SPECIFICATIONS

PROJECT:

Widgery Wharf Office Building

Portland, ME 04101

ARCHITECT:

ARCHETYPE, P.A.

48 UNION WHARF

PORTLAND, MAINE 04101

ISSUED FOR CONSTRUCTION

20 FEBRUARY 2017

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SECTION 01 31 00

SUBMITTALS, MEETINGS AND RECORD DOCUMENTS

1. GENERAL

1.1 PRE-CONSTRUCTION MEETING

A. Architect and Owner will schedule a pre-construction meeting within 15 days of issuance of Notice to Proceed, to be attended by the owner, all project managers, Contractor's field superintendent, and representatives of major sub-contractors. At this time, Contractor shall make specified pre-construction submittals including following:

1. Typed list of sub-contractors with addresses and telephone numbers.
2. Certificates of insurance.
3. Approved construction schedule. See General Conditions, Paragraph 3.10.
4. Schedule of values.
5. Start-up authorization or certificates.

B. Pre-construction meeting agenda will include following:

1. Processing application for payment.
2. Processing and distribution of submittals.
3. Maintenance of record documents.
4. Procedure for field changes, change estimates, change orders, etc.
5. Site and building security.
6. Location and maintenance of temporary storage areas, field offices, vehicular parking and access, waste disposal, etc.
7. Safety and first-aid procedures.
8. Date and time for regular monthly coordination and progress meeting (to be coordinated with monthly application for payment).

1.2 CONSTRUCTION SCHEDULE

A. Refer to General Conditions, Paragraph 3.10, for general provisions concerning construction progress schedule. Schedule shall show activities, itemized according to specification Section, and be organized in bar-chart or graph form so as to show both projected and actual progress of work.

B. Arrange schedule to indicate required sequencing of units, and to show time allowances for submittals, inspections, and similar time margins.

C. Show critical submittal dates related to each time bar, or prepare a separate coordinated listing of critical submittal dates.

D. Show phases of work within each time bar for major elements which involve purchase lead-time, fabrication, seasonal treatment, mockups, testing, or similar phases as well as installation.

E. Submit updated schedule monthly, together with application for payment.

1.3 SCHEDULE OF VALUES

A. Refer to General Conditions, Paragraph 9.2 for general provisions concerning schedule of values.

B. For these submittals, use AIA Document G702/703, Application and Certificate for Payment.

C. Use specifications Sections as listed in Table of Contents as basis for format for listing costs.

D. Itemize separately general cost items, such as bonds and allowances.

E. Itemize change orders separately as they are approved.

1.4 MEETINGS AND REPORTING

A. Contractor shall conduct general progress and coordination meetings at least twice each month, attended by a representative of each primary entity engaged for performance of work. Record discussions and decisions, and distribute copies to those attending and others affected, including Architect/Engineer.

B. Date and time of at least one regular monthly progress and coordination meeting shall be determined at the pre-construction meeting. Timing of this monthly meeting shall be coordinated with payment requests.

1.5 APPLICATION FOR PAYMENT

A. Refer to General Conditions, Paragraph 9.3, for general provisions concerning applications for payment.

B. Use AIA Form G702/703, fully completed and executed.

C. Submit the forms in triplicate including attachment of waivers and similar documentation with one copy.

1.6 SHOP DRAWINGS, PROJECT DATA, SAMPLES

A. Refer to General Conditions, Product Data and Samples, paragraph 3.12, for general provisions covering this type of submittal.

B. Coordinate the preparation and processing of work-related submittals with the performance of the work. Coordinate each separate submittal with other submittals and related activities that require sequential activity. Coordinate the submittal of different units of interrelated work so that one submittal will not be delayed by the necessity of reviewing a related submittal.

C. Architect/Engineer Review:

1. Allow ten working days for the Architect/Engineer's initial processing of each submittal. Allow one week for reprocessing each submittal. No extension of time will be authorized because of failure to transmit submittals to the Architect/Engineer sufficiently in advance of the work.

2. The Architect/Engineer will stamp each submittal to be returned with a uniform, self-explanatory action stamp, appropriately marked and executed to indicate the status of the submittal.

D. Mark each submittal with a permanent label for identification. Provide project name, date, name of Architect/Engineer, name of Contractor, number and title of appropriate specification section and similar definitive information. Provide a space on the label for Contractors and Architect/Engineer's review markings.

E. Package each submittal appropriately for transmittal and handling. Send each submittal from the Contractor to the Architect/Engineer and other destinations using AIA Transmittal Form G810.

F. Provide additional copies of submittals required by governing authorities that are in addition to copies specified for submittal to the Architect/Engineer.

G. Where it is necessary to provide intermediate submittals between the initial and final submittals, provide and process intermediate submittals in the same manner as for initial submittals.

H. Submit as follows:

1. Shop drawings (original drawings prepared by Contractor or sub-contractor illustrating fabrication, layout, erection details, etc.): six prints, or one reproducible transparency and one opaque print, to Architect.

2. Manufacturers' specifications, installation instructions, charts, schedules, catalogs, brochures, etc.: number of copies required by Contractor for distribution, plus one copy for Architect's retention.

3. Samples: one sample to Architect only, unless otherwise specified.

4. In submitting shop drawings and product data to Architect, use separate transmittals for material in different specification Sections, with applicable specification Section clearly numbered.

I. Architect will review submittals within ten working days, measured from date of receipt by Architect until date of mailing. Contractor shall promptly make corrections and resubmit when so directed. Where submittal is marked "Approved as Noted" or similar, assume that all items are approved other than those to which specific exception is taken. Do not delay fabrication, assembly and delivery pending receipt of entirely "Approved" submittal.

J. Distribute approved submittals to job site and record document files, and to suppliers and sub-contractors as required. Samples not designated by Contractor for incorporation into Work shall be kept on file until job completion. Any sample not reclaimed within 30 days after job completion will be considered unclaimed, and will be disposed of as directed by Architect.

1.7 PROJECT RECORD DOCUMENTS

A. Keep on file at job site one complete set of up-to-date Contract Documents, including drawings and specifications, addenda, shop drawings and product data, testing data, change orders, field orders, and other modifications. Documents shall be neatly and securely stored in files or on racks, clearly indexed by trade activity or specification Section, and shall not be used for construction purposes.

B. Legibly mark significant field changes such as following, using colored pencils or felt-tipped pens:

1. Drawings: locations of concealed utilities, field changes of dimension and detail, changes resulting from change order or field order, and details not on original drawings.

2. Specifications: manufacturer and model number of equipment actually installed.

3. Shop drawings and manufacturers' literature: changes made after Architect's review.

C. At completion of Work, deliver completed record documents to Architect. Final payment for Project will not be made until Architect reviews and approves these documents.

1.8 SUBSTANTIAL COMPLETION

A. Refer to General Conditions, Article 9, Substantial Completion, for general provision concerning substantial Completion.

B. Following issuance by Architect/Engineer of Certificate of Substantial Completion, Contractor may submit special payment request, provided the following have been completed:

1. Obtain permits, certificates of inspection and other approval and releases by governing authorities, required for Owner's occupancy and use of project.
2. Submit warranties and similar documentation.
3. Submit maintenance manuals and provide instruction of Owner's operational/maintenance personnel.
4. Complete final cleaning of the work.
5. Submit record documents.
6. Submit listing of work to be completed before final acceptance.

C. Following completion of the following requirements, final payment request may be submitted:

1. Complete work listed as incomplete at time of substantial completion, or otherwise assure Owner of subsequent completion of individual incomplete items.
2. Settle liens and other claims, or assure Owner of subsequent settlement.
3. Submit proof of payment on fees, taxes and similar obligations.
4. Transfer operational, access, security and similar provisions to Owner; and remove temporary facilities, tools and similar items.
5. Completion of requirements specified in "Project Closeout" section.
6. Obtain consent of surety for final payment.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Section Includes:
   1. Submittal procedures.
   2. Product Data, Shop Drawings, and Samples.
   3. Assurance/Control submittals.
      a. Certificates.
      b. Manufacturer's installation instructions.
   4. Architect's action.

1.2 SUBMITTALS

A. Submit two copies of proposed Schedule of Submittals to Contracting Officer Representative within 30 days after receipt of Notice to Proceed. List all items require submittal for review and approval by Contracting Officer.

B. Submit two copies of final Schedule of Submittals to Contracting Officer Representative within 2 days after receipt of proposed Schedule of Submittals review from Contracting Officer.

C. Submit schedule on Contracting Officer approved form provided to Contractor by Contracting Officer Representative.

D. Schedule of Submittals: Include the following.
   1. Indicate type of submittal; product data, shop drawing, sample, certificate, or other submittal.
   2. Identify by Specification Section number, Specification paragraph number where item is specified, and description of item being submitted.
   3. Indicate scheduled date for initial submittal, date for approval, and date for possible resubmittal for each submittal.

E. Coordinate Schedule of Submittals with Construction Schedule. Revise and update Schedule of Submittals when required by changes in the Construction Schedule. Provide Contracting Officer Representative with updated schedules within 2 days of date schedule is revised.

1.3 SUBMITTAL PROCEDURES

A. Transmit each submittal with Contracting Officer accepted form. Submit 3 copies of each transmittal.

B. Sequentially number transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

C. Identify Project, Lessor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

E. Schedule submittals to comply with scheduling requirements of Construction Schedule

F. For each submittal for review, allow 10 days excluding delivery time to and from the Contractor.

G. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

H. Provide space for Contractor and Architect of Record review stamps.

I. Revise and resubmit, identify all changes made since previous submission.

J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with provisions.

K. Submittals not requested will not be recognized or processed.

1.4 PRODUCT DATA

A. Product data includes printed information such as catalog cuts, manufacturer's published instructions, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, performance curves and other similar items.

A. Submit the number of copies which the Contractor requires, plus two copies which will be retained by Contracting Officer Representative and Architect of Record.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.

C. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.5 SHOP DRAWINGS

A. Submit in the form of one reproducible transparency and one opaque reproduction.

B. Shop Drawings: Submit for review. After review, produce copies and distribute in accordance with the SUBMITTAL PROCEDURES article above.

C. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.5 SAMPLES

B. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

C. Submit samples of finishes in colors selected, textures, and patterns for Contracting Officer selection.

D. Include identification on each sample, with full Project information.

E. Submit the number of samples specified in individual specification sections; one of which will be retained by the Contracting Officer.

1.6 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer to Contracting Officer, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Contracting Officer.

1.7 MANUFACTURER INSTALLATION INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Contracting Officer Representative in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.8 CONTRACTING OFFICER ACTION

A. For submittals where action and return is required or requested, Contracting Officer Representative will review each submittal, mark to indicate action taken, and return promptly; generally within 10 calendar days from date of receipt.
   1. Compliance with specified characteristics is the Lessor's responsibility.
   2. Submittals for information, closeout documents, record documents and other submittals for similar purposes, no action will be taken.

B. Action Stamp: Architect of Record will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken.
   1. "Accepted": Final Unrestricted Release. Where submittals are marked "Accepted", that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.

2. "Accepted as Noted": Final-But-Restricted Release. When submittals are marked "Accepted as Noted", that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

3. "Rejected: Submit Specified Item" or "Revise and Resubmit": Returned for Resubmittal. When submittal is marked "Rejected: Submit Specified Item", "Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
   a. Do not permit submittals marked "Rejected: Submit Specified Item" or "Revise and Resubmit," to be used at the Project site, or elsewhere where Work is in progress.
4. "Returned - Not Required": Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Returned - Not Required".

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 33 10

PRODUCTS AND SUBSTITUTIONS

1. GENERAL

1.1 PROCEDURAL REQUIREMENTS

A. Source Limitations:

1. To the fullest extent possible, provide products of the same generic kind, from a single source, for each unit of work. Where it is not possible to do so, match separate procurements as closely as possible.

2. To the extent that the product selection process is under the Contractor's control, provide products that are compatible with previously selected products.

3. Where standard products are available that comply with specified requirements, provide those standard products that have been used successfully before in similar applications, and that are recommended by the manufacturers for the applications indicated.

1.2 PRODUCT SELECTION LIMITATIONS

A. Product Selections: Comply with the following requirements in the selection of products, materials and equipment:

1. Single Product Name: Where only a single product or manufacturer is named, provide the product, unless it is not available, is incompatible with existing work, or does not comply with specified requirements or governing regulations.

2. Two or More Products Named: Where two or more products or manufacturers are named, the selection is at the Contractor's option, provided the product selected complies with specified requirements.

3. "Or Approved Equal" Provisions": Where products or manufacturers are specified by name accompanied by the term "or approved equal", provide either the product named, or comply with the requirements for gaining approval of "substitutions" for the use of an unnamed product.

4. Compliance with Standards: Where the specifications require only compliance with an imposed standard, code or regulation, the Contractor has the option of selecting any product that complies with specified requirements provided no product names are indicated.

5. Performance Requirements: Where the specifications require compliance with indicated performance requirements, the Contractor has the option of selecting any

product that complies with the specific performance requirements, provided no product names are indicated.

6. Visual Requirements: Where the specifications indicate that a product is to be selected from the manufacturer's standard options, without naming the manufacturer, the Architect/Engineer has the option of making the selection, after the Contractor has determined or selected the manufacturer.

B. Nameplates: Except as otherwise indicated for required labels and operating data, do not permanently attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view either in occupied spaces or on the exterior of the completed project.

1.3 SUBSTITUTIONS

A. Conditions: The Contractor's requests for substitutions will be considered when they are reasonable, timely, fully documented, and when they qualify under one or more of the following circumstances.

1. The proposed substitution is related to an "or approved equal" or similar provision in the contract documents.

2. The required product cannot be supplied in time for compliance with Contract Time requirements.

3. The required product is not acceptable to governing authorities.

4. The required product cannot be properly coordinated with other materials in the work, or cannot be warranted or insured as specified.

5. The proposed substitution will offer a substantial advantage to the Owner after deducting offsetting disadvantages including delays, additional compensation to the Architect/Engineer for redesign, evaluation and other necessary services, and similar considerations.

B. Submittals: Include the following information, as appropriate, in each request for substitution:

1. Provide complete product documentation, including product data and samples, where appropriate.

2. Provide detailed performance comparisons and evaluation, including testing laboratory reports where applicable.

3. Provide coordination information indicating the effect of the substitution on other work and the time schedule.

4. Provide cost information for the proposed change order.

5. Provide the Contractor's general certification of the recommended substitution.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Receive, store and handle products, materials and equipment in a manner which will prevent loss, deterioration and damage.

B. Schedule deliveries so as to minimize long-term storage at the project site.

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL SERVICES

1. GENERAL

1.1 DESCRIPTION

A. Quality control services include inspections and tests performed by independent agencies and governing authorities, as well as by the Contractor.

B. Inspection and testing services are intended to determine compliance of the work with requirements specified.

C. Specific quality control requirements are specified in individual specification sections.

1.2 RESPONSIBILITIES

A. Except where indicated as being the Owner's responsibility, quality control services are the Contractor's responsibility, including those specified to be performed by an independent agency and not by the Contractor.

B. The Contractor shall employ and pay an independent agency, testing laboratory or other qualified firm to perform quality control services specified.

C. The Owner will engage and pay for services of an independent agency to perform the inspections and tests that are specified as Owner's responsibilities.

D. Where results of inspections or tests do not indicate compliance with contract document, retests are the Contractor's responsibility.

E. The Contractor shall cooperate with independent agencies performing inspections or tests. Provide auxiliary services as are reasonable. Auxiliary services include:

1. Provide access to the work.
2. Assist taking samples.
3. Deliver samples to test laboratory.

1.3 COORDINATION

A. The Contractor and independent test agencies shall coordinate the sequence of their activities. Avoid removing and replacing work to accommodate inspections and tests. The Contractor is responsible for scheduling times for inspections and tests.

1.4 QUALIFICATIONS FOR SERVICE AGENCIES

A. Engage inspection and test service agencies which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories.

B. Each agency shall be employed with the approval of the Architect/Engineer.

1.5 SUBMITTALS

A. Notify the Architect/Engineer of the testing schedule.

B. Submit a certified written report of each inspection test or similar service, in duplicate to the Architect/Engineer. Submit additional copies of each report to governing authority, when the authority so directs.

1.6 REPORT DATA

A. Written inspection or test reports shall include:

1. Name of testing agency or test laboratory.
2. Dates and locations of samples, tests or inspections.
3. Names of individuals present.
4. Complete inspection or test data.
5. Test results.
6. Interpretations.
7. Recommendations.

B. Reports shall be provided to the Architect/Engineer in a timely manner.

1.7 REPAIR AND PROTECTION

A. Upon completion of inspection or testing repair damaged work and restore substrates and finishes. Comply with requirements for "Cutting and Patching".

