER, P.E.

CONCRETE NOTES FOR:
HIGHWAY DEPARTMENT METAL BUILDING
TOWN OF RIVERHEAD
1177 OSBORN AVE RIVERHEAD, N.Y. 11901
S.C.T.M.# 0600-108-02-01
COUNTY OF SUFFOLK TOWN OF RIVERHEAD

JOB No.: 160041 DRAWN BY: RAC
DATE: 06.20.2016 APPROVED BY: JTB

COMPACTED BACKFILL
SHALL COMPLY WITH SECTION 1803 OF B.C.N.Y. + AS NOTED BELOW

SOIL TESTING, SOIL CLASSIFICATION AND BEARING CAPACITIES, FOOTING AND FOUNDATION DESIGN SHALL BE IN ACCORDANCE WITH N.Y.S. BUILDING CODE CHAPTER 18.

A. MATERIALS

1. FILL AND BACKFILL MATERIAL OBTAINED FROM ON-SITE CUTTING OR EXCAVATION OR SOURCES LOCATED AWAY FROM THE CONSTRUCTION SITE (BORROWED) SHALL BE CLEAN SAND, GRAVEL, EARTH OR A MIXTURE OF THESE CONTAINING NO ORGANIC MATTER WITH A MAXIMUM SIZE OF 4".

2. COMPACTED FILL UNDER SLAB ON GRADE SHALL BE WELL GRADED SAND OR 'BANK RUN'. GRAVEL FROM SITE OR SOURCE APPROVED BY THE SOILS ENGINEER AND APPROVED AS SUITABLE MATERIAL FOR THE PURPOSE OF SUPPORTING THE SLAB ON GRADE. MINIMUM BEARING CAPACITY TO BE 2 TONS PER SQUARE FOOT + 3 TON PER SQUARE FOOT FOR FOOTINGS.

B. COMPACTED BACKFILL

1. PROMPTLY BACKFILL EXCAVATIONS AS WORK PERMITS, BUT NOT BEFORE CONCRETE WALLS AND FOOTINGS HAVE ATTAINED FULL DESIGN STRENGTH AND PIPING AND OTHER ITEMS BELOW BACKFILL HAVE BEEN TESTED AND APPROVED.

2. BACKFILL AND FILL TO NEW SURFACE GRADES AS REQUIRED. IF SUFFICIENT SOUND AND APPROVED FILL MATERIALS ARE NOT ON HAND TO COMPLETE FILLING OPERATIONS TO REQUIRED GRADES, PROVIDE SAME.

3. FILL SHALL BE CONSIDERED AS SATISFACTORY BEARING MATERIAL, THEN PLACED IN ACCORDANCE WITH THE FOLLOWING PROCEDURE:

A) BEFORE PLACEMENT OF FILL THE EXISTING GROUND SURFACE SHALL BE STRIPPED OF ALL ORGANIC GROWTH, WOOD, RUBBISH, DEBRIS AND OTHER DELETERIOUS OR UNSUITABLE MATERIALS. AFTER STRIPPING, THE GROUND SURFACE SHOULD BE COMPACTED TO THE DENSITY DESCRIBED BELOW.

B) MATERIALS FOR FILL SHALL CONSIST OF CLEAN GRANULAR SOIL CONTAINING NO DELETERIOUS MATTER. IT SHALL CONTAIN NO PARTICLES EXCEEDING 4" IN ITS LARGEST DIMENSION, BE WELL GRADED AND CONTAIN NO MORE THAN 12% BY WEIGHT OF MATERIAL PASSING THE NUMBER 200 SIEVE.

C) FILL SHALL BE PLACED AND COMPACTED AT ITS OPTIMUM MOISTURE CONTENT, IN UNIFORM LAYERS NOT GREATER THAN ONE FOOT THICK AND EACH LAYER SHALL BE COMPACTED TO A DENSITY OF 98% OF ITS MAXIMUM DENSITY AT FOOTINGS + 95% OF ITS MAXIMUM DENSITY AT SLABS AS DETERMINED BY ASTM D1557 (MODIFIED PROTOR DENSITY) FIELD DENSITY SHALL BE VERIFIED BY IN-PLACE DENSITY TESTS MADE IN ACCORDANCE WITH ASTM D1556 (SAND CONE METHOD). FILL SHALL NOT BE PLACED WHEN FROZEN OR ON FROZEN SUBGRADE.

D) COMPACTED FILL OPERATIONS SHALL BE CONTINUOUSLY INSPECTED BY A SOILS MECHANIC. CONTRACTOR TO INCLUDE ALL FEES FOR THIS SERVICE IN BID.

ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
RAFTERS HAVING SLOPES GREATER THAN 3 / 12 WITH NO FINISHED CEILING ATTACHED TO RAFTERS	L/180
ROOF TRUSSES	L/360
INTERIOR WALLS AND PARTITIONS	H/180
FLOORS AND PLASTER CEILINGS	L/360
ALL STRUCTURAL MEMBERS	L/240
EXTERIOR WALL WITH PLASTER OR STUCCO FINISH	H/360
EXTERIOR WALLS - WIND LOADS WITH BRITTLE FINISHES [a]	L/240
EXTERIOR WALLS - WIND LOADS WITH FLEXIBLE FINISHES [a]	L/120

NOTE: L = SPAN LENGTH, H = SPAN HEIGHT
a. THE WIND LOAD SHALL BE PERMITTED TO BE TAKEN AS 0.7 TIMES THE COMPONENT AND CLADDING LOADS FOR THE PURPOSE OF THE DETERMINING DEFLECTION LIMITS HEREIN.

(TABLE 1704.4)
REQ'D VERIFICATION & INSPECTION OF CONCRETE CONSTRUCTION

VERIFICATION AND INSPECTION	CONT.	PERIODIC	REFERENCED STANDARD	BC-NYS REFERENCED
1. INSPECTION OF REINFORCING STEEL, INCLUDING PRE-STRESSING TENDONS, AND PLACEMENT.		X	ACI 318: 3.5, 7.1- 7.7	1903.5, 1907.1, 1907.7, 1914.4
2. INSPECTION OF REINFORCING STEEL WELDING IN ACCORDANCE WITH TABLE 1704.3, ITEM 5B.			AWS D1.4 ACI 318: 3.5.2	1903.5.2
3. INSPECT BOLTS TO BE INSTALLED IN CONCRETE PRIOR TO AND DURING PLACEMENT OF CONCRETE WHERE ALLOWABLE LOADS HAVE BEEN INCREASED.	X			1912.5
4. VERIFYING USE OF REQUIRED DESIGN UNIT.		X	ACI 318: CH.4 5.2-5.4	1904, 1905.2.4, 1914.2.3
5. AT THE TIME FRESH CONCRETE IS SAMPLED TO FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE.	X		ASTM C 172 ASTM C 31 ACT 318: 5.6, 5.8	1905.6, 1914.10
6. INSPECTION OF CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES.	X		ACI 318: 5.9, 5.10	1905.9 & 10, 1914.6, 7 & 8
7. INSPECTION FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.		X	ACI 318: 5.11-5.13	1905.11, 1905.13, 1914.9

(TABLE 1704.3)
REQ'D VERIFICATION & INSPECTION OF STEEL CONSTRUCTION

VERIFICATION AND INSPECTION	CONT.	PERIODIC	REFERENCED STANDARD	BC-NYS REFERENCED
1. MATERIAL VERIFICATION OF HIGH-STRENGTH BOLTS, NUTS AND WASHERS: A. IDENTIFICATION MARKING TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS. B. MANUFACTURERS CERTIFICATE OF COMPLIANCE REQUIRED.	-	X	APPLICABLE ASTM MAT'L SPECS. AISC ASD: SEC. A3.4 AISC LRFD: SEC. A3.3	-
2. INSPECTION OF HIGH-STRENGTH BOLTING: A. BEARING - TYPE CONSTRUCTION B. SLIP-CRITICAL CONNECTIONS		X	AISC LRFD: SEC. M2.5	1704.3.3
3. MATERIAL VERIFICATION OF STRUCTURAL STEEL: A. IDENTIFICATION MARKING TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS. B. MANUFACTURERS CERTIFICATE OF MILL TEST REPORTS.	-		ASTM A 6 OR ASTM A 568 ASTM A 6 OR ASTM A 568	1708.4
4. MATERIAL VERIFICATION OF WELD FILLER MATERIALS: A. IDENTIFICATION MARKING TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS. B. MANUFACTURERS CERTIFICATE OF COMPLIANCE REQUIRED.	-	-	AISC, ASC; SEC. A3.6 AISC LRFD: SEC. A3.5	-
5. INSPECTION OF WELDING: A. STRUCTURAL STEEL: 1. COMPLETE AND PARTIAL PENETRATION GROOVE WELDS. 2. MULTIPASS FILLET WELDS 3. SINGLE PASS FILLET WELDS > 5/16" 4. SINGLE PASS FILLET WELDS < OF = 5/16" 5. FLOOR AND DECK WELDS B. REINFORCING STEEL:	X - X X X	 X X	AWS D1.1 AWS D1.3	1704.3.1
1. VERIFICATION OF WELDABILITY OF REINFORCING STEEL OTHER THAN ASTM A 706 2. REINFORCING STEEL-RESISTING FLEXURAL AND AXIAL FORCES IN INTERMEDIATE AND SPECIAL MOMENT FRAMES, AND BOUNDARY ELEMENTS OF SPECIAL REINFORCED CONCRETE SHEAR WALLS AND SHEAR REINFORCEMENT. 3. SHEAR REINFORCEMENT 4. OTHER REINFORCING STEEL.	X X	 X	AWS D1.4 ACI 318: 3.5.2	1903.5.2
6. INSPECTION OF STEEL FRAME JOINT DETAILS FOR COMPLIANCE WITH APPROVED CONSTRUCTION DOCUMENTS: A. DETAILS SUCH AS BRACING AND STIFFENING B. MEMBER LOCATIONS C. APPLICATION OF JOINT DETAILS AT EACH CONNECTION.	-	X		1704.3.2

NOTE:
THE ENGINEER IS RETAINED FOR INSPECTIONS.