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES

1. GENERAL

1.1 DESCRIPTION OF REQUIREMENTS: Provide temporary services and facilities ready for use when first needed to avoid delay in the work. Field office facility shall be sufficiently large to accommodate all persons and furniture/equipment convening for project meetings (progress and requisition meetings). Maintain, expand and modify as needed. Do not remove until no longer needed, or replaced by authorized use of permanent facilities.

1.2 USE CHARGES: Usage charges for temporary services or facilities are not chargeable to the Owner or Architect/Engineer.

1.3 REGULATIONS: Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities.

1.4 STANDARDS: Comply with the requirements of NFPA Code 241, "Building Construction and Demolition Operations", the ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and the NECA National Joint Guideline NJG-6 "Temporary Job Utilities and Services".

1.5 INSPECTIONS: Inspect and test each service before placing temporary utilities in use. Arrange for inspections and tests by governing authorities, and obtain certifications and permits for use.

1.6 SUBMITTALS: Submit copies of reports and permits required or necessary for installation and operation, including reports of tests, inspections and meter readings performed on temporary utilities, and permits and easements necessary for installation, use and operation.

1.7 MATERIALS AND EQUIPMENT

A. Provide materials and equipment that are suitable for the intended use.

B. Provide new materials and equipment for temporary services and facilities; if acceptable to the Architect/Engineer, used materials and equipment that are undamaged may be used.

1.8 INSTALLATION

A. Use qualified tradesmen for installation.

B. Locate temporary services and facilities where they will serve the project adequately and result in minimum interference with the work.

1.9 TEMPORARY UTILITY INSTALLATION

A. Engage, or make arrangements if necessary with, the local utility company to make connections to existing service.

B. Arrange with the companies and existing users for an acceptable time when service can be interrupted to make connections.

C. Establish a service implementation and termination schedule. As early as possible change to use of permanent service, to enable removal of the temporary utility and eliminate possible interference with completion of the work.

D. Provide adequate capacity at each stage of construction. Prior to availability at the site, provide trucked-in services for startup of construction operations.

E. Obtain and pay for easements required to bring temporary utilities to the site, where the Owner's easement cannot be utilized for that purpose.

1.10 ELECTRIC POWER SERVICE

A. Coordinate with Owner to use existing electrical service during construction.

B. Comply with applicable requirements of NEMA, NECA and UL standards and governing regulations.

C. Install temporary lighting of adequate illumination levels to perform the work specified.

D. Comply with NEC pertaining to installation of temporary wiring service and grounding. Provide meters, transformers, and overcurrent protective devices at main distribution panel for power and light circuitry. Provide disconnects for equipment circuits.

1.11 POWER DISTRIBUTION SYSTEM

A. Provide circuits of proper sizes, characteristics, and ratings for each use indicated.

B. Install wiring overhead, and risers vertically where least exposed to damage.

C. Provide rigid steel conduit to protect wiring on grade, floors, decks or other areas exposed to possible damage.

D. Provide 20 amp, 4-gang receptacle outlets, equipped with ground-fault circuit interrupters, reset button and pilot light, spaced that a 100 foot extension cord can reach each area of work. Use only grounded extension cords; use "hard- service" cords where exposed to abrasion and traffic.

E. Provide warning signs at power outlets that are other than 110/120 volt. Provide outlets of proper NEMA configuration to prevent insertion of 110/120 volt plugs into higher voltage outlets.

1.12 TEMPORARY LIGHTING

A. Provide general service incandescent lamps of wattage required for adequate illumination.

B. Protect lamps with guard cages or tempered glass enclosures, where exposed to breakage.

C. Provide exterior type fixtures where exposed to weather or moisture.

D. Provide one 200-watt incandescent lamp per 1000 square feet of floor area for general construction lighting, one 100-watt incandescent lamp every 50 feet in corridors, and one lamp per story, located to illuminate each landing and flight in stairways.

E. Install temporary lighting to fulfill security and protection requirements, without having to operate the entire temporary lighting system.

1.13 TEMPORARY TELEPHONES

A. Install telephone for each temporary office and first aid station.

B. At each telephone location post a list of operational and emergency telephone numbers.

1.14 TEMPORARY HEAT

A. Provide temporary heat where needed for performance of work, for curing or drying of recently installed work or for protection of work in place from adverse effects of low temperatures or high humidity.

B. Provide UL or FM tested and labeled heating units known to be safe and without adverse effect upon work in place or being installed. Coordinate with ventilation requirements to produce the ambient condition.

C. Maintain a minimum temperature of 45 deg. F (7 deg. C) in permanently enclosed portions of the building and areas where finished work has been installed.

D. Except where use of the permanent heating system is available and authorized, provide properly vented self-contained LP gas or fuel oil heaters with individual space thermostatic control for temporary heat. Do not use open burning or salamander type heating units.

1.15 FIELD OFFICES

A. Provide standard prefabricated or mobile units, or the equivalent job-built field offices of sufficient size to accommodate required office personnel at the site.

B. Provide insulated, weathertight units with lockable entrances.

C. Provide vented space heater, capable of maintaining an indoor temperature of 68 deg. F (20 deg. C).

1.16 SANITARY FACILITIES

A. Sanitary facilities include temporary toilets.

B. Comply with governing regulations including safety and health codes for the type, number, location, operation and maintenance of fixtures and facilities.

C. Supply toilet tissue, paper towels, paper cups and similar disposable materials as appropriate for each facility. Provide covered waste containers for used material.

D. Install single occupant self-contained toilet units of the chemical, aerated recirculation or combustion type, properly vented and fully enclosed with glass fiber reinforced polyester shell. Use of pit-type privies will not be permitted.

E. Provide separate toilet facilities for male and female construction personnel.

F Provide drinking water fountains where and when piped potable water, approved by local authorities, is reasonably accessible from permanent or temporary lines. Otherwise, provide containerized tap-dispenser bottled-water type drinking water units.

1.17 FIRST AID SUPPLIES: Comply with governing regulations and recognized recommendations within the construction industry.

1.18 DEWATERING FACILITIES AND DRAINS

A. For temporary drainage and dewatering facilities and operations not directly associated with performance of work included under other sections, comply with dewatering requirements of applicable Division-2 sections. Where feasible, utilize the same facilities.

B. Maintain the site, excavations and construction free of water.

C. Dispose of rainwater in a lawful manner which will not result in flooding and project or adjoining property, nor endanger either permanent work or temporary facilities.

1.19 TEMPORARY ENCLOSURE

A. Provide temporary enclosure of materials, equipment, work in progress and completed portions of the Work to provide protection from exposure, foul weather, other construction operations, and similar activities.

B. Provide enclosures where temporary heat is needed and the permanent building enclosure is not completed, and there is no other provision for containment of heat. Coordinate with ventilating and material drying or curing requirements to avoid dangerous conditions.

C. Provide temporary enclosures by installing waterproof, fire- resistant, UL labeled tarpaulins with a flame-spread rating of 15 or less, using a minimum of wood framing. Use translucent nylon reinforced laminated polyethylene tarpaulins to admit the maximum amount of daylight. Individual openings of 25 square feet or less may be closed with plywood or similar materials.

D. Close openings through the floor or roof decks and other horizontal surfaces with substantial load-bearing wood-framed or similar construction.

1.20 COLLECTION AND DISPOSAL OF WASTES

A. Establish a system for daily collection and disposal of waste materials, including separation and recycling of waste material. Do not hold collected materials longer than 7 days.

B. Handle waste materials that are hazardous, dangerous, or unsanitary separately from other waste by containerizing.

C. Burying or burning of waste materials on the site or washing waste material down sewers will not be permitted.

D. Provide a written construction materials recycling/waste management work plan, provide on-site containers specific to the items targeted in the plan, monitor and document results of the efforts taken, and report all quantifiable results. Develop and document a construction materials recycling/waste management work plan.

1.21 MISCELLANEOUS SERVICES AND FACILITIES

A. Design, construct, and maintain miscellaneous services and facilities as needed to accommodate performance of the work, including temporary stairs, ramps, ladders, staging, shoring, scaffolding, temporary partitions, waste chutes and similar items.

B. Provide and install on site, either by attachment to site fencing or on freestanding and secure structure a PROJECT SIGN, as designed by Owner or Architect or designated parties, on board 4’-0” x 8’-0” or as directed.

1.22 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Provide a neat and uniform appearance in security and protection facilities acceptable to the Architect/Engineer and the Owner.

B. Maintain site in a safe, lawful and publicly acceptable manner.

C. Take necessary measures to prevent erosion.

D. Except for utilization of permanent fire protection facilities, as soon as available, do not change over to use of permanent facilities until substantial completion.

1.23 TEMPORARY FIRE PROTECTION

A. Until fire protection needs may be fulfilled by permanent facilities, install and maintain temporary fire protection of the types needed to protect against losses.

B. Comply with recommendations of NFPA Standard 10.

C. Locate fire extinguishers where most effective; provide not less than one on each floor at or near each stairwell.

D. Provide type "A" fire extinguishers for temporary offices and spaces where there is minimal danger of electrical or flammable liquid fires, and type "ABC" dry chemical extinguishers elsewhere.

E. Store combustible materials in containers in fire-safe locations.

F. Review fire prevention and protection needs with local fire department officials and establish procedures to be followed in the event of fire. Instruct personnel in procedures and post warnings and information.

G. Maintain unobstructed access to fire extinguishers, temporary fire protection facilities, stairways and other access routes.

H. Prohibit smoking in hazardous areas.

I. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of ignition.

J. At temporary water outlets provide hoses of sufficient length to reach construction areas. Hang hoses with a warning sign, indicating that hoses are for fire protection purposes and are not to be removed.

K. At the earliest feasible date complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel at the site on how to use facilities which may not be self-explanatory.

1.24 BARRICADES, WARNING SIGNS AND LIGHTS

A. Comply with recognized standards and code requirements for erection of substantial, barricades where needed to prevent accidents.

B. Paint with appropriate colors and warning signs to inform personnel at the site and the public, of the hazard being protected against.

C. Provide lighting where needed, including flashing red lights where appropriate.

1.25 SECURITY ENCLOSURE AND LOCKUP: Where materials and equipment must be temporarily stored, and are of substantial value or attractive for possible theft, provide a secure lockup.

1.26 ENVIRONMENTAL PROTECTION

A. Conduct construction activities, and by methods that comply with environmental regulations, minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result from the performance of work at the site.

B. Avoid the use of tools and equipment which produce harmful noise.

C. Restrict the use of noise making tools and equipment to hours of use that will minimize complaints.

1.27 OPERATION, TERMINATION AND REMOVAL

A. Limit availability of temporary services and facilities to essential and intended uses to minimize waste and abuse. Do not permit temporary installations to be abused or endangered.

B. Operate and maintain temporary services and facilities in good operating condition and in a safe and efficient manner until removal is authorized. Do not overload services or facilities. Protect from damage by freezing temperatures and similar elements.

C. Do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.

D. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24- hour basis where required to achieve indicated results and avoid the possibility of damage to the Work or to temporary facilities.

E. Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation.

F. Remove each temporary service and facility promptly when need has ended, or when replaced by use of a permanent facility, but no later than substantial completion. Complete, or, if necessary, restore permanent work delayed because of interference with the temporary service or facility. Repair damaged work, clean exposed surfaces and replace work which cannot be repaired.

G. At substantial completion, clean and renovate permanent services and facilities that have been used to provide temporary services and facilities during the construction period.

END OF SECTION

SECTION 01 70 00.01

SITE PERMIT REQUIREMENTS

1. GENERAL

A. Construction of this project must meet the terms and conditions of a City of Portland Site Plan Permit. The Owner has applied for this permit. This permit is provided to the contractor in Attachment A. The aforementioned permit shall be the extent of Owner supplied permits. Any other permits required to conduct the work shall be obtained by the Contractor.

B. Some of the permits may require inspection or the work by the Owner or Engineer. The contractor shall review these requirements and provide the Owner a minimum of 48 hours prior to the need for a specified inspection. The Owner will respond and arrange for a time for the inspections to occur. It is the responsibility of the Contractor to have these inspections performed during the course of the work.

C. Copies of the Permit Applications and correspondence during review of the permits may be inspected during normal working hours at the office of:

Stantec Consulting Services Inc.
482 Payne Road, Scarborough Court
Scarborough, Maine
celina.daniell@stantec.com

D. Any Contractor who desires to view the Permit Applications and Associated Correspondence must contact Stantec 48 hours prior to inspecting the information.

E. Certain conditions of the permits will be the responsibility of the Contractor. The Contractor is responsible for familiarizing himself with all specific and standard conditions of the permits issued for the project, and for undertaking all work in strict conformance with these.

F. A copy of the permit and the approved plans shall be available at the Project Site at all times.

G. A copy of all erosion inspection logs, reports and meeting minutes shall be available at the Project Site at all times.

2. PERMITS

A. The City of Portland Site Plan Permit.

END OF SECTION

ATTACHMENT A

CITY OF PORTLAND SITE PLAN PERMIT

CITY OF PORTLAND, MAINE
PLANNING BOARD

Elizabeth Boepple, Chair
Sean Dundon, Vice Chair
Carol Morrissette
David Eaton
Kristien Nichols
Lisa Whited
Maggie Stanley

October 14, 2016

Malcolm Poole
Proprietors of Union wharf
PO Box 7467 DTS
Portland ME 04112

Stephen R. Bushey, PE
Stantec
482 Payne Road
Scarborough, ME 04074

Project Name:	Phased mixed use development	Project ID:	# 2016-137
Address:	230 Commercial Street	CBL:	031 K 003 & 103; 031/L/035, 038 & 135
Applicant:	Proprietors of Union Wharf		
Planner:	Jean Fraser		

Dear Sirs:

On October 12, 2016, the Planning Board considered a proposal for a phased mixed use development for three new buildings totaling approximately 40,000 sq ft of non-marine uses (offices, retail, restaurant), and reconfiguration of the parking and circulation, at 230 Commercial Street (Union and Widgery wharves). The Planning Board reviewed the proposal for conformance with the standards of the Site Plan and Waterfront Central Zone (NMUOZ).

The Planning Board voted 6-0 (Nichols absent) to approve the application with the following waivers and conditions as presented below:

A. WAIVERS

On the basis of the application, plans, reports and other information submitted by the applicant, findings and recommendations, contained in the Planning Board Report for the public hearing on October 12, 2016 for application #2016-137 (230 Commercial Street) relevant to Portland's Technical and Design Standards and other regulations, and the testimony presented at the Planning Board hearing:

1. Parking Lot Design: The Planning Board voted 6-0 (Nichols absent) to waive Technical Manual Standard *Section 1.14. Parking Lot and Parking Space Design,* which specifies parking aisle and space dimensions, to allow for variations as shown in Plans P5-P7 to facilitate enhanced pedestrian accommodations and address building structure constraints.

2. Lighting: The Planning Board voted 6-0 (Nichols absent) to waive Technical Manual Standard *Section 12 Site Lighting* to facilitate the development of lighting plans for the new external lighting (including building mounted, pedestrian walkway and in the parking area under the Phase 1 office building) and existing site lighting, that meets the objectives of the standards as well as ensuring security and safe conditions.