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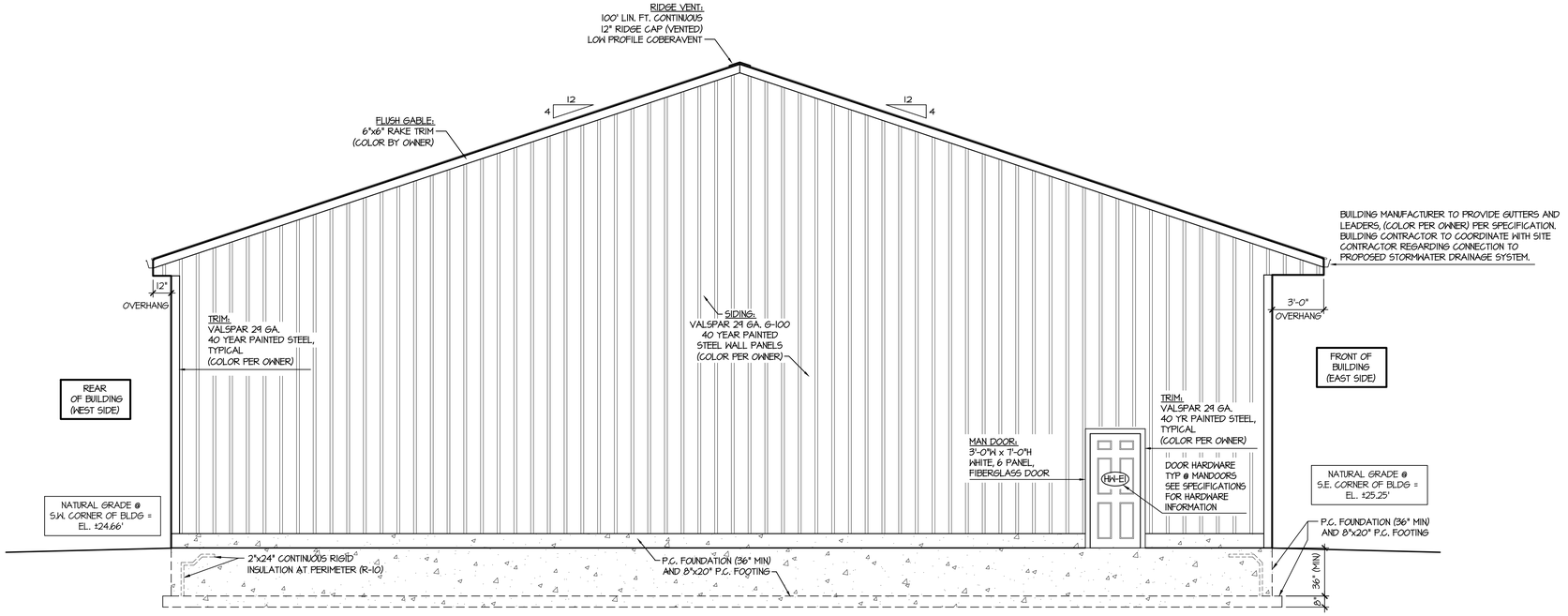
JEFFREY T. BUTLER, P.E., P.C.
P.O. BOX 634
SHOREHAM, NEW YORK
TEL.: 631.208.8850 FAX: 631.727.8033
ENGINEER:
JEFFREY T. BUTLER, P.E.

GENERAL NOTES FOR:
HIGHWAY DEPARTMENT METAL BUILDING
TOWN OF RIVERHEAD
1177 OSBORN AVE RIVERHEAD, NY. 11901
S.C.T.M.# 0600-108-02-01
COUNTY OF SUFFOLK TOWN OF RIVERHEAD

JOB No.: 160041 DRAWN BY: RAC
DATE: 06.20.2016 APPROVED BY: JTB



1 EXTERIOR ELEVATION - SOUTH SIDE

SCALE: 1/4" = 1'-0"

NOTE: ALL ENTRANCES TO MEET ADA REQUIREMENTS

DESIGN ROOF FOR 20#/S.F.
SNOW LOAD
DESIGN FRAME, FLOOR, & SIDE WALLS
FOR 130 M.P.H. WIND LOAD

PRE-ENGINEERED METAL BUILDING
OLYMPIA OR APPROVED EQUAL. ALL
ROOF PANELS SHALL BE INSULATED.
BUILDING SUPPLIER TO PROVIDE
LEADERS AND GUTTERS.

ROOF DRAINAGE CALCULATIONS:

EAST SLOPE: (AREA = 3,508 SQ.FT.)
FROM TABLE VI-903 @ 1/4" PER FOOT,
GUTTER DIAMETER TO BE 8" MIN.
LEADER DIAMETER TO BE 4" MIN.

WEST SLOPE: (AREA = 3,517 SQ.FT.)
FROM TABLE VI-903 @ 1/4" PER FOOT,
GUTTER DIAMETER TO BE 8" MIN.
LEADER DIAMETER TO BE 4" MIN.

PROJECT:
TOWN OF RIVERHEAD HIGHWAY DEPARTMENT

BUILDING:
PROPOSED METAL STORAGE BUILDING

USE: REPAIR AND MAINTENANCE OF TOWN EQUIPMENT, STORAGE OF SPARE PARTS

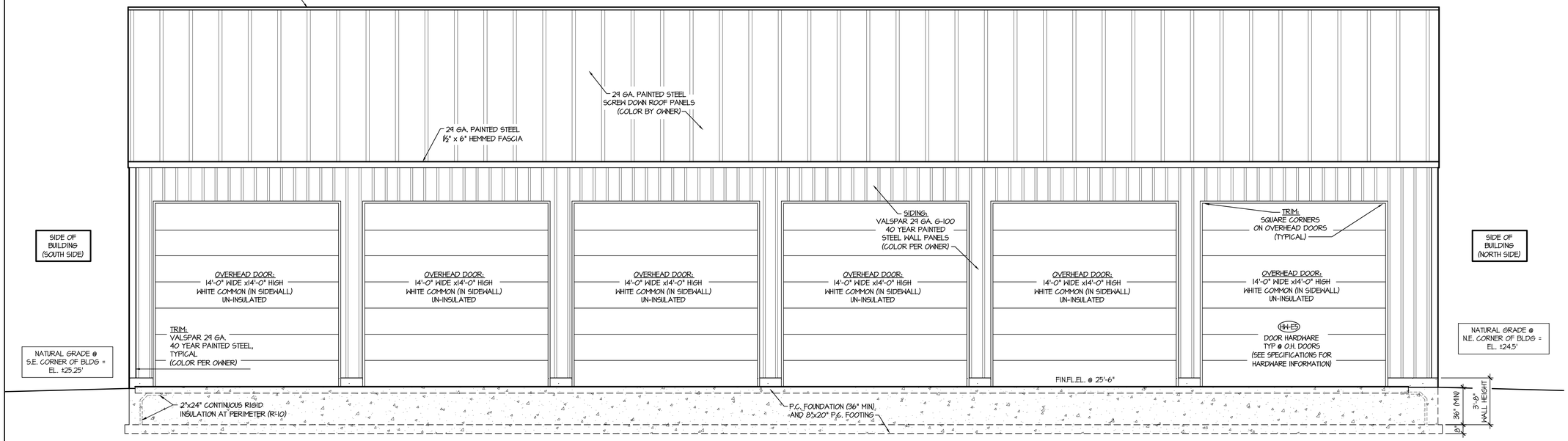
SIZE: 6600 SQ.FT.

CONSTRUCTION CLASSIFICATION: 2b

OCCUPANCY CLASSIFICATION: G3.2

ALL STRUCTURAL COMPONENTS BY BUILDING MANUFACTURER REFER TO SITE PLAN BY JEFFREY T. BUTLER, P.E., P.C. FOR BUILDING PLACEMENT AND RELATED SITE IMPROVEMENTS.

BUILDING MANUFACTURER TO VERIFY EAVE HEIGHT ALLOWS FOR 14'-0" OVERHEAD DOORS



2 EXTERIOR ELEVATION - FRONT - EAST SIDE

SCALE: 1/4" = 1'-0"

REVISIONS:
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JEFFREY T. BUTLER, P.E., P.C.
P.O. BOX 634
SHOREHAM, NEW YORK
TEL.: 631.208.8850 FAX: 631.727.8033

ENGINEER:
JEFFREY T. BUTLER, P.E.