B. SITE PLAN

On the basis of the application, plans, reports and other information submitted by the applicant, findings and recommendations contained in Planning Board Report for the public hearing on October 12, 2016 for application #2016-137 (230 Commercial Street) relevant to the Site Plan Ordinance and other regulations and the testimony presented at the Planning Board hearing:

The Planning Board voted 6-0 (Nichols absent) that the plan is in conformance with the site plan standards of the land use code, subject to the following conditions:

i. That this approval is valid for 3 years to allow for the phasing of the three buildings that are subject of the application; and

ii. That the marine infrastructure improvements, up to a total of $62,500, shall be documented to be complete (to the Planning Authority) prior to the issuance of a certificate of occupancy for the Phase 1 office building. If these improvements are not complete at that time, the applicant shall post a Performance Guarantee to cover the costs of the outstanding improvements. The building permit for the future phases shall not be issued until these improvements are documented to have been completed (up to the required total cost); and

iii. That the applicant shall provide trip generation estimate for the full project prior to the issuance of a building permit for future phases. If the outcome of that analysis indicates in excess of 100 new peak hour trips are generated, the applicant shall comply with all requirements of obtaining a Traffic Movement Permit, which includes Planning Board review and approval prior to the issuance of a building permit; and

iv. The applicant shall advise the Planning Authority as to the floorspace of the future phases prior to applying for a building permit for future phases. If the floorspace of the future phases brings the total (of the three buildings) to 50,000 sq ft or above, a Transportation Demand Management Plan shall be submitted for review and approval prior to the issuance of a building permit; and

v. That a parking supply and management plan shall be provided to the Planning Authority for review and approval prior to construction of the future phase buildings. The parking supply and management plan shall comply with the requirements set out in the Traffic Engineering Review comments dated October 7, 2016.

vi. That that following shall be submitted to the Planning Authority for review and approval prior to the issuance of a building permit for the future phases (frontage refers to the ROW and the area between the ROW and the building wall):
    a. A lighting design plan for the Commercial Street frontage that includes installation of street light fixtures that meet City standards for Commercial Street. The applicant is responsible for design and construction of the street lights;
    b. A landscape plan that shows the final layout and details for street trees; lights; bicycle parking; signage and wayfinding; sidewalk materials including where there would be disturbance and replacement (note: all work to be the responsibility of the applicant).

vii. That the proposals for the pedestrian walkway between Commercial Street and the Phase 1 office building shall be completed prior to the issuance of a Certificate of Occupancy for the Phase 1 office building, and shall be 5 feet in width with the wood pole/bollard lighting for the entire length continued to Commercial Street. Under the future phases, this walkway shall be designed to provide full ADA accessibility; and

viii. That the note shown on Plan P6 (C3.1 Phase 1 Site Layout) that states "*Owner reserves the right to install a removable barrier to restrict access between Widgery Wharf and Union Wharf as necessary"* be revised to add "*following approval by the City's Planning Authority*"; and

ix. That the Plan P6 (C3.1 Phase 1 Site Layout) shall be revised, for review and approval prior to the issuance of a building permit for Phase 1, to add planted vegetation to the island nearest Widgery Wharf Lane as recommended by the City Arborist (single honey locust tree or bayberry shrubs/sweet fern); and

x. That the applicant shall submit the following for review and approval by the Planning Authority prior to the issuance of a building permit:
   a. A lighting plan (and photometrics regarding the light levels) that shows details of lighting under and in the vicinity of the Phase 1 building and along the pedestrian walkways;
   b. Proposals for modified fixtures to replace existing exterior lighting to bring these into greater compliance with the standards;
   c. Details of any proposed retaining wall structures, including height and geotechnical considerations.

xi. That the applicant shall note that Commercial Street is under a Pavement Moratorium status and thus any impacts to the street by the project will trigger City Moratorium mitigation cost/renovation requirements that shall be the responsibility of the applicant.

The approval is based on the submitted plans and the findings related to site plan review standards as contained in the Planning Report for application #2016-137. It should be noted that the approval is based on the site plans, elevations and details for all three of the proposed buildings as presented to the Planning Board Hearing, and any amendments would need to be submitted for further review and approval.

STANDARD CONDITIONS OF APPROVAL

Please note the following standard conditions of approval and requirements for all approved site plans:

1. **Develop Site According to Plan** The site shall be developed and maintained as depicted on the site plan and in the written submission of the applicant. Modification of any approved site plan or alteration of a parcel which was the subject of site plan approval after May 20, 1974, shall require the prior approval of a revised site plan by the Planning Board or Planning Authority pursuant to the terms of Chapter 14, Land Use, of the Portland City Code.

2. **Separate Building Permits Are Required** This approval does not constitute approval of building plans, which must be reviewed and approved by the City of Portland's Permitting and Inspection Division.

3. **Performance Guarantee and Inspection Fees** A performance guarantee covering the site improvements, inspection fee payment of 2.0% of the guarantee amount and six (6) final sets of plans must be submitted to and approved by the Planning Division and Public Works Department prior to the release of a building permit, street opening permit or certificate of occupancy for site plans. If you need to make any modifications to the approved plans, you must submit a revised site plan application for staff review and approval.

4. **Defect Guarantee** A defect guarantee, consisting of 10% of the performance guarantee, must be posted before the performance guarantee will be released.

5. **Preconstruction Meeting** Prior to the release of a building permit or site construction, a pre-construction meeting shall be held at the project site. This meeting will be held with the contractor, Development Review Coordinator, Public Work's representative and owner to review the construction schedule and critical aspects of the site work. At that time, the Development Review Coordinator will

confirm that the contractor is working from the approved site plan. The site/building contractor shall provide three (3) copies of a detailed construction schedule to the attending City representatives. It shall be the contractor's responsibility to arrange a mutually agreeable time for the pre-construction meeting.

6. **Department of Public Works Permits** If work will occur within the public right-of-way such as utilities, curb, sidewalk and driveway construction, a street opening permit(s) is required for your site. Please contact Carol Merritt at 874-8300, ext. 8828. (Only excavators licensed by the City of Portland are eligible.)

7. **As-Built Final Plans** Final sets of as-built plans shall be submitted digitally to the Planning Division, on a CD or DVD, in AutoCAD format (*,dwg), release AutoCAD 2005 or greater.

The Development Review Coordinator must be notified five (5) working days prior to the date required for final site inspection. The Development Review Coordinator can be reached at the Planning Division at 874-8632. All site plan requirements must be completed and approved by the Development Review Coordinator prior to issuance of a Certificate of Occupancy. Please schedule any property closing with these requirements in mind.

If there are any questions, please contact Jean Fraser at (207) 874- 8728.

Sincerely,

Elizabeth Boepple, Chair
Portland Planning Board

Attachments:
1. Traffic Engineering Review comments dated October 7, 2016
2. Planning Board Report
3. Performance Guarantee Packet

Electronic Distribution:
cc.

Jeff Levine, AICP, Director of Planning and Urban Development
Stuart O'Brien, City Planning Director
Barbara Barhydt, Development Review Services Manager
Jean Fraser, Planner
Philip DiPierro, Development Review Coordinator, Planning
Mike Russell, Director of Permitting and Inspections
Ann Machado, Zoning Administrator, Inspections Division
Jonathan Rioux, Inspections Division Deputy Director
Jeanie Bourke, Plan Reviewer/CEO, Inspections Division
Chris Branch, Director of Public Works
Katherine Earley, Engineering Services Manager, Public Works
Bill Clark, Project Engineer, Public Works
Doug Roncarati, Stormwater Coordinator, Public Works
Greg Vining, Associate Engineer, Public Works
Michelle Sweeney, Associate Engineer, Public Works
John Low, Associate Engineer, Public Works
Rhonda Zazzara, Field Inspection Coordinator, Public Works
Jeff Tarling, City Arborist, Public Works
Jeremiah Bartlett, Public Works
Keith Gautreau, Fire Department
Danielle West-Chuhta, Corporation Counsel
Thomas Errico, P.E., TY Lin Associates
Lauren Swett, P.E., Woodard and Curran
Rick Blackburn, Assessor's Department
Approval Letter File

Attachment 1

parking conditions. A scope of work for the study should be coordinated with the Planning Authority.

· The applicant should provide information that summarizes the purpose and dimensions of the painted cross hatched area. It is unclear if the dimensions are being adjusted and if it serves as the main circulatory aisle to the Union Street traffic signal.

Status: The applicant has provided sufficient information and I have no further comment.

· All circulation aisles, parking spaces, and Union Street Wharf (the plans should include the drive) should be dimensioned. Specific waivers from the City's dimensional standards shall be requested with supporting justification.

Status: The applicant has generally provided the requested information and I have the following comments:

- **Phase 1 and future project phases require waivers from the City's Technical standards for parking space size and aisle width. I support waivers from the City's standards due to site constraints and the desire to allocate space for other needs, including enhanced sidewalks. I would note that vehicle circulation under the Phase 1 building will be constrained, but I find it to be reasonable.**
- **Based upon several field observations of traffic and pedestrian conditions on Union Street Wharf near Commercial Street, I find conditions to be reasonable given the uniqueness of the area and that the proposed project is not be expected to increase pedestrian demand significantly to the subject area as a direct sidewalk connection to Commercial Street will be provided.**

· Pedestrian accessibility and provision of a designated routing between the proposed office building and Commercial Street shall be included.

Status: The applicant is providing a sidewalk connection under both Phase 1 and full build construction. I generally find it to be reasonable with the

following comments:

- **Under Phase 1, the sidewalk width narrows as it approaches Commercial Street. It is recommended that a 5-foot minimum width be provided all the way to Commercial Street. Adjustments to the parking lot are recommended. I would also suggest the wood pole/bollard lighting continue to Commercial Street.**

- **Under the future phases, steps are proposed along the sidewalk to Commercial Street. It is recommended that full ADA accessibility be provided.**

· Specific truck delivery plans shall be provided and include specific vehicle loading/unloading locations.

Status: A truck circulation plan has been provided and I find conditions to be acceptable.

<u>Additional Comments</u>

· **In conjunction with the future project phases, the applicant shall provide a lighting design for the project frontage along Commercial Street that includes installation of light fixtures that meet City standards for Commercial Street. The applicant is responsible for design and construction of the street lights.**

· **The full build project does not indicate improvements to the Commercial Street sidewalk along the project frontage. The applicant shall be responsible for replacement of sidewalk in areas disturbed by construction, lighting, or utility activities.**

· **Based upon trip generation information provided by the applicant, Phase 1 of the project will not generate a significant amount of new traffic and will not require a Traffic Movement Permit. Significant traffic and safety impacts are not anticipated for Phase 1. Given that trip generation for the full build-out project has not been provided, the applicant shall provide trip generation estimate for the full project. If the outcome of that analysis indicates in excess of 100 new peak hour trips are generated, the applicant shall comply with all requirements of obtaining a Traffic Movement Permit, which includes Planning Board review and approval.**

· **Commercial Street in under pavement Moratorium status and thus any impacts to the street by the project will trigger City Moratorium mitigation cost/renovation requirements that shall be the responsibility of the applicant.**

If you have any questions, please contact me.

Best regards,

Thomas A. Errico, PE
Senior Associate
Traffic Engineering Director
T·Y·LIN INTERNATIONAL

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PLANNING BOARD REPORT
PORTLAND, MAINE

230 Commercial Street (Widgery and Union Wharves)

Level III Site Plan Review
Proprietors of Union Wharf, Applicant
Project # 2016-137
CBL: 031 K 003 & 103; 031/L/035, 038 & 135

Submitted to: Portland Planning Board Public Hearing Date: October 12th, 2016	Prepared by: Jean Fraser, Planner Date: October 7th, 2016

I. INTRODUCTION

Malcolm Poole of the Proprietors of Union Wharf has submitted a final application for a phased development on the part of Union and Widgery Wharves nearest to Commercial Street. Overall the proposal involves three new buildings totaling approximately 40,000 sq ft of non-marine uses (offices, retail, restaurant) and a reconfiguration of the parking and circulation at this end of Union Wharf. This project was considered at a Planning Board Workshop on June 28, 2016.

The applicant intends to phase the project and is therefore requesting an approval for 3 years, which is the maximum period for a site plan approval.

The entire lot is within the Waterfront Central Zone (WCZ) and the proposed redevelopment is located within the Non Marine Use Overlay Zone (NMUOZ) which extends from Commercial Street to about half way down the wharf to the green line shown on the aerial at right.

The proposed uses are permitted uses and the change from the marine to non-marine is allowed. However, this is the first time a proposal has triggered the WCZ conditions as they pertain to proposed non-marine uses within the NMUOZ. These conditions aim to ensure that the proposed uses do not adversely impact the nearby ongoing marine uses or access to the waterfront, secure investment funds toward wharf infrastructure maintenance costs, and integrate with the Commercial Street corridor.

Some Board members may recall the development at the neighboring Merrill's Wharf (conversion of the Cumberland Cold Storage Building into offices, marine uses and restaurant) where the WCZ Performance Standards regarding circulation and parking were the subject of extensive review.

Applicant: Malcolm Poole, Proprietors of Union Wharf
Consultants: Steve Bushey, PE, Stantec; David Lloyd, Architect, Archetype, PA

Required reviews:

Applicant's Proposal	Applicable Standards
Proposed new development (phased) for 18,000 sq ft of offices and approx. 24,000 sq ft of mixed retail and restaurant uses in the WCZ NMUOZ	WCZ Standards for non marine uses in the NMUOZ: 14-311 Development Standards (WCZ) Sections (b) *NMUOZ standards*; and (d) *Performance Standards*
Proposed new development totaling approximately 40,000 sq ft of floorspace	Level III Site Plan - 14-523 *Required Approvals and Applicability* (f) which specifies development having a total floor area of 10,000 sq ft or more is a Level III review and subject to 14-526 *Site Plan Standards*

Required waivers:

Waiver Requests to Planning Board	*Applicable Standards*
Parking Drive Aisle and Space dimensions: Waiver required for parking drive aisles and spaces as shown on the submitted plans.	Technical Standard 1.14 *Parking Lot and Parking Space Design* specify parking aisle and space dimensions that are not met in a number of locations in the proposed site plan. The Traffic Engineering Reviewer supports this waiver due to site constraints and the desire to allocate space for other needs, including enhanced sidewalks. He also confirmed that although vehicle circulation under the Phase 1 building will be constrained, it is reasonable. (Att 5).
Lighting: Waiver requested to ensure light levels do not impact nearby residential properties and to allow reuse of existing light infrastructure.	Technical Standard *Section 12 Site Lighting* requires minimum light levels and full cut off fixtures. A suggested condition of approval requires the submission of a lighting plan and details that meets CPTED objectives and the aim of the standard.

II. PROJECT DATA

DATA	*Phase I Office Building*	*Future Phases along Commercial Street*	*Both Phases for development area*
Total Site Acreage	Just over 1 acre (Entire lot is about 5 acres)		
Existing Zoning	WCZ/Non Marine Use Overlay Zone		
Existing Use		Sapporo Restaurant	
Proposed Uses	Offices	Retail/market/restaurant	
Total Disturbed Area	20,000 sq ft		
Existing impervious areas	181,907 sq ft (entire lot)		
Proposed impervious areas	181,907 sq ft (entire lot)		
Existing building footprint	6000 sq ft	2538 sq ft	8,538 sq ft
Proposed building footprint	6094 sq ft	10,030 sq ft	16,124 sq ft
Proposed floorspace	18,000 sq ft	Approx 24,000 sq ft	Approx. 40,000-42,000
Proposed structure height	49 feet	42 feet	
Existing parking spaces	109 approx in development area		109 approx in development area
Proposed parking spaces	113 within development area		81 within development area
Proposed handicapped parking spaces	2		2
Proposed number of new bicycle parking spaces	4 bike parking spaces	4 bike parking spaces	8 bike parking spaces
Estimated Cost of Project	$1.5 million		

III. EXISTING CONDITIONS

The applicant has described the site in some detail in Attachment D; an aerial is included in Attachment 1 and the *View Assessment* in Attachment L shows "before" and "after" views that compare existing conditions to the post-development conditions.

The development site is within a 1+ acre section of the Union Wharf complex nearest to Commercial Street. There are existing brick commercial buildings facing Commercial Street and more "industrial" buildings within the lot. The overall lot totals 5 acres and includes part of Widgery Wharf; the remainder of the overall lot is largely marine uses.

The site is accessed by two drives from Commercial Street, the western-most one is signalized, as it is an extension of Union Street. Current pedestrian access from Commercial Street is via roads and parking lots. The overall site includes 212 parking spaces, with about half of those within the development area and mostly leased on a monthly basis. The applicant allows these spaces to be used at night (to serve local restaurants and businesses) on a casual basis.

The entire lot and development site are impervious, with no vegetation; the stormwater surface flows into the harbor.

IV. PROPOSED DEVELOPMENT

The proposals are described in Attachments D, E and K and the Plan Set. They include a first phase office building (Building 1 on the aerial below) of 3 floors plus ground level parking, with a total of 18,000 sq ft. It is located on the site of an existing single story metal building that is currently vacant. The floor plans are included at Plan P15; the elevations are in Plan P16 and the renderings and perspectives are in Plan P19.

The phase 2 proposals comprise 2 new buildings to be constructed on the site of an existing single story restaurant building (see right) and on the adjacent parking lot to the east- these are annotated as buildings 2 and 3 in the aerial above.

The proposed 2 and 3 story buildings would total approximately 20,000-25,000 sq ft; the floorplans and elevations are shown in Plans P17 and P18; the renderings /perspectives are in Plan P20.).

The overall site plan (Plan P5 with an extract below) for all of the phases includes a pedestrian link from Commercial Street to the new office building, and enhanced landscape treatment along Commercial Street:

V. PUBLIC COMMENT AND WORKSHOP DISCUSSION

The Planning Board held a Workshop on June 28, 2016 where the Board asked the applicant to:

- Reconsider the layout to preserve public views of water as per the WCZ condition
- Focus on pedestrian/traffic safety and parking
- Undertake more scrutiny of the access- address current problems
- Aim to reduce impervious surface and increase stormwater treatment
- Clarify an alternative approach to parking lot landscaping and wayfinding that is consistent with the marine character.

Public comments

A total of 261 notices of this Hearing were sent to property owners within 500 feet and to interested citizens. In addition, the project was the subject of a legal advertisement in the *Portland Press Herald* editions on October 3rd and 4th, 2016. The Planning Division has not received any public comments as of the time of completing this report.

A Neighborhood Meeting is required for this project and was held on August 2, 2016 and attended by nine neighbors. The submitted certification is included in Attachment I.

VI. RIGHT, TITLE AND INTEREST AND FINANCIAL/TECHNICAL CAPACITY

Right, Title and Interest - The deed as recorded in 1993 is included in Attachment C.

Financial Capacity – A letter from the Gorham Savings Bank dated May 12, 2016 is included in Attachment C.

VII. STAFF REVIEW

A. ZONING ASSESSMENT

The development area as well as the entire lot are located in the Waterfront Central Zone; the development area is within the Non Marine Use Overlay Zone (NMUOZ) part of the wharf. The submissions include a narrative (Attachment D Development Description) that outlines that the proposed uses are permitted uses in the NMUOZ and notes that they are subject to the standards set out in 14-311.

The applicable 14-311 standards are set out in full below (italics) as many of the requirements have not been applied to a project in Portland and this review will be the first time it has been applied. Staff have consulted with Bill Needelman, a former Senior Planner who drafted these standards and who managed the public process and reviews with the Planning Board/City Council during the adoption process. Bill is now the City's Waterfront Coordinator and recently met with staff and the applicant to clarify the intent of the ordinance language; he will be attending the Planning Board hearing.

14-311 (b) NMUOZ standards: Non-marine uses listed under 14-307(b) and 14-308 located within the NMUOZ, as defined in 14-306, shall be subject to the performance standards listed in 14-311(d) as well as the following standards:

1. Vessel access: Non-marine uses allowed under this provision shall not disrupt or block access to vessel berthing and shall otherwise adhere to the performance standards of this zone described in Sec. 14-311(d).

Staff Comment: The proposals are not located near the waterside areas.

2. Maximum setback for new development on lots with seventy-five (75) or more feet of Commercial Street frontage: Any new non-marine development constructed subject to this provision which is located on a lot with seventy-five (75) or more feet of frontage along the Commercial Street right of way shall be located with its front façade no further than thirty-five feet (35) from the southerly sideline of the Commercial Street right of way. Furthermore, any such development shall orient its front façade and its primary pedestrian entrance toward Commercial Street and no vehicular circulation or parking may occupy the land or pier area between the front façade of the building and Commercial Street.

Non-marine development subject to this provision on lots with fewer than seventy-five (75) feet of frontage along the Commercial Street right-of-way, changes of use within existing buildings, and/or building additions of less than 5,000 square feet of new development to existing buildings are exempt from the maximum setback provisions established herein.

Staff Comment: The overall development (all phases) meets this requirement. The applicant has requested that the site plan approval be confirmed for 3 years to allow the construction to take place over that time period.

3. Investment in marine infrastructure: All applicants for site plan review or a change of use permit for non-marine development in the NMUOZ are required to invest in marine infrastructure as a condition of development, provided that the total project costs exceed $250,000. The value of the investment shall be not less than five percent (5%) of total project costs over $250,000 for constructing non-marine space and associated site improvements in the NMUOZ.

Required investment may occur by one or both the following methods:

a. Direct investment in marine infrastructure located on the same lot: Investment shall be for the benefit of marine uses listed in 14-307(a) within the same lot as the proposed non-marine development. Investment may include dredging, pile replacement, new or replaced structural decking (but not pavement resurfacing), new or replaced fendering systems, new or replaced floats, pier expansions, permanent conversions of recreational berthing to commercial berthing, bulkhead or seawall repair or improvements, or any combination of similar improvements.

Plans for the marine infrastructure investment shall be submitted to the planning authority with the application for site plan review or change of use permit and shall include details and a commitment as to how the marine infrastructure will be utilized by marine users. The marine infrastructure improvements shall be

completed prior to the issuance of a certificate of occupancy for the non-marine development project.

b. Financial contribution: If direct investment in marine infrastructure is not made, the developer shall make a financial contribution to the city's waterfront loan and investment fund.

Staff Comment: The applicant has confirmed that they will be making a direct investment in eligible marine infrastructure in the amount of $380,000 to $550,000 (Attachment K). This meets the zoning requirement of $62,500 investment for all phases that comprise this site plan applicaton. A suggested condition confirms the investment shall be made prior to the issuance of the Phase 1 Certificate of Occupancy, and that in the event the investment was not complete a Performance Guarantee type escrow account would be set up, and that the issuance of a building permit for the next phase of the development would be contingent on the improvements being completed.

(d) Performance standards: All uses in the waterfront central zone shall comply with the following standards. Standards 8, 10, 13, 14, 15, 16, and 17 below shall be reviewed by the planning authority:

1. *Outdoor storage of materials: Outdoor storage of commodities and materials accessory to normal conduct of business, except pilings and/or cranes, shall be permitted to a maximum height of forty-five (45) feet, and such materials shall be entirely contained, including runoff contaminants and residual material, within a designated area within the lot boundaries.*

2. *Noise: The level of sound, measured by a sound level meter with frequency weighting network (manufactured according to standards prescribed by the American National Standards Institute, Inc.), inherently and recurrently generated within the waterfront central zone shall not exceed seventy-five (75) decibels on the A scale at the boundaries of any lot, except for sound from construction activities, sound from traffic on public streets, sound from temporary activities such as festivals, and sound created as a result of, or relating to, an emergency, including sound from emergency warning signal devices. In measuring sound levels under this section, sounds with a continuous duration of less than sixty (60) seconds shall be measured by the maximum reading on a sound level meter set to the A weighted scale and the fast meter response (L maxfast). Sounds with a continuous duration of sixty (60) seconds or more shall be measured on the basis of the energy average sound level over a period of sixty (60) seconds (LEQ_1).*

3. *Vibration: Vibration inherently and recurrently generated shall be imperceptible without instruments at lot boundaries. This shall not apply to vibration resulting from activities aboard a vessel or from railroad vehicle activities, or from activities on a pile supported pier.*

4. *Federal and state environmental regulations: All uses shall comply with federal and state environmental statutes and regulations regarding emissions into the air, except where provisions of this Code are more stringent.*

5. *Discharges into harbor areas: No discharge into harbor water areas shall be permitted, unless permitted by the Maine Department of Environmental Protection under a waste discharge license and as approved by the department of public works in accordance with chapter 24, article III of this code. All private sewage disposal or private wastewater treatment facilities shall comply with the provisions of chapter 24, article II of this code and federal and state environmental statutes and regulations regarding wastewater discharges.*

6. *Storage of vehicles: Storage of any unregistered automotive vehicle on the premises for more than sixty (60) days shall not be permitted.*

7. *Landfill of docking and berthing areas: Landfill of docking and berthing areas shall be governed by 38 M.R.S.A. sections 480-A through 480-HH, and permitted only if the landfill does not reduce the amount of linear berthing areas or space, or berthing capacity. If approved, construction shall be undertaken using methods approved by the department of public works and shall be accomplished in accordance with the provisions of division 25 of this article and in a manner so as to ensure that a stable and impermeable wall of acceptable materials will completely contain the fill material and will not permit any fill material to leach into docking areas or navigable waters.*

Staff Comment: Provisions 1-7 do not appear to apply to the proposals under consideration.

8. *Off-street parking and loading: Division 20 (off-street parking) and division 21 (off-street loading) of this article shall not apply.*

   The planning authority shall review applications for non-marine use parking against the following standards:

   a. *Applicants for non-marine parking in the waterfront central zone shall submit a parking and traffic circulation plan showing the location of all existing and proposed structures, travel ways and parking on the subject lot.*

   b. *Outside of the NMUOZ, non-marine use parking is subject to the limitations described in 14-311(a) ("55% rule").*

   c. *Non-marine use parking shall only be located on a lot where, based on the parking and traffic circulation plan and a parking analysis to be submitted for planning authority review, the marine use parking supply is reasonably sufficient to serve marine use space located on the subject lot.*

   d. *Water-dependent use parking spaces shall be located as close as reasonably possible to associated vessels and/or ground floor lease areas.*

   Staff Comment: The applicant has submitted an assessment of the parking requirement based on the Land Use Code 332.1 (J) which is under Division 20 (Attachment K). This code states that it applies to the WCZ but is contradicted by the opening sentence of the standard. At the time of the PB Workshop staff had requested more analysis and a plan that clarified the number, location and need for parking spaces for offices and employees of future phase buildings.

   Tom Errico, Traffic Engineering Reviewer, is comfortable that the Phase 1 parking requirements can be accommodated without impacting the parking needs of the other wharf occupants. The impact of the future phases is not clear and he has provided the following comment (Attachment 5):

   - **Status:** The applicant has noted that there are no long-term leases for parking spaces to be dedicated to the Phase 1 building. Accordingly, I find Phase 1 parking supply conditions to be acceptable. A Condition of Approval shall be included for the future project phases that a parking supply and management plan shall be provided to the City Planning Authority prior to construction of future phase buildings. The desired outcome of the plan would be to survey parking demand and supply conditions on the entire site following occupancy of Phase 1. The plan should specifically note parking spaces dedicated through lease or other arrangements to each business on the entire project site. The plan should also include details on the management of evening and weekend parking conditions. A scope of work for the study should be coordinated with the Planning Authority.

9. *Shoreland and flood plain management regulations: Any lot or portion of a lot located in a shoreland zone as identified on the city shoreland zoning map or in a flood hazard zone shall be subject to the requirements of division 26 and/or division 26.5 of this article.*

   Staff Comment: The applicant has submitted a narrative outlining how the proposals meet the Shoreland Zone requirements (Attachment K). The project includes the installation of several cartridge filter units for the roof drainage on all of the buildings and therefore has addressed the Shoreland ordinance provision that encourages upgrades to the stormwater system. The proposal is in conformance with the Shoreland Regulations generally.

10. *Lighting: All lighting on the site shall be shielded such that direct light sources shall not unreasonably interfere with vessels transiting the harbor nor have an unreasonable adverse impact on adjacent residential zones.*

11. *Signs: Signs shall be permitted as set forth in division 22 of this article.*

12. *Storage of pollutants and oily wastes: On-premises storage of pollutants and oily wastes shall not be permitted for more than forty-five (45) days.*

    Staff Comment: These are generally covered by the site plan standards; see staff comments below under **Section VII.**

13. *Urban design: Construction of new structures located within thirty-five (35) feet of the southerly edge of Commercial Street between Maine Wharf and the easterly property line of the city fish pier shall conform to the guidelines set forth in the downtown urban design guidelines, unless such structures are also located within one-hundred (100) feet of the water. Such structures that are also located within one-hundred (100) feet of the water shall conform to the extent practicable to the downtown urban design guidelines.*

    Staff Comment: The applicant has provided more detailed plans and renderings (Attachment L and Plans P5-7 and P19-21) and staff consider these meet the downtown urban design guidelines (Attachment 4).

Phase 1 Office Building

Future Phases on Commercial Street

14. *Pier and wharf expansions: In addition to meeting Harbor Commission and Coast Guard requirements for navigation, any expansion or extension of a pier and or wharf in the waterfront central zone shall demonstrate its compatibility with fixed route ferry service and emergency vessel operations.*

Staff Comment: The proposals do not include any pier or wharf expansion.

15. *Compatibility of non-marine uses with marine uses: Non-marine uses, structures and activities, including but not limited to access, circulation, parking, dumpsters, exterior storage and loading facilities or other structures shall neither interfere with the existence or operation of marine uses nor impede access to vessel berthing or other access to the water by existing or potential marine uses. Siting of a use not set forth in section 14-307(a) shall not substantially reduce or inhibit existing public access to marine or tidal waters.*

16. *Functional utility of piers and access to the water's edge: All new development, whether for marine or non-marine uses, should anticipate current and future functional and operational needs of water-dependent pier tenants to access the water's edge for the transfer of goods and materials between berthed vessels and land bound vehicles, and shall demonstrate adherence to the following provisions:*

    a. *Provisions for the storage and movement of goods and materials must be designed into all waterside development and internal circulation routes must be maintained or otherwise provided as an element of any development. The siting, design, and circulation of non-marine uses, particularly those allowed on first floors, shall adjust if needed to accommodate reasonable access for pedestrians, vehicles, and freight transfer to and from berthed vessels.*

    b. *Any development that proposes to site a building within ten (10) feet of a pier edge (thus precluding vehicle use of the pier edge) should provide openings and circulation through or around the building to allow the transfer of goods and materials to trucks and circulation routes within the interior of the pier.*

    c. *With the exception of non-commercial berthing allowed under section 14-307(a)(20), there is to be no other non-commercial berthing.*

    d. *Except for common circulation drives as defined in 14-306, access ways, parking and loading areas designated for marine uses shall be exclusively for marine uses and shall not be shared with non-marine uses.*

Staff Comment: The proposals do not interfere with the existence or operation of the marine uses and access to vessels. There is no change to the circulation for existing occupants of the wharf and parking is addressed by a condition as discussed above under #8.

17. *Public view protection: Any new development in the waterfront central zone shall perform a public view impact analysis for review and approval by the planning board or planning authority as a condition of site plan approval. The analysis shall: (a) demonstrate the project's adherence to the Portland View Corridor Protection Plan (City of Portland Comprehensive Plan, 2002) to the extent practicable; and (b) promote the public's visual access to the water through sensitive building placement.*

Staff Comment: The proposal is located near an extended and protected view corridor as shown on the View Corridor Protection Plan in Attachment 2; the proposed new buildings are located outside of the protected view corridor itself. The applicant has submitted a *View Assessment* in Attachment L that illustrates that there is limited visual access to the water under the existing conditions and that the proposals maintain visual links between Commercial Street, the new office building and the remainder of the wharf.

B. DEVELOPMENT REVIEW (SITE PLAN STANDARDS in Section 14-526)

The applicant has provided a comprehensive final application, with additional information as requested at the Planning Board Workshop. The proposed development has been reviewed by staff for conformance with the relevant review standards of Portland's site plan ordinance and applicable regulations.

Transportation Standards

a. ***Impact on Surrounding Street Systems (Traffic Movement Permit)***

The applicant has provided trip generation data for Phase 1 (offices) and these confirm that a Traffic Movement Permit would not be required for Phase 1 of the project. The site plan application includes the future phases and Tom Errico is unable to evaluate the trip generation and associated impacts of the future phases. He comments (Attachment 5):

- *Based upon trip generation information provided by the applicant, Phase 1 of the project will not generate a significant amount of new traffic and will not require a Traffic Movement Permit. Significant traffic and safety impacts are not anticipated for Phase 1. Given that trip generation for the full build-out project has not been provided, the applicant shall provide trip generation estimate for the full project. If the outcome of that analysis indicates in excess of 100 new peak hour trips are generated, the applicant shall comply with all requirements of obtaining a Traffic Movement Permit, which includes Planning Board review and approval.*

The applicant was requested by the Board to look at the access conditions near where Union Street enters the site and this was discussed with staff. Mr Errico comments (Attachment 5):

- *Based upon several field observations of traffic and pedestrian conditions on Union Street Wharf near Commercial Street, I find conditions to be reasonable given the uniqueness of the area and that the proposed project is not be expected to increase pedestrian demand significantly to the subject area as a direct sidewalk connection to Commercial Street will be provided.*

b. ***Access and Circulation (including for pedestrians)***

The applicant has submitted a Circulation Plan (Plan P8) that is based on a meeting with staff and addresses the questions that came up during the PB Workshop regarding emergency service and delivery vehicle access and access to the parking under the Phase 1 office building. A 5 foot wide pedestrian walkway between Commercial Street and the Phase 1 office building has been added and is to be framed with wood pilings and accent lighting (Attachment K).

Tom Errico, the City's consultant Traffic Engineering reviewer, has provided the following final comments regarding several details, and these have been included in the suggested conditions of approval: (Attachment 5):

- *The plans note a removable barrier between Widgery and Union Wharf's. In my professional opinion providing access to the Union Street traffic signal for the area of parking abutting Widgery Wharf is important. Accordingly, I would suggest that a permanent circulation lane between the Wharf's be provided.*
  Status: The plans note that the owner reserves the right to install a removable barrier. I would recommend that the note be revised to add "following approval by the City's Planning Authority".