EXTERIOR ELEVATIONS FOR:
HIGHWAY DEPARTMENT METAL BUILDING
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1177 OSBORN AVE RIVERHEAD, N.Y. 11901
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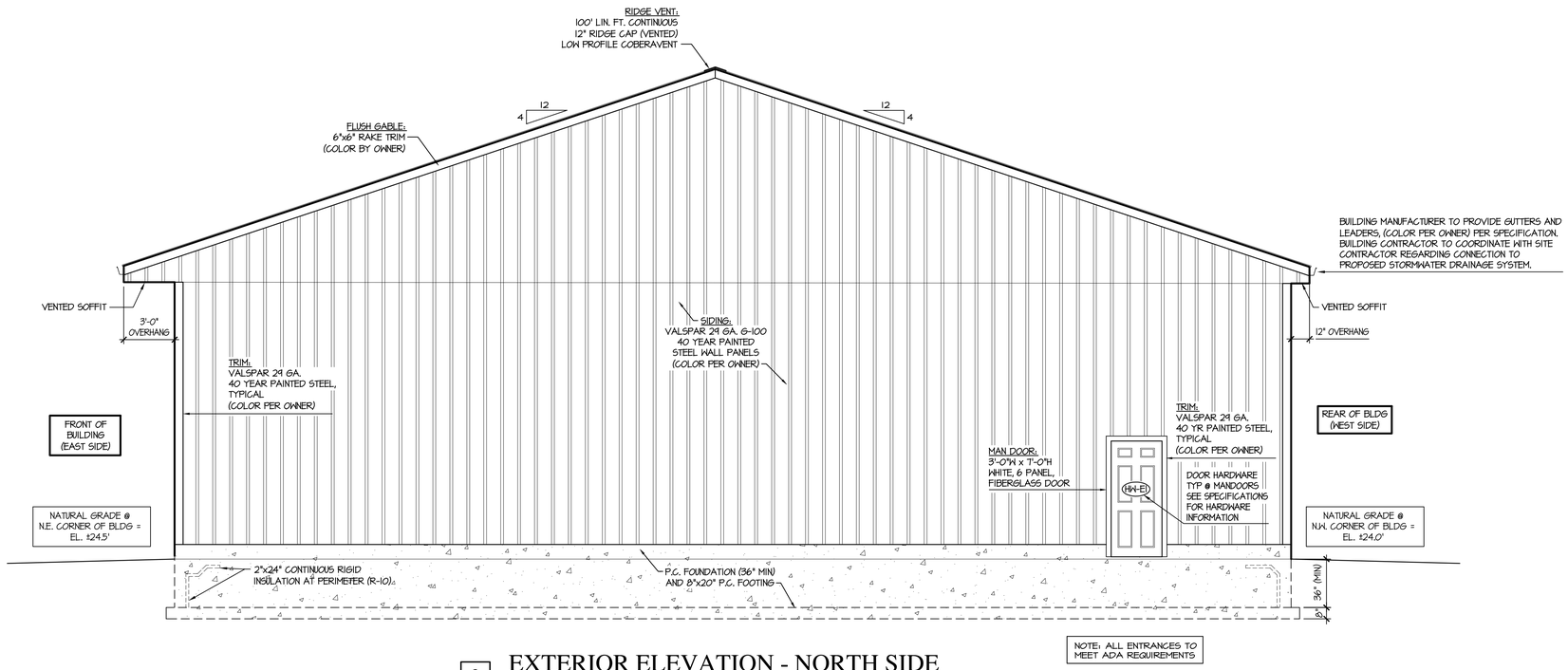
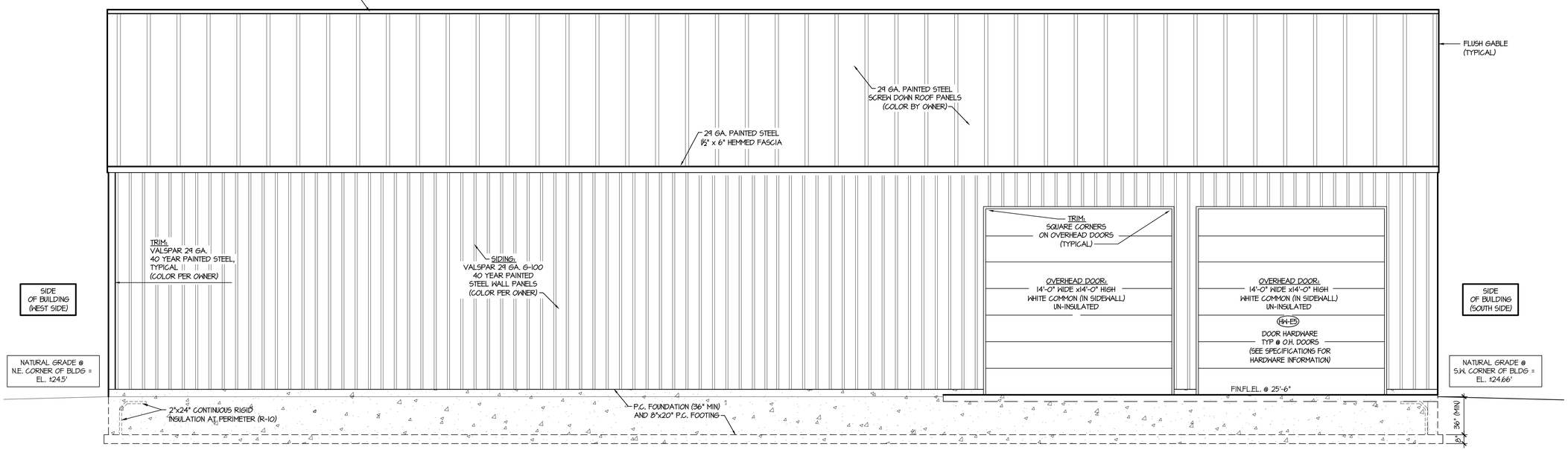


NOTE: ALL ENTRANCES TO MEET ADA REQUIREMENTS

3 EXTERIOR ELEVATION - NORTH SIDE

SCALE: 1/4" = 1'-0"



4 EXTERIOR ELEVATION - REAR - WEST SIDE

SCALE: 1/4" = 1'-0"

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ENGINEER:
JEFFREY T. BUTLER, P.E., P.C.
P.O. BOX 634
SHOREHAM, NEW YORK
TEL.: 631.208.8850 FAX: 631.727.8033
JEFFREY T. BUTLER, P.E.

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FOUNDATION PLAN

SCALE: 1/4" = 1'-0"

6" THICK REINFORCED P.C. SLAB

(4,000 PSI)
FINISH: HARD STEEL TROWEL BURNISHED

PITCH SLAB TO O.H. DOORS TO PROVIDE POSITIVE FLOW AT AN UNIFORM PITCH

SAW CUT SLAB FOR STRESS RELIEF AT 20' x 20' GRID

NOTE:
1. CONFIRM FOOTINGS LOCATIONS AND SIZE WITH BUILDING MANUFACTURE.
2. COORDINATE ANCHOR BOLT LOCATION AND PATERN (LOCATED ABOVE PIERS) WITH APPROVED BUILDING MANUFACTURE'S DRAWINGS.
3. COORDINATE STEEL BUILDING HIGH WIND CONNECTION REQUIREMENTS (BY OTHERS) WITH FOUNDATION CONNECTION LOCATIONS PROVIDE BY JEFFREY T. BUTLER, P.E., P.C.

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JEFFREY T. BUTLER, P.E., P.C.
P.O. BOX 634
SHOREHAM, NEW YORK
TEL.: 631.208.8850 FAX: 631.727.8033

ENGINEER:
JEFFREY T. BUTLER, P.E.

FOUNDATION PLAN FOR:
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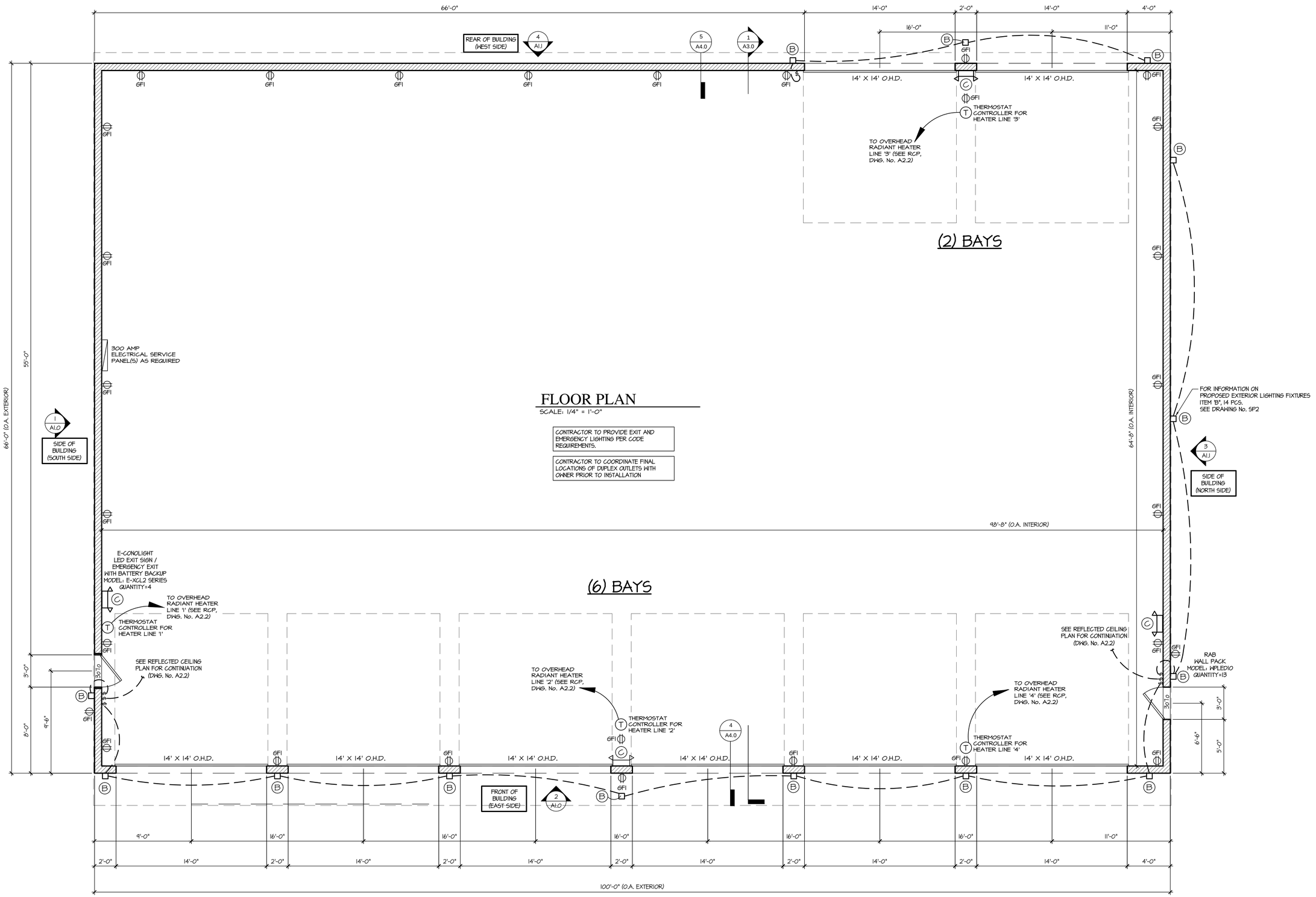