- *Pedestrian accessibility and provision of a designated routing between the proposed office building and Commercial Street shall be included.*
  Status: The applicant is providing a sidewalk connection under both Phase 1 and full build construction. I generally find it to be reasonable with the following comments:
  - ***Under Phase 1, the sidewalk width narrows as it approaches Commercial Street. It is recommended that a 5-foot minimum width be provided all the way to Commercial Street. Adjustments to the parking lot are recommended. I would also suggest the wood pole/bollard lighting continue to Commercial Street.***
  - ***Under the future phases, steps are proposed along the sidewalk to Commercial Street. It is recommended that full ADA accessibility be provided.***

c. ***Transit Facilities -*** this standard would not apply as there are no bus routes along this section of Commercial Street.

d. ***Parking -*** see discussion under the WCZ Performance Standards above. It should be noted that the Site Plan ordinance requires a parking analysis showing "*that the amount of parking is appropriate for the proposed use of the site"* where the proposed parking is 10% or more over the required parking (in this case there is no parking requirement under zoning).

The Traffic Engineering reviewer has requested a condition that would require further parking demand and supply information prior to commencement of the future phases (Attachment 5). The reviewer has also indicated support for waivers in respect of the reconfiguration of the existing parking areas and the dimensions in the parking underneath the phase 1 office building, which are not compliant with the technical standards because of the need to incorporate pedestrian facilities and address the building structural constraints.

e. ***Bicycle Parking -*** these have been included in the proposals and meet the site plan standards.

f. ***Transportation Demand Management (TDM)-*** This standard applies to all commercial or institutional uses of 50,000 sq ft or more total floor space. The current overall proposal is for new floorspace totaling up to about 42,000 sq ft, so the standard would not apply if the future phases remain as outlined.

Environmental Quality Standards

a. ***Site Landscaping***
The Planning Board discussed the fact that the landscaping in the rear parking lot area should be consistent with the marine character of the wharf. Staff including the City Arborist met with the applicants and the proposals for limited plantings and a pedestrian path lined by wooden piles is considered acceptable in principle. The City Arborist has recommended that the island that shows three "potted trees" have a single honey locust tree (planted) or bayberry shrubs/sweet fern. Staff also recommend that prior to the implementation of the future phases that a plan for the Commercial Street frontage be submitted that shows the required (under site plan) street trees and other landscape enhancement along the frontage.

b. ***Water Quality, Storm Water Management and Erosion Control***
The development site is already 100% impervious and therefore the Chapter 500 standards technically do not require any quality control for stormwater despite the large areas of parking lot that drain directly into the harbor. The applicant has introduced some treatment to roof drainage. The applicant has addressed all of the comments of the Peer Engineer prelim comments but details of retaining walls would need to be submitted (Attachment 6).

Public Infrastructure and Community Safety Standards

a. ***Consistency with City Master Plans (Infrastructure) -*** The Traffic Engineering Reviewer has noted the following issues; they have been included in the suggested conditions of approval (Attachment 5):

- *In conjunction with the future project phases, the applicant shall provide a lighting design for the project frontage along Commercial Street that includes installation of light fixtures that meet City standards for Commercial Street. The applicant is responsible for design and construction of the street lights.*
- *The full build project does not indicate improvements to the Commercial Street sidewalk along the project frontage. The applicant shall be responsible for replacement of sidewalk in areas disturbed by construction, lighting, or utility activities.*
- *Commercial Street in under pavement Moratorium status and thus any impacts to the street by the project will trigger City Moratorium mitigation cost/renovation requirements that shall be the responsibility of the applicant.*

b. ***Public Safety and Fire Prevention -*** The Fire Department has confirmed that they find the access to be acceptable (Attachment 3). Staff have some concerns regarding the lack of surveillance of the parking are under the Phase 1 office building, and the suggested condition regarding the lighting is included to address this concern.

c. ***Public Utilities -*** all capacity letters have been obtained (Attachment J.)

Site Design Standards - all standards have generally been addressed but staff have comments regarding the following:

a. ***Exterior Lighting:*** The final submission does not include any details of the existing or proposed lighting (including the accent lighting along the walkway) and requests a waiver from the Site Plan Technical Standards (Attachment D page 1-7). Staff consider that for security and safety in relation to CPTED (especially in the under-building parking area and along the pedestrian walkway from Commercial Street) the lighting should meet the City standards. In addition, the existing lighting comprises high level spotlights that are not compliant and staff consider some modification to the existing lighting is required.

The applicant has indicated in Attachment K that they are amenable to providing specific building mounted light design, fixture selection and photometrics as a condition of approval prior to the issuance of a buidng permit. Staff suggest that the condition include the following:

- The requirement for a lighting plan (and photometrics regarding the light levels) that shows details of lighting under and in the vicinity of the Phase 1 building and along the pedestrian walkways;
- Proposals for modified fixtures to replace existing exterior lighting to bring these into greater compliance with the standards.

The Board is requested to approve a waiver from the Lighting Standards to allow staff to work with the applicant to achieve a lighting plan that addresses the CPTED and Lighting objectives but may have elements that are not strictly in conformance with the standards.

VIII. STAFF RECOMMENDATION

Subject to the proposed motions and conditions of approval listed below, Planning Division staff recommends that the Planning Board approve the proposed phased office and commercial/retail development as proposed by the Proprietors of Union Wharf.

IX. MOTIONS FOR THE BOARD TO CONSIDER

A. WAIVERS

On the basis of the application, plans, reports and other information submitted by the applicant, findings and recommendations, contained in the Planning Board Report for the public hearing on October 12, 2016 for application #2016-137 (230 Commercial Street) relevant to Portland's Technical and Design Standards and other regulations, and the testimony presented at the Planning Board hearing:

1. Parking Lot Design: The Planning Board (**waives/does not waive**) Technical Manual Standard *Section 1.14. Parking Lot and Parking Space Design,* which specifies parking aisle and space dimensions, to allow for variations as shown in Plans P5-P7 to facilitate enhanced pedestrian accommodations and address building structure constraints.

2. Lighting: The Planning Board (**waives/does not waive**) Technical Manual Standard *Section 12 Site Lighting* to facilitate the development of lighting plans for the new external lighting (including building mounted, pedestrian walkway and in the parking area under the Phase 1 office building) and existing site lighting, that meets the objectives of the standards as well as ensuring security and safe conditions.

B. SITE PLAN

On the basis of the application, plans, reports and other information submitted by the applicant, findings and recommendations contained in Planning Board Report for the public hearing on October 12, 2016 for application #2016-137 (230 Commercial Street) relevant to the Site Plan Ordinance and other regulations and the testimony presented at the Planning Board hearing:

The Planning Board finds that the plan **is / is not** in conformance with the site plan standards of the land use code, subject to the following conditions:

i. That this approval is valid for 3 years to allow for the phasing of the three buildings that are subject of the application; and

ii. That the marine infrastructure improvements, up to a total of $62,500, shall be documented to be complete (to the Planning Authority) prior to the issuance of a certificate of occupancy for the Phase 1 office building. If these improvements are not complete at that time, the applicant shall post a Performance Guarantee to cover the costs of the outstanding improvements. The building permit for the future phases shall not be issued until these improvements are documented to have been completed (up to the required total cost); and

iii. That the applicant shall provide trip generation estimate for the full project prior to the issuance of a building permit for future phases. If the outcome of that analysis indicates in excess of 100 new peak hour trips are generated, the applicant shall comply with all requirements of obtaining a Traffic Movement Permit, which includes Planning Board review and approval prior to the issuance of a building permit; and

iv. The applicant shall advise the Planning Authority as to the floorspace of the future phases prior to applying for a building permit for future phases. If the floorspace of the future phases brings the total (of the three buildings) to 50,000 sq ft or above, a Transportation Demand Management Plan shall be submitted for review and approval prior to the issuance of a building permit; and

v. That a parking supply and management plan shall be provided to the Planning Authority for review and approval prior to construction of the future phase buildings. The parking supply and management plan shall comply with the requirements set out in the Traffic Engineering Review comments dated October 7, 2016.

vi. That that following shall be submitted to the Planning Authority for review and approval prior to the issuance of a building permit for the future phases (frontage refers to the ROW and the area between the ROW and the building wall):
    a. A lighting design plan for the Commercial Street frontage that includes installation of street light fixtures that meet City standards for Commercial Street. The applicant is responsible for design and construction of the street lights;
    b. A landscape plan that shows the final layout and details for street trees; lights; bicycle parking; signage and wayfinding; sidewalk materials including where there would be disturbance and replacement (note: all work to be the responsibility of the applicant).

vii. That the proposals for the pedestrian walkway between Commercial Street and the Phase 1 office building shall be completed prior to the issuance of a Certificate of Occupancy for the Phase 1 office building, and shall be 5 feet in width with the wood pole/bollard lighting for the entire length ie continue to Commercial Street. Under the future phases, this walkway shall be designed to provide full ADA accessibility; and

viii. That the note shown on Plan P6 (C3.1 Phase 1 Site Layout) that states "*Owner reserves the right to install a removable barrier to restrict access between Widgery Wharf and Union Wharf as necessary"* be revised to add "*following approval by the City's Planning Authority*"; and

ix. That the Plan P6 (C3.1 Phase 1 Site Layout) shall be revised, for review and approval prior to the issuance of a building permit for Phase 1, to add planted vegetation to the island nearest Widgery Wharf Lane as recommended by the City Arborist (single honey locust tree or bayberry shrubs/sweet fern); and

x. That the applicant shall submit the following for review and approval by the Planning Authority prior to the issuance of a building permit:
   a. A lighting plan (and photometrics regarding the light levels) that shows details of lighting under and in the vicinity of the Phase 1 building and along the pedestrian walkways;
   b. Proposals for modified fixtures to replace existing exterior lighting to bring these into greater compliance with the standards;
   c. Details of any proposed retaining wall structures, including height and geotechnical considerations.

xi. That the applicant shall note that Commercial Street is under a Pavement Moratorium status and thus any impacts to the street by the project will trigger City Moratorium mitigation cost/renovation requirements that shall be the responsibility of the applicant.

ATTACHMENTS

Report Attachments

1. Aerial photograph
2. View Corridor Protection Plan
3. Fire Department final comments
4. Urban Designer final comments
5. Traffic Engineer preliminary comments
6. Peer Engineer final comments
7. City Arborist final comments

Public comments - (none received to date)

Applicants Submittal

A. Stantec Final Cover letter and table of contents submission
B. Final Site Plan Application
C. RTI & Financial Capacity documents
D. Development Description
E. Conformity with Standards
F. Traffic Information
G. Construction Plan
H. Fire Safety
I. Neighborhood Meeting
J. Capacity letters
K. Stantec letter: further info costs & parking & other response to comments
L. View Assessment

Submitted Plans

P1. Cover Sheet
P2. General Notes and legend
P3. Boundary survey
P4. Existing conditions
P5. Overall Site Layout (all phases)
P6. Phase 1 Site Layout
P7. Future Phases Site Layout
P8. Circulation Plan
P9. Overall Grading and Drainage
P10. Phase 1 Grading and Drainage
P11. Future Phases Grading and Drainage
P12. Details (4 sheets)
P13. Construction Management Plan Phase 1
P14. Construction Management Plan Future Phases
P15. Phase 1 Floor Plan (offices)
P16. Phase 1 Elevation (offices)
P17. Future Phases Floor Plans
P18. Future Phases Elevations
P19. Renderings/Perspectives of Phase 1 Office Building
P20. Renderings/perspectives of Future Phases/Commercial Street
P21. Aerial View all phases

LONG WHARF
WIDGERY'S WHARF
UNION WHARF
PORT
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225
223
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231
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11
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VIEW CORRIDOR PROTECTION PLAN
Adopted by Portland City Council March 11, 2001
Effective April 10, 2001
Viewing Protection within View Corridor
View Corridor Extended
Viewed Landmark
Hanover St.
Cumberland Av.
Franklin Arterial
Congress St.
Temple St.
Exchange St.
Cross St.
Pearl St.
Fore St.
High St.
Center St.
Union St.
Dana St.
Moulton St.
Silver St.
First Parish Unitarian Church
City Hall
St. Patrick's Church
Custom House
MARGINAL WAY
SOMERSET ST
KENNEBEC ST
LANCASTER ST
OXFORD ST
CUMBERLAND AV
CONGRESS ST
FEDERAL ST
FREE ST
SPRING ST
MIDDLE ST
NEWBURY ST
COMMERCIAL ST
THAMES ST
DANFORTH ST
PLEASANT ST
0 250 500 1,000 Feet
Map produced by the City of Portland's Departments of Planning & Development and Public Services
May 2009

MEMORANDUM

To: FILE

From: Jean Fraser

Subject: Application ID: 2016-137

Date: 10/7/2016

Comments Submitted by: Keith Gautreau/Fire on 10/3/2016

Jean,

I'm good with what they are proposing as far as emergency access.

Thanks,
Keith

Portland Maine | Yes. Google's good here.

Jean Fraser <jf@portlandmaine.gov>

Re: Hearing Report 230 Commercial (Union Wharf)

1 message

Caitlin Cameron <ccameron@portlandmaine.gov> Wed, Oct 5, 2016 at 3:07 PM
To: Jean Fraser <jf@portlandmaine.gov>

Based on the submission, I feel the Standards 13 and 17 to be met.

On Wed, Oct 5, 2016 at 2:54 PM, Jean Fraser <jf@portlandmaine.gov> wrote:

Caitlin

I know you are very busy but I am completing the hearing report on this on Friday and there are 2 Urban Design issues- below is from the Workshop Memo:

13. Urban design: Construction of new structures located within thirty-five (35) feet of the southerly edge of Commercial Street between Maine Wharf and the easterly property line of the city fish pier shall conform to the guidelines set forth in the downtown urban design guidelines, unless such structures are also located within one-hundred (100) feet of the water. Such structures that are also located within one-hundred (100) feet of the water shall conform to the extent practicable to the downtown urban design guidelines.

Staff Comment: Staff have requested a more detailed site plan showing the proposed treatment of the areas along Commercial Street and the area between the two phases. This will be subject to a more detailed review for the Hearing.

17. Public view protection: Any new development in the waterfront central zone shall perform a public view impact analysis for review and approval by the planning board or planning authority as a condition of site plan approval. The analysis shall: (a) demonstrate the project's adherence to the Portland View Corridor Protection Plan (City of Portland Comprehensive Plan, 2002) to the extent practicable; and (b) promote the public's visual access to the water through sensitive building placement.

Staff Comment: The proposal is located near an extended and protected view corridor as shown on the View Corridor Protection Plan in Attachment 2 (contrary to the last part of Attachment E). The proposed new buildings are located outside of the protected view corridor itself.

Portland Maine | Yes. Google's good here.

Jean Fraser <jf@portlandmaine.gov>

230 Commercial Street - Final Traffic Comments

1 message

Tom Errico <thomas.errico@tylin.com> Fri, Oct 7, 2016 at 10:09 AM
To: Jean Fraser <jf@portlandmaine.gov>

Hi Jean – The following is a status update of my preliminary comments and represent my Final Traffic Comments.

· The plans note a removable barrier between Widgery and Union Wharf's. In my professional opinion providing access to the Union Street traffic signal for the area of parking abutting Widgery Wharf is important. Accordingly, I would suggested that a permanent circulation lane between the Wharf's be provided.

Status: The plans note that the owner reserves the right to install a removable barrier. I would recommend that the note be revised to add "following approval by the City's Planning Authority".

· The applicant should clearly depict which spaces are designated for the office use and document the current users of the spaces and whether they are tied to an existing site plan approvals.

Status: The applicant has noted that there are no long-term leases for parking spaces to be dedicated to the Phase 1 building. Accordingly, I find Phase 1 parking supply conditions to be acceptable. A Condition of Approval shall be included for the future project phases that a parking supply and management plan shall be provided to the City Planning Authority prior to construction of future phase buildings. The desired outcome of the plan would be to survey parking demand and supply conditions on the entire site following occupancy of Phase 1. The plan should specifically note parking spaces dedicated through lease or other arrangements to each business on the entire project site. The plan should also include details on the management of evening and weekend

parking conditions. A scope of work for the study should be coordinated with the Planning Authority.

· The applicant should provide information that summarizes the purpose and dimensions of the painted cross hatched area. It is unclear if the dimensions are being adjusted and if it serves as the main circulatory aisle to the Union Street traffic signal.

Status: The applicant has provided sufficient information and I have no further comment.

· All circulation aisles, parking spaces, and Union Street Wharf (the plans should include the drive) should be dimensioned. Specific waivers from the City's dimensional standards shall be requested with supporting justification.