FLOOR PLAN

SCALE: 1/4" = 1'-0"

CONTRACTOR TO PROVIDE EXIT AND EMERGENCY LIGHTING PER CODE REQUIREMENTS.

CONTRACTOR TO COORDINATE FINAL LOCATIONS OF DUPLEX OUTLETS WITH OWNER PRIOR TO INSTALLATION

REVISIONS:
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JEFFREY T. BUTLER, P.E., P.C.
P.O. BOX 634
SHOREHAM, NEW YORK
TEL.: 631.208.8850 FAX: 631.727.8033

ENGINEER:

JEFFREY T. BUTLER, P.E.

FLOOR PLAN FOR:
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DRAWN BY: RAC
APPROVED BY: JTB
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DATE: 06.20.2016

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NOTE:
THE INSTALLATION OF HEATERS MUST CONFORM WITH LOCAL AND STATE CODES AND WITH THE NATIONAL FUEL GAS CODE, ANSI-Z223.1-1999 (NFPA54 CURRENT ADDITION).

REAR OF BUILDING (WEST SIDE)

FRESH AIR INLET

EXHAUST AIR OUTLET

PROVIDE SIDEWALL VENTING (TYPICAL OF 4) 4" COMBUSTION AIR INLET

BURNER CONTROL BOX, 60" POWER CORD CONNECTION (TYPICAL EACH LINE)

HOME RUN TO BREAKER PANEL

ALL HEATERS MUST MAINTAIN HL3 CLEARANCES TO COMBUSTABLES.

SUSPEND HEATERS A.F.F. = 16'-0" (TYPICAL)

PROVIDE SSE SIDE SHIELD EXTENSIONS IN LOCATIONS WITHIN CLOSE PROXIMITY TO OVERHEAD DOORS (TYPICAL)

(2) BAYS

(6) BAYS

SEE FLOOR PLAN FOR CONTINUATION (DWG. No. A2.1)

E-CONOLIGHT
LED LOW BAY LUMINAIRE
MODEL: E-ALBIL07NJ
WHITE CYLINDRICAL METAL HOUSING W/ INTERGATED HEAT SINK
MOUNTING HIEGHT = 16' A.F.F.
PENDANT, HOOK AND CORD MOUNT
QUANTITY = 18
AVERAGE ILLUMINANCE: 25 FC
LIGHTING POWER DENSITY (LPD): 0.24 W.S.F.

HEATER LINE (1)
RE-VERBER-RAY
INFRARED RADIANT HEATER
HL3 SERIES - 2 STAGE
MODEL No. HL3-50-150
HIGH FIRE: 150,000 BTU EA.
LOW FIRE: 100,000 BTU EA.
USE SSE SIDE SHIELD EXTENSIONS (THIS UNIT)

HEATER LINE (2)
RE-VERBER-RAY
INFRARED RADIANT HEATER
HL3 SERIES - 2 STAGE
MODEL No. HL3-50-150
HIGH FIRE: 150,000 BTU EA.
LOW FIRE: 100,000 BTU EA.

HEATER LINE (3)
RE-VERBER-RAY
INFRARED RADIANT HEATER
HL3 SERIES - 2 STAGE
MODEL No. HL3-50-150
HIGH FIRE: 150,000 BTU EA.
LOW FIRE: 100,000 BTU EA.

HEATER LINE (4)
RE-VERBER-RAY
INFRARED RADIANT HEATER
HL3 SERIES - 2 STAGE
MODEL No. HL3-50-150
HIGH FIRE: 150,000 BTU EA.
LOW FIRE: 100,000 BTU EA.
USE SSE SIDE SHIELD EXTENSIONS (THIS UNIT)

WIRE DIRECT TO BREAKER PANEL

FOR INFRARED RADIANT HEATER LOCAL CONTACT SEE:
ATI - APPLIED TECHNOLOGIES OF N.Y.
90 PLANT AVENUE
HAUPPAUGE, N.Y. 11788
PHONE: 631-331-0215
http://www.atiofny.com

FOR LED LOW BAY LIGHTING CONTACT SEE:
E-CONOLIGHT
1501 96th STREET, STURTEVENT, WI 53177
PHONE: 888-243-4445
www.e-conolight.com

SIDE OF BUILDING (SOUTH SIDE)

SIDE OF BUILDING (NORTH SIDE)

FRONT OF BUILDING (EAST SIDE)

EXHAUST AIR OUTLET

14' X 14' O.H.D.

66'-0"
55'-0"
66'-0" (O.A. EXTERIOR)
98'-8" (O.A. INTERIOR)
64'-8" (O.A. INTERIOR)
100'-0" (O.A. EXTERIOR)

REFLECTED CEILING PLAN
SCALE: 1/4" = 1'-0"

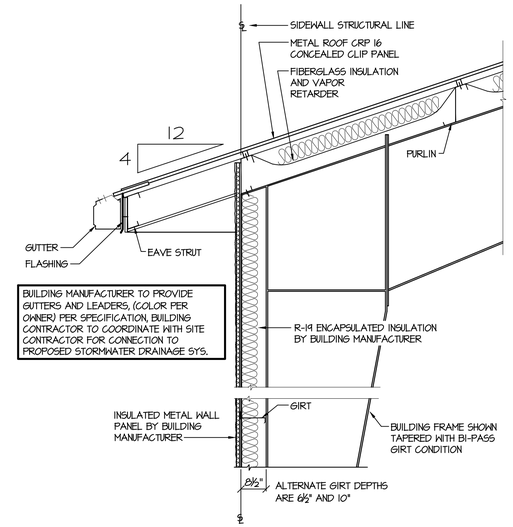
REVISIONS:
08-24-2016 UPDATED FOR BIDDING PURPOSES
11-16-2016 REVISED PER TOWN OF RIVERHEAD COMMENTS

JEFFREY T. BUTLER, P.E., P.C.
P.O. BOX 634
SHOREHAM, NEW YORK
TEL.: 631.208.8850 FAX: 631.727.8033

ENGINEER:
JEFFREY T. BUTLER, P.E.

REFLECTED CEILING PLAN FOR:
HIGHWAY DEPARTMENT METAL BUILDING
TOWN OF RIVERHEAD
1177 OSBORN AVE RIVERHEAD, N.Y. 11901
S.C.T.M.# 0600-108-02-01
COUNTY OF SUFFOLK TOWN OF RIVERHEAD