Status: The applicant has generally provided the requested information and I have the following comments:

- Phase 1 and future project phases require waivers from the City's Technical standards for parking space size and aisle width. I support waivers from the City's standards due to site constraints and the desire to allocate space for other needs, including enhanced sidewalks. I would note that vehicle circulation under the Phase 1 building will be constrained, but I find it to be reasonable.

- Based upon several field observations of traffic and pedestrian conditions on Union Street Wharf near Commercial Street, I find conditions to be reasonable given the uniqueness of the area and that the proposed project is not be expected to increase pedestrian demand significantly to the subject area as a direct sidewalk connection to Commercial Street will be provided.

· Pedestrian accessibility and provision of a designated routing between the proposed office building and Commercial Street shall be included.

Status: The applicant is providing a sidewalk connection under both Phase 1 and full build construction. I generally find it to be reasonable with the

following comments:

- Under Phase 1, the sidewalk width narrows as it approaches Commercial Street. It is recommended that a 5-foot minimum width be provided all the way to Commercial Street. Adjustments to the parking lot are recommended. I would also suggest the wood pole/bollard lighting continue to Commercial Street.

- Under the future phases, steps are proposed along the sidewalk to Commercial Street. It is recommended that full ADA accessibility be provided.

· Specific truck delivery plans shall be provided and include specific vehicle loading/unloading locations.

Status: A truck circulation plan has been provided and I find conditions to be acceptable.

Additional Comments

· In conjunction with the future project phases, the applicant shall provide a lighting design for the project frontage along Commercial Street that includes installation of light fixtures that meet City standards for Commercial Street. The applicant is responsible for design and construction of the street lights.

· The full build project does not indicate improvements to the Commercial Street sidewalk along the project frontage. The applicant shall be responsible for replacement of sidewalk in areas disturbed by construction, lighting, or utility activities.

· Based upon trip generation information provided by the applicant, Phase 1 of the project will not generate a significant amount of new traffic and will not require a Traffic Movement Permit. Significant traffic and safety impacts are not anticipated for Phase 1. Given that trip generation for the full build-out project has not been provided, the applicant shall provide trip generation estimate for the full project. If the outcome of that analysis indicates in excess of 100 new peak hour trips are generated, the applicant shall comply with all requirements of obtaining a Traffic Movement Permit, which includes Planning Board review and approval.

· Commercial Street in under pavement Moratorium status and thus any impacts to the street by the project will trigger City Moratorium mitigation cost/renovation requirements that shall be the responsibility of the applicant.

If you have any questions, please contact me.

Best regards,

Thomas A. Errico, PE
Senior Associate
Traffic Engineering Director
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MEMORANDUM

TO: Jean Fraser, Planner
FROM: Lauren Swett, PE
DATE: October 4, 2016
RE: Union Wharf Mixed-Use Development, Level III Preliminary Site Plan Application

---

Woodard & Curran has reviewed the Preliminary Level III Site Plan Application for the proposed mixed-use development located at 230 Commercial Street in Portland, Maine. The project involves a multi-phase development of up to three new buildings for office space, and future mixed-uses, which may include an open market and restaurant.

Documents Reviewed by Woodard & Curran

- Response to comments and attachments, dated September 28, 2016, prepared by Stantec, on behalf of Proprietors of Union Wharf/Poole Group of Companies.
- Engineering Plans, dated September 27, 2016, prepared by Stantec, on behalf of Proprietors of Union Wharf/Poole Group of Companies.

Comments *(repeated comments are provided in italics)*

1) *Per Section 13 of the City's Technical Manual, the Applicant is required to submit a Boundary Survey that has been Stamped by a Maine Licensed Professional Surveyor; the survey has not been stamped at this time. A stamped survey should be provided as part of the final application.* Applicant has noted that this will be provided under separate cover.
2) In accordance with Section 5 of the City of Portland Technical Manual, a Level III development project is required to submit a stormwater management plan pursuant to the regulations of MaineDEP Chapter 500 Stormwater Management Rules, including conformance with the Basic, General, and Flooding Standards. We offer the following comments:
   a) Basic Standard: Plans, notes, and details have been provided to address erosion and sediment control requirements, inspection and maintenance requirements, and good housekeeping practices in accordance with Appendix A, B, & C of MaineDEP Chapter 500.
   b) General Standard: The project will not result in an increase in impervious area. As such, the project is not required to include any specific stormwater management features for stormwater quality control.
   c) Flooding Standard: The project will not result in an increase in impervious area. As such, the project is not required to include any specific stormwater management features to control the rate or quantity of stormwater runoff from the site.
3) *Details should be provided for the proposed retaining wall structures, including height and geotechnical considerations.* Applicant has noted that they would like to provide this information as a condition of approval as the design of these elements is not complete.

The Applicant has addressed all prior comments at this time.

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MEMORANDUM

TO: Jean Fraser, Planner
FROM: Lauren Swett, PE
DATE: June 24, 2016
RE: Union Wharf Mixed-Use Development, Level III Preliminary Site Plan Application

---

Woodard & Curran has reviewed the Preliminary Level III Site Plan Application for the proposed mixed-use development located at 230 Commercial Street in Portland, Maine. The project involves a multi-phase development of up to three new buildings for office space, and future mixed-uses, which may include an open market and restaurant.

Documents Reviewed by Woodard & Curran

- Preliminary Level III Site Plan Application and attachments, dated May 31, 2016, prepared by Stantec, on behalf of Proprietors of Union Wharf/Poole Group of Companies.
- Engineering Plans, dated May 26, 2016, prepared by Stantec, on behalf of Proprietors of Union Wharf/Poole Group of Companies.

Comments

1) Per Section 13 of the City's Technical Manual, the Applicant is required to submit a Boundary Survey that has been Stamped by a Maine Licensed Professional Surveyor; the survey has not been stamped at this time. A stamped survey should be provided as part of the final application.
2) The Applicant should note that any changes to the design of the future phases will require additional review and approval by the City of Portland.
3) The Applicant has submitted a wastewater capacity application and provided a letter from the Portland Water District noting that there is sufficient capacity to serve the proposed development. However, there are several conditions of service noted in the letter from Portland Water District; the Applicant should provide a status update on these conditions.
4) In accordance with Section 5 of the City of Portland Technical Manual, a Level III development project is required to submit a stormwater management plan pursuant to the regulations of MaineDEP Chapter 500 Stormwater Management Rules, including conformance with the Basic, General, and Flooding Standards. We offer the following comments:
   a) Basic Standard: Plans, notes, and details have been provided to address erosion and sediment control requirements, inspection and maintenance requirements, and good housekeeping practices in accordance with Appendix A, B, & C of MaineDEP Chapter 500; however, a detail for the proposed stabilized construction entrance should be provided.
   b) General Standard: The project will not result in an increase in impervious area. As such, the project is not required to include any specific stormwater management features for stormwater quality control. However, the Applicant is proposing a Fabco Roof Drain Stormbasin Cartridge Filter to be connected to the proposed roof drain systems in the three buildings. We encourage the Applicant to review the City's Stormwater Service Charge Credit Manual (available online) to evaluate whether this system qualifies for a Stormwater Service Charge credit. We also encourage the Applicant to consider utilizing other LID measures and stormwater treatment for other existing impervious areas on the site.
   c) Flooding Standard: The project will not result in an increase in impervious area. As such, the project is not required to include any specific stormwater management features to control the rate or quantity of stormwater runoff from the site.
5) The plans should note a location for snow storage. The snow storage location should be sited outside of existing and proposed drainage courses.
6) Details should be provided for the proposed retaining wall structures, including height and geotechnical considerations.

SECTION 01 70 00.02

CIVIL ENGINEERING REQUESTS FOR INFORMATION

1. GENERAL

1.1 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for handling and processing "Requests for Information" (RFI).

2. "Request for Information" form is attached at the end of this Section.

3. Request/limit of use for AutoCAD files.

4. "Electronic Document Transfer Agreement" form is attached at the end of this Section.

1.2 DEFINITION

A. Requests for Information: A formal process used during the construction phase to facilitate communication between the contractor, the Owner's representative, the Architect's Clerk of the Works, and the Civil Engineer with regard to requests for additional information and clarification of the intent of the Contract Documents (Drawings and Specifications).

B. Do not use "Request for Information" form during bidding. Direct questions during bidding phase as indicated in the bid documents.

1.3 PROCEDURE

A. Conditions Requiring Clarification and the Contract Documents:

1. Contractor shall submit a "Request for Information" to the Owner and request review by the Civil Engineer.

2. Submit "Request for Information" from the Contractor's office or field office only. "Requests for Information" submitted directly from subcontractors or suppliers will not be accepted.

3. Generate "Requests for Information" by one source per project and number accordingly.

4. Submit one "Request for Information" per form.

B. Engineer will review RFI from the Contractor with reasonable promptness and the Contractor will be notified in writing of decisions made.

1. The Engineering Consultant's written response to the RFI shall not be considered as a Change Order or Change Directive, nor does it authorize changes in the Contract Sum or Contract Time.

C. Contractor shall maintain a log of "Requests for Information" sent to, and responses from Engineer "Requests for Information" log shall be sent, by Fax, every Friday to the Engineer.

D. All "Requests for Information" regarding scheduling, costing, and Owner provided equipment coordination shall be directed to the Architect.

1.4 REQUEST FOR INFORMATION FORM

A. Submit "Requests for Information" on the attached "Request for Information" form, or format accordingly on letterhead. Engineer will not respond to requests for information unless this form or format is utilized.

B. Where submittal form or format does not provide space needed for complete information, additional sheets may be attached.

1.5 REQUEST FOR ELECTRONIC MEDIA

A. Contractors may request AutoCAD disks for use in determining earthwork quantities. Contractors may obtain these disks by submitting the enclosed “Electronic Document Transfer Agreement” form to the Architect. This form restricts the use of this data.

B. The computer aided design file represents the work product of Stantec Consulting Services Inc. Certain files and information are considered proprietary and are not to be released to any third party.

C. Contractors acknowledge that CAD files may include embedded information, have varying degrees of layer management, and are subject to limitations in the software systems.

END OF SECTION

REQUEST FOR INFORMATION FROM THE ENGINEER

RFI NO. _____

DATE: _____

PROJECT: _____
(City, State)

TO: _____

FROM: _____
(General Contractor)

_____
(Project Superintendent)

_____
(Job Site Fax Number)

DRAWING NO. _____

DETAIL NO. _____

SPECS SECTION NO. _____

RFI Type:

( ) Demolition
( ) Site Preparation
( ) Earthwork
( ) Rock
( ) Erosion Control
( ) Storm Sewer
( ) Utilities
( ) Paving
( ) Landscape/ Irrigation
( ) Site Lighting
( ) Slope Stabilization Retaining Walls
( ) Traffic Related
( ) Other

Information Requested: _____

Requested By: _____

Reply: _____

_____
Response By:

_____
Date:

File Distribution:

ELECTRONIC DOCUMENT TRANSFER AGREEMENT

Project:
Client:
Location:

Date:
Project No.
Page 1 of 1

Company Requesting Files:

Person Requesting Files:

Description of Files:

Reason for Requesting Files:

1. The requested electronic file(s) (the "Files") remain the property of Stantec.
2. No warranties or guarantees are made that the Files represent or reflect the complete scope of work and/or as-built condition.
3. Stantec assumes no responsibility for data files supplied in electronic format. Such data is being provided as a courtesy only.
4. Company receiving the Files and users thereof accept full responsibility for verifying the accuracy and completeness of the Files and shall indemnify and hold Stantec, its officers, employees, consultants and agents harmless from any claims or damages arising from the use of the Files.
5. The use of Files to alter or revise the scope of work is not permitted unless authorized by change orders.
6. In the event that drawing Files transferred electronically contain electronic copies of permits or professional seals, the Files shall be immediately returned to Stantec and all copies thereof destroyed.
7. No use shall be made of the Files for any purpose other than that for which they were originally intended without the express written consent of Stantec.
8. No retransmission of the Files in any form to any third party is permitted unless authorized in writing by Stantec.

Having read and understood the above, and in consideration of Stantec providing e-copies, the undersigned agrees to be bound by the terms hereof.

Print Name and Title

Signature of Company's Authorized Representative — Date

Signature of Stantec Project Manager Authorizing Release — Date

The above requested files will only be released upon receipt by Stantec of an original of this agreement signed by a duly authorized representative of the company requesting the files. Stantec reserves the right to deny any request for copies of electronic files.

SECTION 01 71 23.13

LAYOUT OF WORK

1. GENERAL

1.1 GENERAL PROVISIONS

A. The City of Portland has established a project benchmark and elevation as shown and identified on the project plans. For the purposes of this specification, this shall be the limit of Owner provided survey control to the contractor. The datum is NGVD 1929.

B. The Contractor shall employ a licensed land surveyor in the State of Maine to lay out the work from the established reference points, benchmarks, and the coordinate system indicated on the drawings, and shall be responsible for all measurements in connection with the layout. AutoCAD 2014 files will be furnished to the Contractor upon written request upon signing a limit of use form. The licensed land surveyor shall certify in writing that the layout was performed under his/her direct supervision and is correct and meets the requirements of the contract documents. A copy of the certificate shall be furnished to the Engineer.

The Contractor is responsible for confirming elevation by cross checking the two benchmarks.

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 that may be established or indicated by the Owner. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Owner until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Owner may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

C. The layout shall establish the locations of silt fence and areas of clearing shall be delineated for review and approval of the Owner prior to clearing.

D. Establish and plainly mark centerlines for the site work and such other lines and grades that are reasonably necessary to properly assure that location, orientation, and elevations established for each athletic field, access drive, utilities, and parking lots, are in accordance with lines and elevations shown on contract drawings.

E. Following completion of general mass excavation and before any other permanent work is performed, establish and plainly mark 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.

1. Such additional survey control points or system of points thus established shall be checked and certified by a registered land surveyor or registered civil engineer. Furnish such certification to the Owner before any work is placed.

2. A detailed check of all coordinates, resultant pipe lengths, backslopes, and appurtenant locations shall be made by the registered land surveyor or civil engineer and provided to the Owner prior to starting utility lines.

F. During progress of work, the Contractor shall have line grades and plumbness of all major work checked and certified by a registered land surveyor or registered civil engineer as meeting requirements of contract drawings. Furnish such certification to the Owner before any major items are placed. In addition, Contractor shall furnish to the Owner certificates from a registered land surveyor or registered civil engineer that the following work is complete in every respect as required by contract drawings.

1. Elevations of all parking, driveway, and walkways.

2. Lines and elevations of sewers, storm drains, utility systems.

3. Lines of elevations of all swales and drainage areas.

4. Lines of elevations of parking area.

5. Horizontal alignment of all access drives.

6. Record conditions of the stormwater management system.

G. Record Data:

1. The Contractor shall record the following information for buried utilities:

   - The location of all appurtenances and controls including control or shutoff valves, angle points or bends, manholes, handholes, and inlets.

2. All information shall be identified on a CAD reproducible drawing by a number or letter with a schedule of locations by coordinates tied to the Maine State Coordinate Grid. The final record drawings shall be delivered to the Owner. Two copies are required.

H. The location of catch basins and manholes shall be accurately located by a registered land surveyor. Catch basins and manholes shall be located from the layout data and established on the contract drawings.

I. Whenever approved changes from contract drawings are made in line or grading requiring certificates, record such changes on a reproducible drawing bearing the registered land surveyor or registered civil engineer seal, and forward these drawings upon completion of work to the Engineer.

J. Changes in location, additions and appurtenant items such as, but not limited to, manholes, inlets, pipe lines and conduits shall be shown in same manner as on contract drawings (by coordinates or dimensions from buildings); however, if no such locations are shown on contract drawings, changes in locations of items shall be shown by a sufficient number of right-angled dimensions from the nearest building.

K. Contractor is responsible for all costs associated with layout of work, and any costs associated with correcting non-conforming work or with restoring the landscape to its original condition.

L. The survey data obtained for this section shall be incorporated into the project record drawings and profiles.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

1. GENERAL

1.1 REFERENCES

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.

B. Divisions 2 through 31.

1.2 DESCRIPTION OF WORK

A. Definition: "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition. This section does not apply to new work that has been installed as part of the Work.

B. Structural Work: Do not cut-and-patch structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.

C. Operational/Safety Limitations: Do not cut-and-patch operational elements and safety components in a manner resulting in decreased performance, shortened useful life, or increased maintenance.

D. Visual/Quality Limitations: Do not cut-and-patch work exposed to view (exterior and interior) in a manner resulting in noticeable reduction of aesthetic qualities and similar qualities, as judged by the Architect/Engineer.