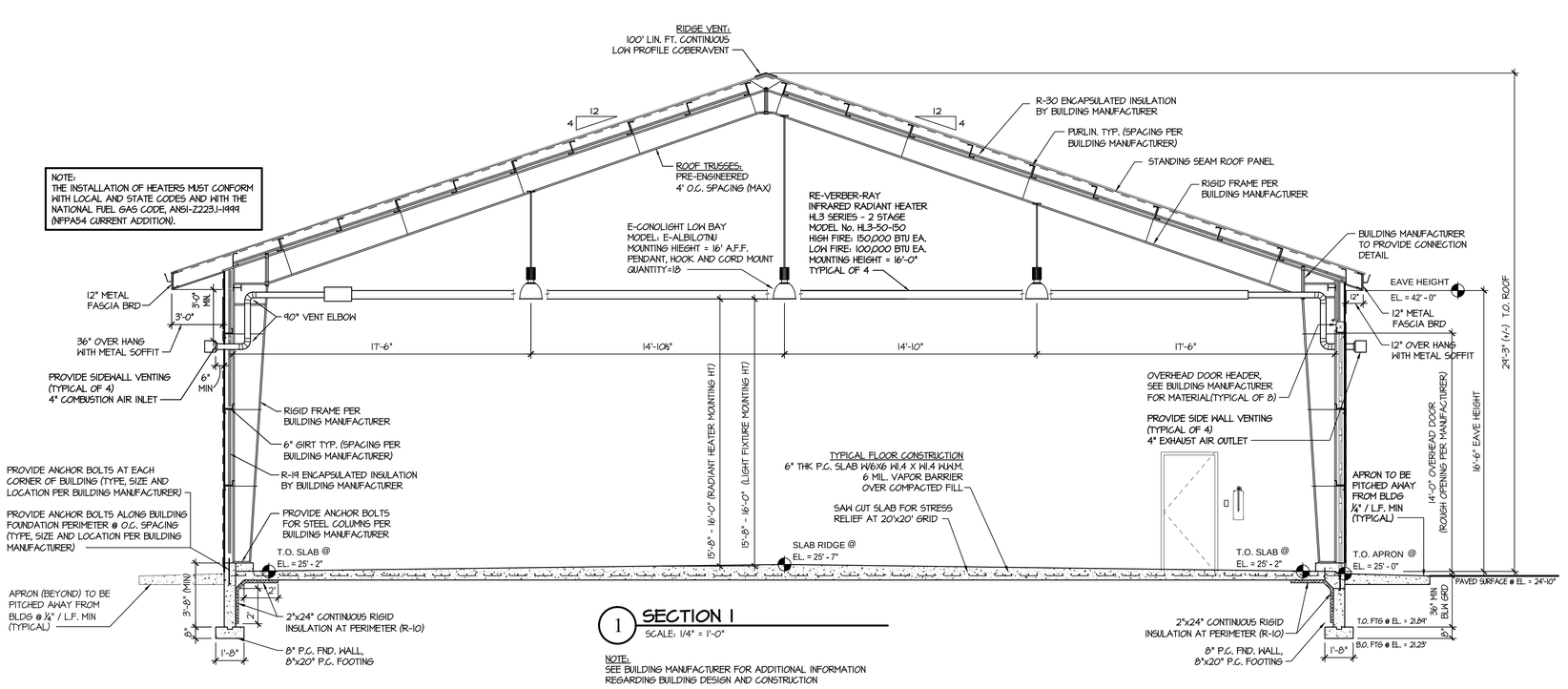
JOB No.: 160041 | DRAWN BY: RAC
DATE: 06.20.2016 | APPROVED BY: JTB



2 WALL AND ROOF DETAIL

SCALE: 1/2" = 1'-0"

NOTE:
SEE BUILDING MANUFACTURER FOR ADDITIONAL INFORMATION
REGARDING BUILDING DESIGN AND CONSTRUCTION



1 SECTION 1

SCALE: 1/4" = 1'-0"

NOTE:
SEE BUILDING MANUFACTURER FOR ADDITIONAL INFORMATION
REGARDING BUILDING DESIGN AND CONSTRUCTION

REVISIONS:
11-16-2016 REVISED PER TOWN OF RIVERHEAD COMMENTS

JEFFREY T. BUTLER, P.E., P.C.
P.O. BOX 634
SHOREHAM, NEW YORK
TEL.: 631.208.8850 FAX: 631.727.8033

ENGINEER:

JEFFREY T. BUTLER, P.E.

BUILDING SECTION AND DETAILS FOR:
HIGHWAY DEPARTMENT METAL BUILDING
1177 OSBORN AVE RIVERHEAD, N.Y. 11901
S.C.T.M.# 0600-108-02-01
COUNTY OF SUFFOLK TOWN OF RIVERHEAD

JOB NO.: 160041 | DRAWN BY: RAC
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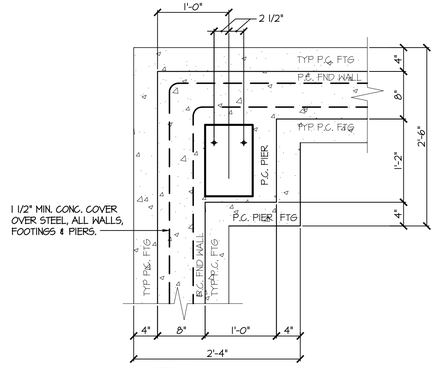
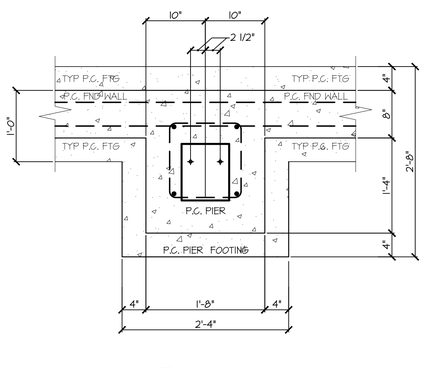


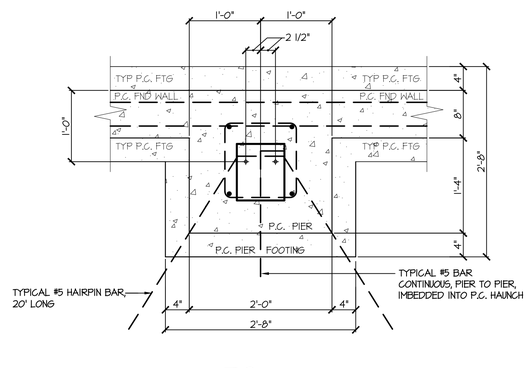
P1 (PLAN VIEW)

SCALE: 1" = 1'-0"



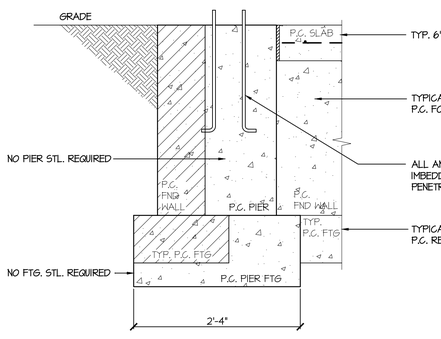
P2 (PLAN VIEW)

SCALE: 1" = 1'-0"



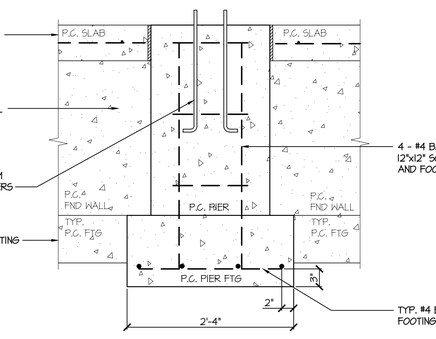
P3 (PLAN VIEW)

SCALE: 1" = 1'-0"



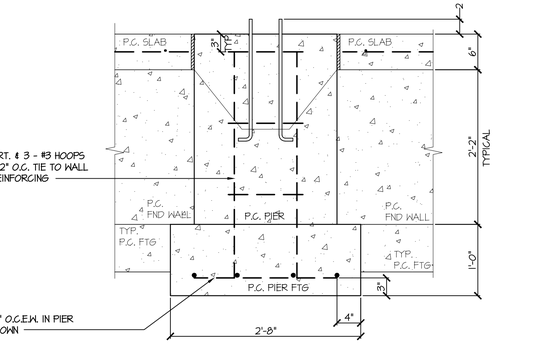
P1 (ELEVATION)

SCALE: 1" = 1'-0"



P2 (ELEVATION)

SCALE: 1" = 1'-0"



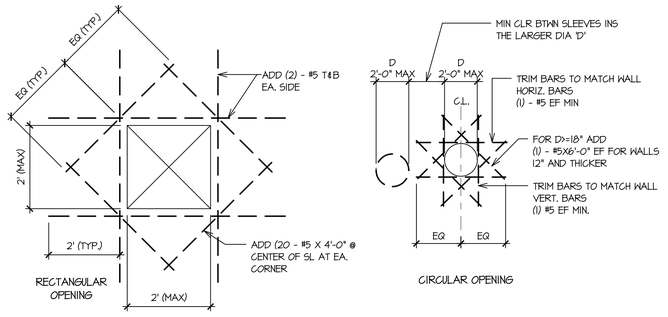
P3 (ELEVATION)

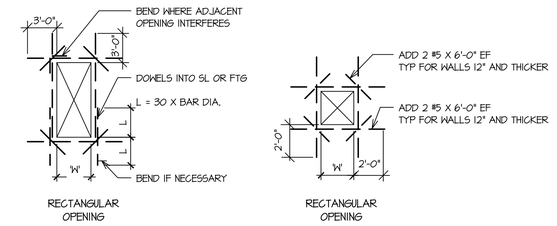
SCALE: 1" = 1'-0"

1 PIERS - PLANS AND ELEVATIONS

SCALE: 1" = 1'-0"

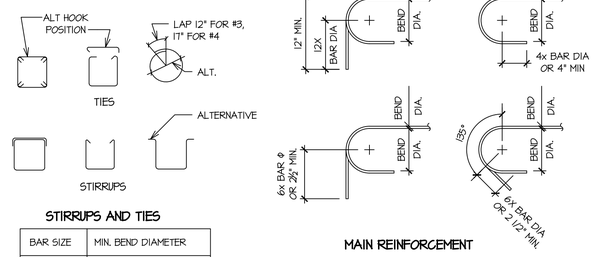
NOTE:
1. CONFIRM FOOTING LOCATIONS AND SIZE WITH BUILDING MANUFACTURE.
2. COORDINATE ANCHOR BOLT LOCATION AND PATERN (LOCATED ABOVE PIERS) WITH APPROVED BUILDING MANUFACTURE'S DRAWINGS.
3. COORDINATE STEEL BUILDING HIGH WIND CONNECTION REQUIREMENTS (BY OTHERS) WITH FOUNDATION CONNECTION LOCATIONS PROVIDE BY JEFFREY T. BUTLER, P.E., P.C.





2 TYPICAL CONCRETE WALL OPENINGS

SCALE: 1/8" = 1'-0"



STIRRUPS AND TIES

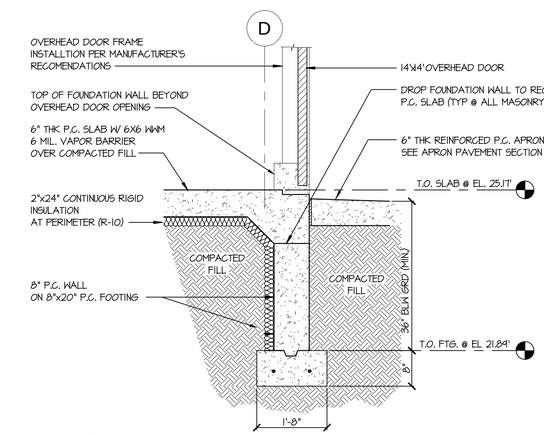
BAR SIZE	MIN. BEND DIAMETER
#3 - #8	6 X BAR DIA
#9 - #11	8 X BAR DIA
#14 - #18	10 X BAR DIA

MAIN REINFORCEMENT

BAR SIZE	MIN. BEND DIAMETER
#3 - #5 OTHERS	4 X BAR DIA SAME AS MAIN REINF.

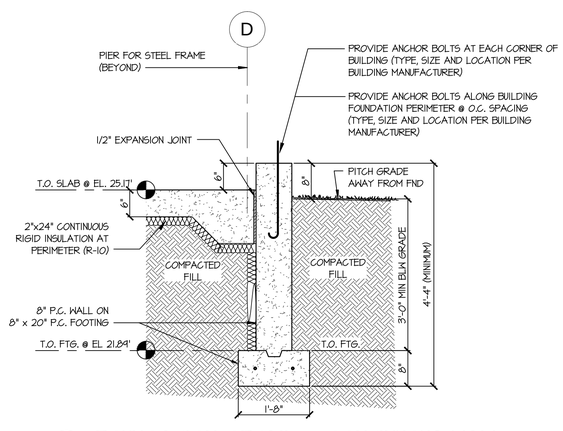
3 TYPICAL REINFORCING BAR HOOKS AND BENDS

SCALE: 1/8" = 1'-0"



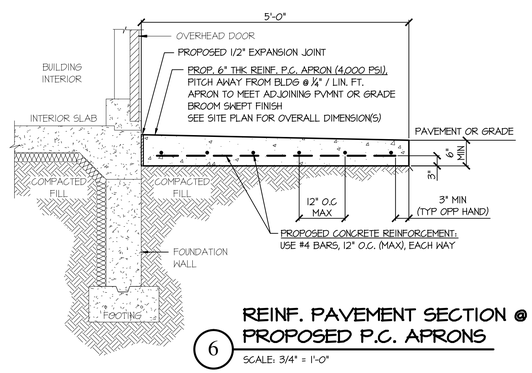
4 FOUNDATION DETAIL @ WALL OPENING

SCALE: 3/4" = 1'-0"



5 FOUNDATION DETAIL @ CONTINUOUS WALL

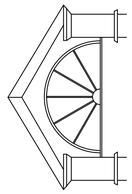
SCALE: 3/4" = 1'-0"



6 REINF. PAVEMENT SECTION @ PROPOSED P.C. APRONS

SCALE: 3/4" = 1'-0"

REVISIONS:
11-16-2016 REVISED PER TOWN OF RIVERHEAD COMMENTS



JEFFREY T. BUTLER, P.E., P.C.
P.O. BOX 634
SHOREHAM, NEW YORK
TEL.: 631.208.8850 FAX: 631.727.8033

ENGINEER:
JEFFREY T. BUTLER, P.E.

DETAILS FOR:
HIGHWAY DEPARTMENT METAL BUILDING
TOWN OF RIVERHEAD
1177 OSBORN AVE RIVERHEAD, N.Y. 11901
S.C.T.M.# 0600-108-02-01
COUNTY OF SUFFOLK TOWN OF RIVERHEAD

JOB NO.: 160041 DRAWN BY: RAC
DATE: 06.20.2016 APPROVED BY: JTB

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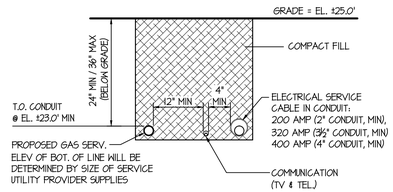
DigNet of NEW YORK CITY & LONG ISLAND
800-272-4480 | 811
www.dignetnycli.com or www.call811.com (for other states)

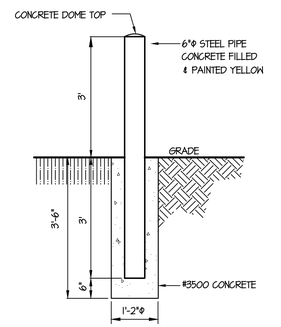
By law, excavators and contractors working in the five boroughs of New York City and Nassau and Suffolk Counties on Long Island must contact DigNet, 1-800-272-4480 or 811, at least 48 hours but no more than 10 working days (excluding weekends and legal holidays) prior to beginning any mechanized digging or excavation work to ensure underground lines are marked. Excavators and contractors can also submit locate requests online, through ITIC. If you do not currently use ITIC, please call 1-800-524-7603 for more information.

For safety reasons, homeowners are strongly encouraged to call as well when planning any type of digging on their property. Homeowners can contact us directly at 1-800-272-4480 or by calling 811, the national call before you dig number. For excavation work completed on personal property, it is the contractor's responsibility--NOT the homeowner's--to contact DigNet. Having utility lines marked prior to digging is free of charge.



TRENCH DETAIL @ GAS, POWER, COMMUNICATION SERVICES

NOT TO SCALE

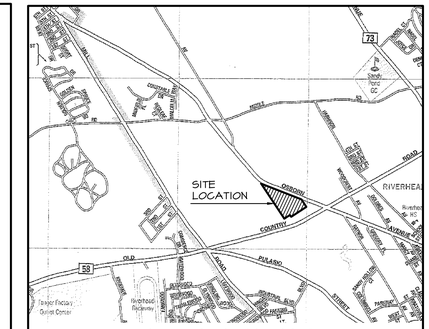


BOLLARD DETAIL

SCALE: N.T.S., QTY: 10

LINE / SYMBOL LEGEND

- PROPERTY LINE
- SETBACK LINE
- EXISTING TO BE REMOVED/RELOCATED
- U/G SERVICES (UG)
- STORM WATER PIPING (SD)
- VALLEY GUTTER (VG)
- EXISTING FENCE
- EROSION CONTROL: SILT FENCE
- CONSTRUCTION FENCE
- EXISTING CONTOUR
- FINISHED FLOOR ELEVATION — F.F.EL. =
- PARKING SPACE
- STORM WATER FLOW
- CATCH BASIN
- LEACHING POOL W/ OPEN GRATE
- EROSION CONTROL: INLET PROTECTION



LOCATION MAP:

NOT TO SCALE

PROPOSED SITE PLAN:

SITUATE AT:
1177 OSBORN AVENUE RIVERHEAD, NY 11901
TOWN OF RIVERHEAD
SUFFOLK COUNTY, NEW YORK
SCTM NO.: 0600-108-02-01
ZONING DISTRICT: BC (BUSINESS CENTER)
CURRENT USE:
TOWN HIGHWAY DEPT. GARAGE, STORAGE & STOCKPILE MATERIAL

SITE DATA:	EXISTING:	PROPOSED:
AREA OF SITE:	321,961 S.F. (7.389 AC.)	N.C.
BUILDING AREAS:		
BUILDING 'A':		
'A1'	11,072 S.F.	N.C.
'A2'	1,284 S.F.	N.C.
BLDG 'B'	2,610 S.F.	N.C.
BLDG 'C'	4,450 S.F.	N.C.
BLDG 'D'	2,986 S.F.	N.C.
BLDG 'E'	N/A	6,600 S.F.
P/O BLDG LOC'D ON NEIGHBORING LOT (SE CORNER):	56 S.F.	N.C.
TL. AREA:	22,458 S.F.	6,600 S.F.

SURVEY OF EXISTING CONDITIONS OF DESCRIBED PROPERTY: LIBER 4310 PAGE 26

SITE PLAN BASED ON ORIGINAL SURVEY BY:
F.C. WATSON LAND SURVEYOR, P.C.
P.O. BOX 1118
BRIGHTHATERS, N.Y. 11718
PHONE: 631-328-3422
FAX: 631-677-3202
EMAIL: fcwatson@verison.net
SURVEY CREATED: OCT. 2015

OWNER:
TOWN OF RIVERHEAD
200 HOWELL AVE.
RIVERHEAD, NY 11901

NOTES TO CONTRACTOR:

1. CONTRACTOR TO ENGAGE A LICENCED SURVEYOR FOR STAKE OUT PRIOR TO EXCAVATION. CONTRACTOR TO PROVIDE AS BUILT FOUNDATION PLAN TO TOWN OF RIVERHEAD PRIOR TO ERECTION OF BUILDING. CONTRACTOR TO PROVIDE AS BUILT SURVEY AT THE CONCLUSION OF JOB.
2. CONTRACTOR TO PROVIDE TOWN OF RIVERHEAD SIGNED AND SEALED (NEW YORK STATE) DRAWINGS FOR BUILDING FROM BUILDING MANUFACTURER ALONG WITH PROOF OF COMPLANCE WITH LOAD AS REQUIRED WITHIN 2015 NEW YORK STATE BUILDING CODE (130 MPH).
3. CONTRACTOR TO OBTAIN BUILDING PERMIT FROM TOWN OF RIVERHEAD. ENGINEER OF RECORD TO PROVIDE UPDATED FOUNDATION PLANS AFTER CONTRACTOR SUPPLIES ENGINEER WITH BUILDING REACTIONS AND BOLT PATTERNS FOR BUILDING SELECTED.