E. Limitation on Approvals: The Architect/Engineer's approval to proceed with cutting and patching does not waive right to later require removal/replacement of work found to be cut-and-patched in an unsatisfactory manner, as judged by the Architect/Engineer.

F. Materials marked to be removed and reused shall be repaired as necessary to maintain their existing condition. When repair is not sufficient, existing materials shall be disposed of and new materials installed to match existing materials.

G. Refer to other sections of these specifications for specific cutting and patching requirements and limitations applicable to individual units of work.

H. Unless otherwise specified, requirements of this Section apply to Mechanical and Electrical work. Refer to Divisions 15 and 16 for additional requirements and limitations on cutting and patching of mechanical and electrical work.

1.3 QUALITY ASSURANCE

A. Refer to Section 01 33 10, Products and Substitutions, for general provisions covering product selection, substitutions, material storage and installation.

B. Refer to Section 01 45 00, Quality Control Services, for provisions for testing and inspections.

C. Refer to specific Specification Section covering subject in question for quality assurance requirements.

1.4 SUBMITTALS

A. Issue submittals in accordance with Section 01300, Submittals.

B. Refer to specific Specification Section covering subject in question for submittal requirements.

2. PRODUCTS

2.1 GENERAL

A. Use materials for cutting and patching that are identical to existing materials. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal-or-better performance characteristics.

B. Fire-stopping:

1. Seal openings in fire-rated walls and floors to make a tight fit with penetrating items, using appropriate non-combustible filler material. to provide a rating equivalent to wall/floor assemble.

2. Acceptable filler materials include:
   a. Concrete
   b. Cementitious proprietary product: Zonolite Firestop ZF-1
   c. Blanket-type mineral-fiber or ceramic-fiber insulation (glass-fiber insulation is not acceptable)
   d. Fire-resistant sealant: **Refer to Section 07 84 13.**
   e. Fire-resistant silicone foam: Dow Corning RTV Foam Penetration Seal System, Hilti CB 120 Adhesive Filling and Sealing Foam, Tremco Fyre-Sil
   f. Flexible intumescent strip wrapped around pipe penetrations: Dow Corning Fire Stop Intumescent Wrap, Hilti CS 24720 Intumescent Wrap, Nelson RSW, Tremco TREMstop WS
   g. Intumescent fibrous material enclosed in a polyethylene envelope: Nelson PLW, Tremco TREMstop PS
   h. Pliable intumescent putty: Nelson FSP Flameseal, Tremco TREMstop WBM

i. Water-based intumescent fire-protective coating for electrical cables: Nelson CTG

3. Neatly patch and seal exposed-to-view openings, using sealants, tooled mortar joints, escutcheons, or flanged collars, as appropriate.

3. EXECUTION

3.1 INSPECTION

A. Before cutting, examine surfaces to be cut and patched and conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

3.2 TEMPORARY SUPPORT

A. To prevent failure provide temporary support of work to be cut.

3.3 PROTECTION

A. Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.4 PERFORMANCE

A. Employ skilled workmen to perform cutting and patching work. Except as otherwise indicated or as approved by the Architect/Engineer, proceed with cutting and patching at the earliest feasible time and complete work without delay.

B. Cutting:

1. Cut the work using methods that are least likely to damage work to be retained or adjoining work. Provide dust barriers to prevent dust from entering existing building beyond immediate work area. Where possible, review proposed procedures with the original installer; comply with original installer's recommendations.

2. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill to insure a neat hole. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

3. Comply with requirements of applicable sections of Division 2 where cutting and patching requires excavating and backfilling.

4. By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated or abandoned. Cut-off conduit and pipe in walls or partitions to be removed. After by-pass and cutting, cap, valve or plug and seal tight remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.

C. Patching:

1. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

2. Where feasible, inspect and test patched areas to demonstrate integrity of work.

3. Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.

4. Where removal of walls or partitions extends one finished area into another finished area, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. If necessary to achieve uniform color and appearance, remove existing floor and wall coverings and replace with new materials.

5. Where patch occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing patch, after patched area has received prime and base coat.

6. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.5 MAINTENANCE OF TRAFFIC, ACCESS, AND UTILITIES

A. Maintain accessibility from street at all times to any fire hydrants within construction area. Ensure that utilities serving adjacent buildings remain in service.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1. GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements, and for disposition of hazardous waste.

2. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

3. Divisions 01 through 33 Sections for requirements specific to the work of each of these Sections.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Facilitate recycling and salvage of materials.

1.4 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 7 days of date established for Notice to Proceed.

1.5 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. LEED Submittal (N.I.C.): LEED letter template for Credit MR 2.2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

H. Qualification Data: For waste management coordinator.

1.6 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications (N.I.C.): LEED-Accredited Professional, certified by USGBC. A waste management coordinator may also serve as LEED coordinator.

B. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

1.7 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.

2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.

3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.

4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

2. PRODUCTS (Not Used)

3. EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.

2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for sale and donation are not permitted on Project site.

C. Salvaged Items for Owner's Use:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area onsite designated by Owner.
5. Protect items from damage during transport and storage.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

   a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.

4. Store components off the ground and protect from the weather.

5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphalt Paving (N.I.C.): Grind asphalt in accordance with Section 024221 Reclaimed Stabilized Base.

B. Concrete (N.I.C.): Remove reinforcement and other metals from concrete and sort with other metals in accordance with Section 024200 Aggregate Material from Recycling.

1. Pulverize concrete to maximum Section 024200 Aggregate Material from Recycling.

C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Pulverize masonry to maximum Section 024200 Aggregate Material from Recycling.

D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

E. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

F. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

G. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

H. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

I. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.

J. Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

K. Carpet Tile: Remove debris, trash, and adhesive.

1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

L. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

M. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

2. Polystyrene Packaging: Separate and bag materials.

3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.

4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them in accordance with the Environmental Work Plan prepared by Ransom Consulting (Refer to Section 026000 Excavated Material Management).

3.7 SAMPLE FORMS

A. Owner will review and provide sample templates at the preconstruction conference.

END OF SECTION

SECTION 01 77 00

PROJECT CLOSEOUT

1. GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. Provisions of this section apply to the procedural requirements for the actual closeout of the Work, not to administrative matters such as final payment or the changeover of insurance.

B. Closeout requirements relate to both substantial and final completion of the Work; they also apply to individual portions of completed work as well as the total Work.

C. Specific requirements contained in other sections have precedence over the general requirements contained in this section.

Certifications, Final Requisition, Incomplete Work Escrow.

1.2 PROCEDURES AT SUBSTANTIAL COMPLETION

A. Prerequisites: Comply with General Conditions and complete the following before requesting Architect's/Engineer's inspection of the Work, or a designated portion of the Work, for certification of substantial completion.

1. Submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates and similar required documentation for specific units of work, enabling owner's unrestricted occupancy and use.

2. Submit record documentation, maintenance manuals, tools, spare parts, keys and similar operational items.

3. Complete instruction of Owner's operating personnel, and start-up of systems.

4. Complete final cleaning, and remove temporary facilities and tools.

B. Inspection Procedures:

1. Upon receipt of Contractor's request, Architect/Engineer will either proceed with inspection or advise Contractor of prerequisites not fulfilled.

2. Following initial inspection, Architect/Engineer will either prepare certificate of substantial completion, or advise Contractor of work which must be performed prior to issuance of the certificate of substantial completion.

3. The Architect/Engineer will repeat the inspection when requested and assure that the Work has been substantially completed.

4. Results of the completed inspection will form the initial "punch-list" for final acceptance.

1.3 PROCEDURES AT FINAL ACCEPTANCE

A. Reinspection Procedure:

1. The Architect/Engineer will reinspect the Work upon receipt of the Contractor's notice that, except for those items whose completion has been delayed due to circumstances that are acceptable to the Architect/Engineer, the Work has been completed, including punch-list items from earlier inspections.

2. Upon completion of reinspection, the Architect/Engineer will either recommend final acceptance and final payment, or will advise the Contractor of work not completed or obligations not fulfilled as required for final acceptance. If necessary, this procedure will be repeated.

1.4 RECORD DOCUMENTATION

A. Record Drawings:

1. Maintain a complete set of either blue- or black-line prints of the contract drawings and shop drawing for record mark-up purposes throughout the Contract Time.

2. Mark-up these drawings during the course of the work to show both changes and the actual installation, in sufficient detail to form a complete record for the Owner's purposes. Give particular attention to work which will be concealed and difficult to measure and record at a later date, and work which may require servicing or replacement during the life of the project.

3. Require the entities marking prints to sign and date each mark-up.

4. Bind prints into manageable sets, with durable paper covers, appropriately labeled.

B. Maintenance Manuals:

1. Provide 3-ring vinyl-covered binders containing required maintenance manuals, properly identified and indexed.

2. Include operating and maintenance instructions extended to cover emergencies, spare parts, warranties, inspection procedures, diagrams, safety, security, and similar appropriate data for each system or equipment item.

1.5 GENERAL CLOSEOUT REQUIREMENTS

A. Operator Instructions: Require each Installer of systems requiring continued operation and maintenance by owner's operating personnel, to provide on-location instruction to Owner's personnel, sufficient to ensure safe, secure, efficient, non-failing utilization and operation of systems. Provide instructions for the following categories of work:

1. Mechanical/electrical/electronic systems (not limited to work of Divisions 23 and 26).
2. Live plant materials and lawns.
3. Roofing, flashing, joint sealers.
4. Floor finishes.

B. Final Cleaning: At the time of project close out, clean or reclean the Work to the condition expected from a normal, commercial building cleaning and maintenance program. Complete the following cleaning operations before requesting the Architect/Engineer's inspection for certification of substantial completions.

1. Remove non-permanent protection and labels.
2. Polish glass.
3. Clean exposed finishes.
4. Touch-up minor finish damage.
5. Clean or replace mechanical systems filters.
6. Remove debris.
7. Broom-clean unoccupied spaces.
8. Sanitize plumbing and food service facilities.
9. Clean light fixtures and replace burned-out lamps.
10 Sweep and wash paved areas.
11. Police yards and grounds

END OF SECTION

SECTION 02 32 00

GEOTECHNICAL INVESTIGATIONS

1. GENERAL

1.1 GENERAL PROVISIONS

A. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions apply to work of this Section.

1.2 DESCRIPTION OF WORK

A. Contractor shall review the Geotechnical Report prepared for the project by Summit Geoengineering Services appended to this section of Project Specifications. During the Bidding Process, the Contractor may conduct his own subsurface investigations after requesting and receiving prior approval from the Owner. The request for approval shall be accompanied by a plan indicating the location and type of investigations to be undertaken by the Contractor. The Contractor is encouraged to verify Owner's subsurface investigations and shall notify the Owner in writing prior to the bid date of any discrepancies.

2. PRODUCTS

2.1 REPORT

A. Subsurface conditions have been investigated by test pits and borings. Locations of the test pits and borings are shown on the contract drawings. Logs of the explorations are also appended to these specifications.

B. Said subsurface investigations are not warranted to show the actual subsurface conditions except at the location of said test pits or investigations, and at these points are subject to inaccuracies inherent in methods used and to variations in the classification and interpretation of soil layers.

C. Subsurface information is included only as an aid to the Bidder and it is the obligation of the Bidder to draw his own conclusions of subsurface conditions from his own investigations prior to submitting his proposal. The Contractor agrees, in signing his Contract, that he will make no claims against the Owner or Engineer, if in carrying out the work, he finds that the actual conditions encountered in performing the work do not conform to conditions presented, discussed, or anticipated prior to the commencement of work, the Contractor shall notify the Owner immediately of such differences in the conditions.

3. EXECUTION

3.1 REPORT REVIEW

A. A copy of the geotechnical engineering services report is appended to the project manual and shall be considered part of the Contract Documents.

END OF SECTION

GEOTECHNICAL REPORT
PREPARED BY
SUMMIT GEOENGINEERING SERVICES

SUMMIT
GEOENGINEERING SERVICES

GEOTECHNICAL REPORT

New Office Building
19 Union Wharf
Portland, Maine

Prepared for:

Proprietors of Union Wharf
36 Union Wharf
Portland, Maine 04101

Prepared by:

Summit Geoengineering Services
145 Lisbon St.
Lewiston, Maine

Project #15167
October 2015

SUMMIT
GEOENGINEERING SERVICES

October 14, 2015
SGS #15167

Charlie Poole
Proprietors of Union Wharf
36 Union Wharf
Portland, Maine 04101

Reference: Geotechnical Report, New Office Building
19 Union Wharf, Portland, Maine

Dear Charlie;

Summit Geoengineering Services, Inc. (SGS) has completed a geotechnical investigation for the proposed office building at the site referenced above. Our scope of services included the drilling of 3 borings and preparing this geotechnical report summarizing our findings and providing geotechnical recommendations.

Our scope of services for this project did not include an environmental site assessment or further investigation for the presence or absence of hazardous or toxic material on, below, or around the site. Any statements in this report, or on the soil boring logs, regarding odors or unusual and suspicious conditions observed are for informational purposes and are not intended to constitute an environmental assessment.

1.0 Project Description

The project consists of constructing a new 3-story office building at 19 Union Wharf in Portland, Maine. The new building will be a traditional steel frame with light gage metal, sheathed and clad with a metal panel system or a structural wood framed building sheathed and clad with a metal panel system for the exterior walls. The new building will be constructed in the footprint of an existing single story pre-engineered metal building.

Based on contour mapping from the City of Portland GIS, the exterior grade around the existing building increases from elevation 8 feet on the southern end to elevation 9 feet on the northern end. The finish floor elevation of the building is approximately 8.5 feet. The existing building is an open-span steel framed structure with an asphalt floor. We anticipate that the proposed grades will match the existing grades.

2.0 Subsurface Exploration

Summit Geoengineering Services (SGS) observed the subsurface conditions at the site with the drilling of 3 borings on August 18, 2015 and October 6, 2015. Split spoon sampling was performed on the first day of the borings, and SGS returned on the second date to probe to refusal in order to determine bedrock elevation. Refusal was encountered at depths ranging from 103.5 to 108.0 feet. The borings were performed using 3" vibrated casing. Continuous split spoon sampling was conducted in general accordance with ASTM D1586 from the ground surface to the top of the soft silty clay layer to collect blow counts and soil samples for visual classification. Once the soft clay layer was encountered, sampling was terminated, and SGS returned on October 6, 2015 and probed to refusal in the same boring locations.

Locations of the borings were marked by SGS prior to drilling by measuring from the existing building. These locations can be seen in the SGS Exploration Plan in Appendix. The boring logs are included in Appendix B.

SGS performed a subsurface exploration directly to the north of the site in 2014. This exploration included three borings and one Cone Penetration Test (CPT). The CPT was performed directly adjacent to the northwest corner of the existing building location, and the closest boring was approximately 100 feet away. The cone log is included in Appendix B. Results from these explorations were included in the geotechnical analyses in providing foundation recommendations.

3.0 Subsurface Conditions

3.1 Soil

The soil at the site generally consists of ***asphalt*** overlying ***fill*** overlying ***marine sediments*** overlying ***bedrock.***

3.1.1 ***Asphalt.*** The asphalt layer was at the surface of all of the boring locations and ranges from 3" to 5.5" thick.

3.1.2 ***Fill.*** The fill can generally be broken into two sub-layers. The upper layer consists of brown to dark gray silt with little to some gravel and sand, and trace clay. This layer was located directly below the pavement, except in Borings B-101, which contained a thin layer of silty clay in between this layer and the pavement. It is loose to compact, humid, and ranges in thickness from 2 feet to 3.5 feet. Standard Penetration Test blow counts (SPT-N) in this layer ranged from 4 to 22 with an average of 11. It classifies as SM or ML in accordance with the Unified Soil Classification System.

The lower portion of the fill consisted of alternating layers of olive silty clay/clayey silt and black silt. The olive silty clay/clayey silt is a reworked fill that is humid to wet, very soft to loose, and contains some ash and brick fragments. The black silt contains no to some sand, ash,

gravel, and brick fragments. There is a slight to strong petroleum odor throughout the lower sub-layer of fill. Likely timber cribbing was encountered in this sub-layer in Boring B-101 and B-103 at depths of 10.5 feet and 8 feet, respectively. SPT-N in this layer ranges from 2 to 17 with an average of 9. It ranges in thickness from 7 feet to 14 feet and classifies as ML, CL, or SM in accordance with the Unified Soil Classification System.