STORM DRAINAGE CALC:

(PROVIDED FOR PROPOSED BUILDING AND PROPOSED PAVED AREA ONLY)

VOLUME = AREA x RAINFALL x COEFFICIENT
PROPOSED BUILDING AREA = 6,600 S.F.
PROPOSED PAVED AREAS = 12,985 S.F.
RAINFALL = 2" = 0.16T'
COEFFICIENT OF ASPHALT/ CONC. = 1.0

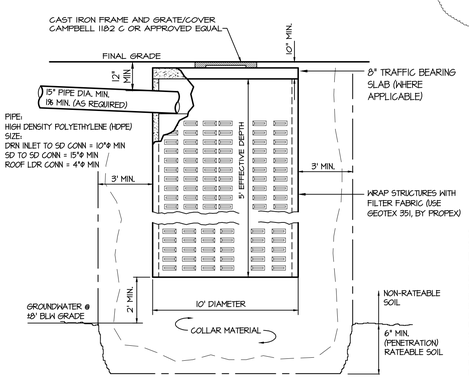
PROPOSED ROOF DRAINAGE CALC.:
6,600 S.F. x 0.16T x 1.0 = 1,102 CUFT.
VOLUME REQUIRED: 1,102 CUFT.

PROPOSED PAVED AREA CALC.:
12,985 S.F. x 0.16T x 1.0 = 2,170 CUFT.
VOLUME REQUIRED: 2,170 CUFT.

1,102 CUFT. (BLDG) + 2,170 CUFT. (PAVED) = 3,272 CUFT.
TL VOLUME REQUIRED: 3,272 CUFT.

USE: (10) 10'Φ STORMWATER LEACHING POOLS, 5' LIQ. DEPTH EA.
OPEN COVER, INTERCONNECT AS SHOWN
TL VOLUME PROVIDED: 3,421 CUFT.

NOTE:
DRAINAGE CONNECTIONS, PIPING AND STRUCTURES SHALL BE PROVIDED AND INSTALLED BY THE TOWN OF RIVERHEAD HIGHWAY DEPARTMENT



NOTES:
1. COLLAR DEPTH IS NOT REQUIRED WHEN RATEABLE MATERIAL EXISTS FOR FULL DEPTH.
2. COLLAR MATERIAL SHALL BE CLEAN GRAVEL ONLY.
3. ALL DRAINAGE STRUCTURES MUST BE WRAPPED WITH FILTER FABRIC.
4. USE 15" DIA CORRUGUATED HIGH DENSITY POLYETHYLENE (HDPE) HEAVY DUTY PIPE FOR INTERCONNECTION OF ON-SITE STORM WATER LEACHING POOLS
   A. HDPE PIPE SPECIFICATION (AASHTO M-294)
   B. INSTALLATION OF HDPE SPECIFICATION (ASTM D-2321)
   C. WATER-TIGHT JOINT TESTING SPECIFICATION (ASTM D-3212)
   D. GASKET SPECIFICATION (ASTM F-477)

TYPICAL STORM WATER LEACHING POOL (SD) DETAIL

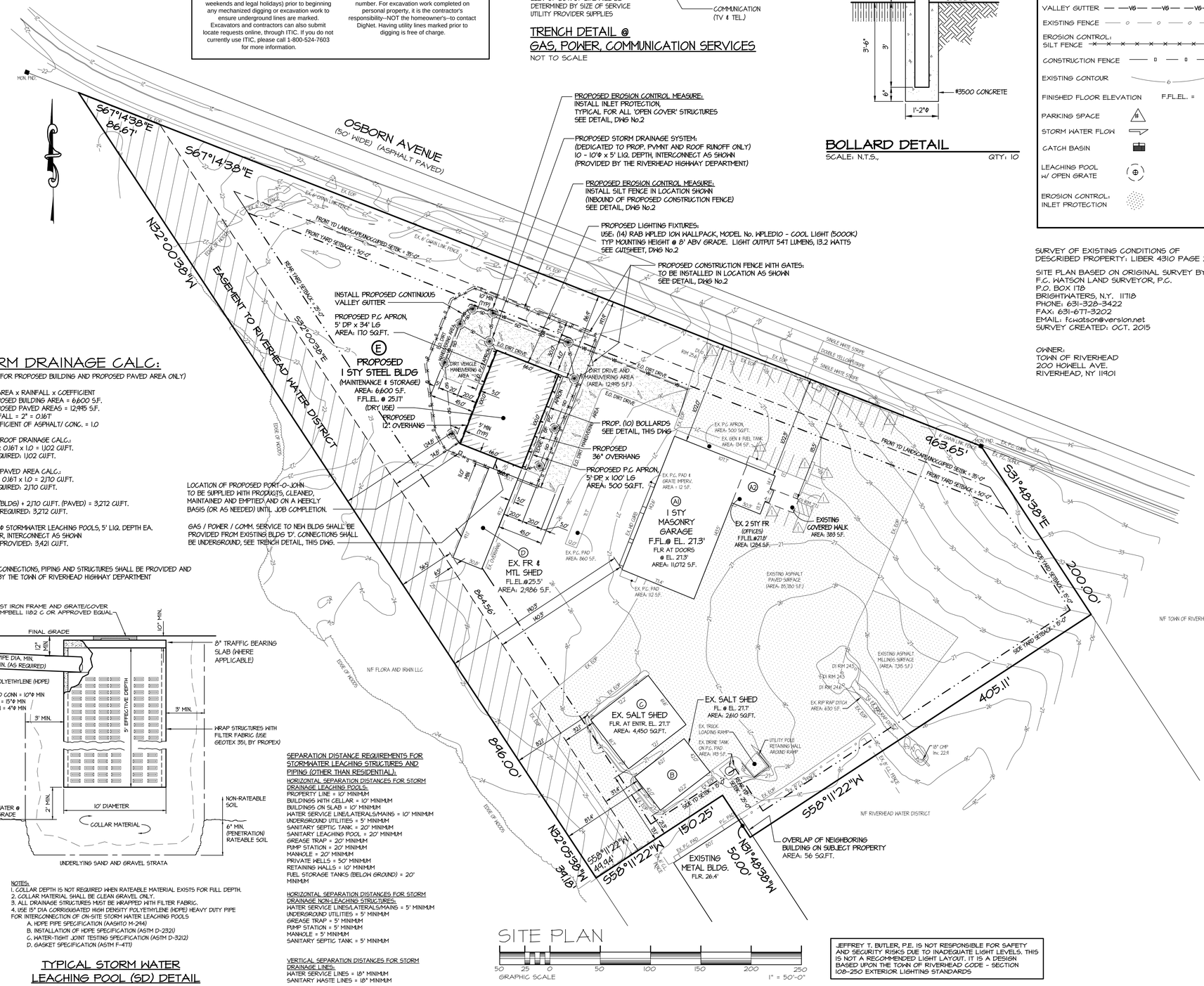
NOT TO SCALE

SEPARATION DISTANCE REQUIREMENTS FOR STORMWATER LEACHING STRUCTURES AND PIPING (OTHER THAN RESIDENTIAL):

HORIZONTAL SEPARATION DISTANCES FOR STORM DRAINAGE LEACHING POOLS:
PROPERTY LINE = 10' MINIMUM
BUILDINGS WITH CELLAR = 10' MINIMUM
BUILDINGS ON SLAB = 10' MINIMUM
WATER SERVICE LINES/LATERALS/MAINS = 10' MINIMUM
UNDERGROUND UTILITIES = 5' MINIMUM
SANITARY SEPTIC TANK = 20' MINIMUM
SANITARY LEACHING POOL = 20' MINIMUM
GREASE TRAP = 20' MINIMUM
PUMP STATION = 20' MINIMUM
MANHOLE = 20' MINIMUM
PRIVATE WELLS = 50' MINIMUM
RETAINING WALLS = 10' MINIMUM
FUEL STORAGE TANKS (BELOW GROUND) = 20' MINIMUM

HORIZONTAL SEPARATION DISTANCES FOR STORM DRAINAGE NON-LEACHING STRUCTURES:
WATER SERVICE LINES/LATERALS/MAINS = 5' MINIMUM
UNDERGROUND UTILITIES = 5' MINIMUM
GREASE TRAP = 5' MINIMUM
PUMP STATION = 5' MINIMUM
MANHOLE = 5' MINIMUM
SANITARY SEPTIC TANK = 5' MINIMUM

VERTICAL SEPARATION DISTANCES FOR STORM DRAINAGE LINES:
WATER SERVICE LINES = 18" MINIMUM
SANITARY WASTE LINES = 18" MINIMUM



SITE PLAN

GRAPHIC SCALE 50 25 0 50 100 150 200 250 — 1" = 50'-0"

JEFFREY T. BUTLER, P.E. IS NOT RESPONSIBLE FOR SAFETY AND SECURITY RISKS DUE TO INADEQUATE LIGHT LEVELS. THIS IS NOT A RECOMMENDED LIGHT LAYOUT. IT IS A DESIGN BASED UPON THE TOWN OF RIVERHEAD CODE - SECTION 108-250 EXTERIOR LIGHTING STANDARDS

REVISIONS:
11-16-2016 REVISED PER TOWN OF RIVERHEAD COMMENTS

JEFFREY T. BUTLER, P.E.P.C.
P.O. BOX 634
SHOREHAM, NEW YORK
TEL.: 631.208.8850 FAX: 631.727.8033

ENGINEER:

JEFFREY T. BUTLER, P.E.

PROPOSED SITE PLAN FOR:
HIGHWAY DEPARTMENT METAL BUILDING
TOWN OF RIVERHEAD
1177 OSBORN AVE RIVERHEAD, N.Y. 11901
S.C.T.M.# 0600-108-02-01
COUNTY OF SUFFOLK — TOWN OF RIVERHEAD
JOB No.: 160041 — DRAWN BY: RAC
DATE: 07-18-2016 — APPROVED BY: JTB

PAGE: SP1

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WPLED10

RAB LIGHTING

LED 10W & 13 Wallpacks. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze

Weight: 3.3 lbs

Project: **Type:**

Prepared By: **Date:**

Driver Info		LED Info	
Type:	Constant Current	Watts:	10W
120V:	0.21A	Color Temp:	5000K
208V:	0.14A	Color Accuracy:	69 CRI
240V:	0.12A	L70 Lifespan:	100000
277V:	N/A	Lumens:	548
Input Watts:	13W	Efficacy:	42 LPW
Efficiency:	76%		

Technical Specifications

Listings

UL Listing:
Suitable for Wet Locations as a Downlight. Suitable for Damp Locations as an Uplight, Wall Mount only. Suitable for Mounting within 4ft. of ground.

Dark Sky Approved:
The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

IESNA LM-79 & IESNA LM-80 Testing:
RAB LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 and 80, and have received the Department of Energy "Lighting Facts" label.

LED Characteristics

Lifespan:
100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

Color Consistency:
7-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

Color Stability:
LED color temperature is warrantied to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:
RAB's of CCT (Correlated color temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2015.

Construction

Finish:
Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contains no VOC or toxic heavy metals.

Cold Weather Starting:
The minimum starting temperature is -40°C/-40°F

Ambient Temperature:
Suitable for use in 40°C (104°F) ambient temperatures

Thermal Management:
Cast aluminum Thermal Management system for optimal heat sinking. The LPACK is designed for cool operation, most efficient output and maximum LED life by minimizing LED junction temperature.

Housing:
Precision die cast aluminum housing, lens frame.

Mounting:
Junction box.

Green Technology:
RAB LEDs are Mercury, Arsenic and UV free.

For use on LEED Buildings:
IDA Dark Sky Approval means that this fixture can be used to achieve LEED Credits for Light Pollution Reduction.

Gaskets:
High Temperature Silicone.

Electrical

Driver:
Multi-chip 10W high output long life LED Driver Constant Current, Class II, 120V-240V, 50/60/ Hz, 350mA.

Optical

Lumen Maintenance:
The LED will deliver 70% of its initial lumens at 100,000 hours of operation.

Other

California Title 24:
See WPLED10/PC for a 2013 California Title 24 compliant model.

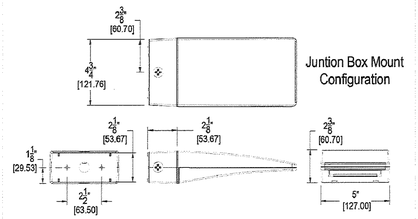
Patents:
The LPACK design is protected under patents in the U.S. Pat. D608,040, Canada Pat. 130,243, China Pat. 200930183252.2, and pending patents in Taiwan and Mexico.

Warranty:
RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish.

Equivalency:
The WPLED10 is Equivalent in delivered lumens to a 70W Metal Halide Wallpack

HID Replacement Range:
The WPLED10 can be used to replace 35-100W Metal Halide Wallpacks based on delivered lumens.

Dimensions



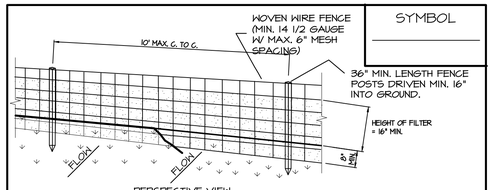
Juntion Box Mount Configuration

Features

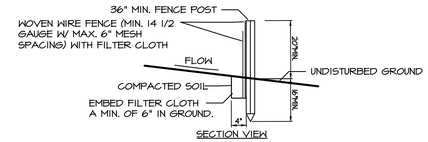
- High performance LED light engine
- Maintains 70% of initial lumens at 100,000 hours
- Weatherproof high temperature silicone gaskets
- Superior heat sinking with die cast aluminum housing and external fins
- 5-year warranty

Ordering Matrix

Family	Watts	Color Temp	Sensor	Surface Plate	Surface Place	Finish	Photocell
WPLED	10						
	10 = 10W 13 = 13W	= 5000K (Cool) Y = 3000K (Warm) N = 4000K (Neutral)	= No Sensor MS = Mini Sensor	= No Surface Plate	S = Surface Plate	= Bronze W = White	= No Photocell /PC = 120V Button /PCS = 120V Swivel /PC2 = 277V Button



PERSPECTIVE VIEW



SECTION VIEW

CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 12 1/2 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

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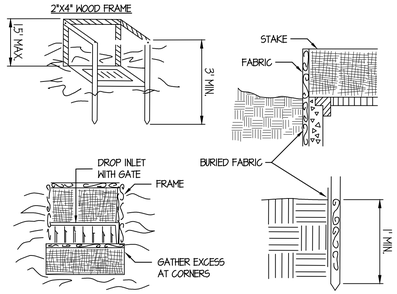
SILT FENCE



CONSTRUCTION SPECIFICATIONS

1. FILTER FABRIC SHALL HAVE AN EOS OF 40-85. BURLAP MAY BE USED FOR SHORT TERM APPLICATIONS.
2. CUT FABRIC FROM A CONTINUOUS ROLL TO ELIMINATE JOINTS. IF JOINTS ARE NEEDED THEY WILL BE OVERLAPPED TO THE NEXT STAKE.
3. STAKE MATERIALS WILL BE STANDARD 2" x 4" WOOD OR EQUIVALENT. METAL WITH A MINIMUM LENGTH OF 3 FEET.
4. SPACE STAKES EVENLY AROUND INLET 3 FEET APART AND DRIVE A MINIMUM 18 INCHES DEEP. SPANS GREATER THAN 3 FEET MAY BE BRIDGED WITH THE USE OF WIRE MESH BEHIND THE FILTER FABRIC FOR SUPPORT.
5. FABRIC SHALL BE EMBEDDED 1 FOOT MINIMUM BELOW GROUND AND BACKFILLED. IT SHALL BE SECURELY FASTENED TO THE STAKES AND FRAME.
6. A 2" x 4" WOOD FRAME SHALL BE COMPLETED AROUND THE CREST OF THE FABRIC FOR OVER FLOW STABILITY. MAXIMUM DRAINAGE AREA 1 ACRE

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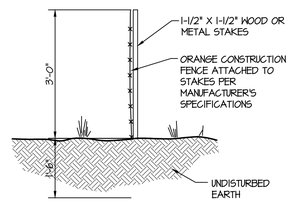
FILTER FABRIC DROP INLET PROTECTION

DigNet
of NEW YORK CITY & LONG ISLAND
800-272-4480 | 811

www.dignetnycli.com
or
www.call811.com
(for other states)

By law, excavators and contractors working in the five boroughs of New York City and Nassau and Suffolk Counties on Long Island must contact DigNet, 1-800-272-4480 or 811, at least 48 hours but no more than 10 working days (excluding weekends and legal holidays) prior to beginning any mechanized digging or excavation work to ensure underground lines are marked. Excavators and contractors can also submit locate requests online, through ITIC. If you do not currently use ITIC, please call 1-800-524-7603 for more information.

For safety reasons, homeowners are strongly encouraged to call as well when planning any type of digging on their property. Homeowners can contact us directly at 1-800-272-4480 or by calling 811, the national call before you dig number. For excavation work completed on personal property, it is the contractor's responsibility--NOT the homeowner's--to contact DigNet. Having utility lines marked prior to digging is free of charge.



NOTES:
1. STAKE SPACING MAY VARY PER MANUFACTURER'S RECOMMENDATIONS, UP TO A MAXIMUM OF 8' O.C.
2. JOIN CONSTRUCTION FENCE SECTIONS BY OVERLAPPING END STAKES
3. INSPECT AND REPAIR PERIODICALLY TO MAINTAIN THE CONSTRUCTION FOR THE CONSTRUCTION AREA.

TEMPORARY CONSTRUCTION FENCE DETAIL

(NOT TO SCALE)

REVISIONS:
11-16-2016 REVISED PER TOWN OF RIVERHEAD COMMENTS

JEFFREY T. BUTLER, P.E., P.C.
P.O. BOX 634
SHOREHAM, NEW YORK
TEL.: 631.208.8850 FAX: 631.727.8033

ENGINEER:
JEFFREY T. BUTLER, P.E.

DETAILS FOR:
HIGHWAY DEPARTMENT METAL BUILDING
TOWN OF RIVERHEAD
1177 OSBORN AVE RIVERHEAD, N.Y. 11901
S.C.T.M.# 0600-108-02-01
COUNTY OF SUFFOLK TOWN OF RIVERHEAD

JOB No.: 160041 DRAWN BY: RAC

DATE: 08-24-2016 APPROVED BY: JTB

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