3.1.3 ***Marine Sediment.*** The marine sediment deposit was encountered in all of the borings and is described as gray to olive gray clayey silt with trace to some sand, little organics and shell pieces, and occasional organic odor. It ranges in depth below ground surface from 12.5 feet to 16.5 feet and likely extends close to the bedrock surface (a thickness of up to 93.5 feet). It is wet, soft to very soft, and ranges in SPT-N from "weight of hammer" to 10 with an average of 5 (assuming that "weight of hammer" is equivalent to an SPT-N of 0). Moisture content of collected marine sediment samples from Boring B-2 (performed in 2014 approximately 100 feet north of the proposed building location) ranges from 38.8% to 58.8%. Liquid Limit and Plastic Limit of a tested sample was 39 and 20, respectively. The marine sediment classifies as CL or ML in accordance with the Unified Soil Classification System.

The CPT performed at the corner of the building during SGS's previous investigation encountered refusal at approximately 77 feet. It is likely that this was a confined dense layer of sand within the marine sediment deposit.

3.2 Groundwater

The groundwater at the site is highly influenced by the tide elevation. Based on tidal data published by the Maine Department of Environmental Protection, the highest annual tide for the Portland area is elevation 6.5 feet. During the explorations, groundwater was observed to range from depth 2.7 feet below ground surface to 5.5 feet below ground surface (approximate elevation of 2.5 feet to 5 feet). We anticipate that groundwater reaches elevation 6.5 feet during high tide conditions.

3.3 Bedrock

Bedrock was encountered in Borings B-101 and B-103 at depths of 103.5 feet and 108.0 feet, respectively (elevation -95.0 feet and -100.0 feet, respectively). According to the Maine Geological Survey, bedrock at the site is of the Precambrian Z Spring Point Formation consisting of green schist and amphibolites facies ranging from and mafic to felsic volcanic rock.

4.0 <u>Evaluation</u>

At this time, specific building loads are not available for the proposed structure. However, based on roughly estimated dead loads and live loads for buildings of this size and height and the soil properties, we anticipate that a conventional frost wall foundation will result in excessive settlements that are not tolerable for this building type. The settlement calculations were based on data collected from our geotechnical exploration at the site, and also included laboratory test results of clay samples collected from the boring from the adjacent site as well as CPT data. Predicted settlements of column footings and spread footings supported by a shallow foundation

are estimated to be anywhere from 2.5 inches to 4 inches. We believe these magnitudes of settlement are unacceptable for the proposed building.

Alternative foundations considered for the new building included a structural mat, helical piles (intermediate foundation), preload, and piles (deep foundation). Due to cost, feasibility, time constraints, and physical site constraints, the helical piles and preload options are not recommended for this site. Total settlement of a structural mat foundation was computed to be in the range of 2 to 3 inches. Based on the above, we believe that a pile-supported foundation is the most economical and reliable foundation type to support the anticipated exterior and interior column and wall loads. The ground floor slab can be constructed as a "floating" slab supported on the improved existing soil. We recommend that the columns and load bearing elements of the new building be supported by steel H-piles or pipe piles end bearing on bedrock.

If the slab subgrade preparation and construction recommendations from this report are followed, the ground floor slab for the new structure can be supported on grade and will not need piles. It will be important to minimize slab settlements so a gap (or "lip") does not develop between the slab and the foundation. To do this, and to mitigate slab cracking from localized weak subgrade location, subgrade preparation procedures are provided in Section 5.2.

5.0 Foundation Recommendations

5.1 Pile Foundation Recommendations

Based on anticipated design loads of the new building, we recommend all interior and exterior continuous and isolated footings be supported on steel H-piles or pipe piles bearing on bedrock. Bedrock depths encountered during the explorations indicate that the pile lengths will range from approximately 103 feet to 108 feet. The first floor slab can be supported on grade (Section 5.2).

We recommend that steel piles be designed and installed in accordance with the International Building Code 2015 (IBC 2015), Section 1810. The designed piles should be verified with a WEAP analysis to ensure that compressive driving stresses do not exceed the allowable capacity of the piles. To ensure that the pipe piles can be properly driven through potential obstructions in the fill, such as timber cribbing, we recommend that all piles be capped with a steel conical tip (if pipe piles are used) or a steel driving shoe (if H-piles are used) welded to the end of the pile. The piles can be designed using the soil parameters from the Table below:

PILE DESIGN PARAMETERS		
Parameter	**Existing Fill**	**Native Silt/Clay**
Moist unit weight	120 pcf	108 pcf
Undrained Shear Strength (i.e. cohesion)	0 psf	300 psf + 12psf/ft depth*
Effective friction angle	25^0	0^0
Earth Pressure Coefficient (compression)	1.00	1.00
Earth Pressure Coefficient (tension)	0.70	0.70
Lateral Modulus	300 kcf	150 kcf
Friction Factor (steel and soil)	0.25	0.20

* We recommend that the cohesion for the native silt/clay described above be taken as either 300 psf at the top of the layer with an added 12 psf per foot of depth, or taken as 600 psf throughout the entire layer.

5.1.1 Lateral Support

Once the pile type and diameter have been determined, the allowable lateral load should be established. We recommend that the allowable lateral capacity of the installed piles be taken as a maximum of 3 tons per pile, but may be less for smaller diameter piles. All soil within a 3 foot width beyond the edge of the pile in all directions should be proofrolled with a minimum of 4 passes in each of two perpendicular directions with a 5-ton (operating weight) vibratory roller.

We recommend that piles within a pile group be spaced at a minimum of 4 times the diameter of the pile center to center. We further recommend that piles within a pile group which are spaced parallel to the direction of horizontal loading should be spaced at a minimum of 6 times the diameter of the pile center to center. Piles spaced closer than this will result in overlapping stress distributions in the soil and cause lateral capacity to be reduced.

Lateral capacity can also be developed by the soil resistance against the pile caps and grade beams. If the lateral deflection of the pile cap or grade beam is greater than 0.005 feet per foot of grade beam/pile cap depth, the passive resistance of the soil will be mobilized. We recommend that the allowable lateral capacity of the soil against pile caps and grade beams be taken as 375 psf per foot of depth perpendicular to the lateral force applied (passive equivalent fluid pressure) for this condition. If lateral deflections are less than 0.005 feet per foot of depth, we recommend an allowable lateral capacity of 70 psf per foot of depth (at-rest equivalent fluid pressure) for this condition. These soil resistances assume that Foundation Backfill (FB, Section 5.3) is compacted to 95 percent of its maximum dry density, determined in accordance with ASTM D1557, and that the design moist unit weight of the soil is a minimum of 130 pounds per cubic foot (pcf).

Pile Cap and Grade Beam Lateral Resistance	
Lateral Deflection	**Lateral Soil Resistance**
< 0.005 ft/ft of depth	70 psf/ft of depth
> 0.005 ft/ft of depth	375 psf/ft of depth

5.1.2 Corrosion Protection

Due to the various composition of the upper fill soil, the potential presence of corrosive material, and the presence of salt water, we recommend that corrosion resistance measures be taken to protect the long-term integrity of the piles. In the order of preference, these measures include:

- If pipe piles are used, filling the piles with concrete
- Increasing the size of the steel pile to account for area loss over time
- Coating the pipe pile with a corrosion inhibitor

To increase the corrosion protection, more than one of the above mentioned methods can be used. The corrosion rate of an uncoated steel pipe pile is estimated to be in the order of 0.002 in/year.

5.1.3 Uplift Resistance

We recommend that the uplift capacity of the H-piles or pipe piles be taken as the cohesion of the silty clay multiplied by the surface area of the pile embedded in the native silty clay. Additional uplift capacity includes the dead weight of the pile, pile cap, soil above the pile cap, and friction of the mobilized soil. We recommend that a factor of safety of 2.5 be used in the cohesion uplift capacity and the soil friction and a factor of safety of 1.0 be used for all of the dead weight calculations. If needed, a viable way to increase the uplift capacity is by increasing the size of the pile cap and the volume of soil above the pile cap.

5.1.4 Pile Splices

We anticipate that pile splices will be required for the installed piles. The design of all pile splices should be in accordance with IBC 2015 Section 1810.3.6.

5.2 Slabs on Grade

We understand that the first floor of the new building will likely consist of office space or similar use. We have assumed that the finish floor elevation will approximately match the existing finish floor elevation and that entire floor area will be heated. The subgrade encountered in the explorations consisted of silty sand, sandy silt, and silty clay underlain by clay and silt fill and timber cribbing. To accommodate for potential long-term settlement occurring from soil migration into the timber cribbing and to mitigate pavement/slab cracking from differential settlement caused by localized soft areas, we recommend that slabs in heated areas be constructed on a minimum of 24” of compacted Structural Fill (SF, see table below for gradation requirements) overlying a non-woven geotextile (Mirafi 1160N or equivalent) placed on proofrolled subgrade. For slabs in unheated areas, the thickness of SF should be increased to 30.” The geotextile should span the entire building footprint and be extended a minimum of 3 feet beyond the edge of the building footprint in all directions.

All soil exposed in the excavation below the SF and geotextile should be proofrolled with a minimum of 4 passes in each of two perpendicular directions with a 10 ton minimum (operating weight) roller set on static mode. The excavation should be completely dewatered. Any exposed soft or unsuitable soil should be removed and replaced with ¾" crushed stone. SGS should be retained to perform a subgrade inspection before the placement of the subgrade geotextile layer.

The portion of SF passing the 3" sieve shall meet the following gradation requirements:

STRUCTURAL FILL (SF)	
Sieve Size	**Percent finer**
3 inch	100
½ inch	35 to 80
¼ inch	25 to 65
No. 40	0 to 30
No. 200	0 to 7

Reference: MDOT Specification 703.06, Type D

The maximum particle size should be limited to 4 inches. Structural Fill should be placed in 6 to 12 inch lifts and should be compacted to a minimum of 95% of its maximum dry density, determined in accordance with ASTM D1557.

For the conditions described above, the slab can be designed using a subgrade modulus value of 150 pci.

5.3 Frost Protection and Foundation Backfill

Based on a 10-year design air freezing index of 1,200 degree F days for the Portland, Maine region, the bottom of all pile caps, grade beams, and foundation walls exposed to freezing temperatures should be constructed at a minimum depth of 4 feet below finish exterior grade. We recommend that these elements be backfilled with Foundation Backfill (FB). The portion of FB passing the 3" sieve size should meet the following gradation requirements:

FOUNDATION BACKFILL (FB)	
Sieve Size	**Percent finer**
3 inch	100
¼ inch	25 to 100
No. 40	0 to 50
No. 200	0 to 7

Reference: MDOT Specification 703.06, Type E

Maximum particle size should be limited to 6 inches. Foundation backfill should be placed in 6 to 12 inch lifts and compacted to 95% of its optimum dry density determined in accordance with ASTM D1557. The bottom of pile caps, grade beams, and footings in heated areas should be

constructed at a minimum of 2 feet below finish floor elevation.

5.4 Non-Bearing Foundation Walls

We recommend that all load bearing foundation walls and columns for the new building be supported by deep foundations. However, non-bearing foundation walls can be constructed directly on the existing soil. Assuming the subgrade preparation recommendations outlined in Section 5.2 are followed, non-bearing foundation walls can be proportioned using an allowable bearing capacity of 1,000 psf.

Exterior walls exposed to freezing temperatures should be constructed at a minimum depth of 4 feet below finish grade. We recommend that all exposed native soils beneath constructed walls be proofrolled with a minimum of 4 passes with a walk behind plate compactor. Soft, wet, or unsuitable soils should be removed and replaced with compacted SF or ¾" crushed stone. Walls should be backfilled using FB placed in accordance with the methods outlined in Section 4.3.

5.5 Seismic Site Class and Design Criteria

Based on shear wave velocity measurements collected during the CPT on the adjacent site and laboratory testing on collected samples, the site classifies as Site Class E "soft clay soil" in accordance with the 2012 International Building Code. The following seismic site coefficients should be used:

SEISMIC DESIGN COEFFICIENTS	
Seismic Coefficient	**Site Class E**
Short period spectral response (S_S)	0.240
1 second spectral response (S_1)	0.078
Maximum factored spectral response (S_{MS})	0.601
1 second factored spectral response (S_{M1})	0.273
Design short period spectral response (S_{DS})	0.401
Design 1 second spectral response (S_{D1})	0.182

5.6 Groundwater Considerations

Based on an approximate finish floor elevation of 8.5 feet, a 4 foot required frost depth, and a highest annual tide of 6.5 feet, we anticipate that groundwater levels may be periodically at or above the bottom of footing and grade beam elevation. Accordingly, we recommend that perimeter underdrains be constructed around all of the foundation walls and grade beams. Underdrains should consist of 6-inch diameter, perforated PVC pipe surrounded by a minimum of 6 inches of crushed stone wrapped in filter fabric. The underdrains should be placed at the base of the foundation and outlet to a free draining location or pumped if necessary. An alternative to installing underdrains is to design the pile caps and grade beams with an uplift pressure computed based on a groundwater elevation of 6.5 feet.

5.0 Testing and Field Monitoring Recommendations

All piles should be installed to an ultimate capacity equal to the allowable axial capacity multiplied by a factor of safety of 2.5. To ensure that this capacity is developed, and to avoid over-stressing of the installed piles, we recommend dynamic pile testing (PDA) be performed on select piles in accordance with ASTM D4945. If desired, the piles can be designed with a maximum allowable capacity of 40 tons to preclude the need for PDA testing.

We recommend that a detailed pile-driving log for each pile be performed and reviewed to evaluate pile installation and consistency. The contractor or a qualified technician can record the pile-driving logs. If the contractor is selected to record the pile driving logs, we recommend that SGS review the logs and verify that the piles are being installed within the design recommendations.

We recommend that the skin friction values generated by the compressive load test (ASTM D4945) be evaluated to verify the field uplift capacity.

Field testing for lateral pile capacity is not required.

6.0 Construction Considerations

All existing foundation elements and slab/asphalt should be removed in its entirety from within the building footprint. We understand that the foundation type of the existing structure is unknown. If it is a shallow frost wall on spread footing foundation, the entire frost walls and footings should be removed. If the foundation includes piles, the foundation walls, pile caps, and grade beams should be removed and piles should be cut to allow for the placement of the geotextile below the 24” Structural Fill layer below the slab.

If the foundation for the existing building includes piles, consideration should be given to avoid interference between the new piles and the existing piles.

Based on the groundwater levels observed from our explorations, we anticipate that groundwater will be encountered within the foundation and slab excavations during high tide periods. We believe that dewatering can be accomplished relatively easily by conventional shallow sumps. Diversion and control of surface water should be performed to prevent water flow from adjacent wet areas or from rain or snowmelt from entering the excavations.

All exposed native soil which will be load bearing (under slabs, pile caps, and grade beams) should be proofrolled with a minimum of 4 passes in each of two perpendicular directions with a 5-ton (operating weight) vibratory roller.

General excavations within the silty clay soil, if encountered, will be susceptible to softening when wet. If subgrade softening does occur, we recommend over excavation and replacement with a minimum of 6 inches of ¾” crushed stone. The placed crushed stone should be compacted with a minimum of 4 passes with a walk-behind plate compactor.

Although unanticipated, excavations deeper than 4 feet should be sloped no greater than 1.5H to 1V. These slopes are based on the current OSHA Excavation Guidelines.

7.0 Closure

Our recommendations are based on professional judgment and generally accepted principles of geotechnical engineering. Some changes in subsurface conditions from those presented in this report may occur. Should these conditions differ materially from those described in this report, SGS should be notified so that we can re-evaluate our recommendations. Furthermore, SGS should be notified should pile material change, expected fill height increase, or pile refusal is encountered more than 20 feet deeper or shallower than elevation -105 feet.

Building foundation loads were not available for this report. Once the foundation (and slab) loads have been determined, SGS should be notified so we can confirm the recommendations in this report are valid.

We appreciate the opportunity to serve you during this phase of your project. If there are any questions or additional information is required, please do not hesitate to call.

Sincerely,
Summit Geoengineering Services, Inc.

Mathew Hardison, EI
Geotechnical Engineer

William M. Peterlein, PE
Principal Geotechnical Engineer

APPENDIX A

EXPLORATION PLAN

LEGEND

B-1 SUMMIT TEST BORING (SEPTEMBER 1, 2015)

CPT-1 SUMMIT CONE PENETRATION TEST (AUGUST 18, 2014)

PLAN REFERENCE

AERIAL IMAGE (2013) WAS OBTAINED FROM MAINE OFFICE OF G.I.S. CONTOURS WERE OBTAINED FROM PORTLAND G.I.S.

TEST BORING LOCATION PLAN
PROPOSED OFFICE BUILDING

UNION WHARF - PORTLAND, MAINE

PREPARED FOR

PROPRIETORS OF UNION WHARF

DATE: 9-3-2015	DRAWN BY: KRF	CHECKED BY: WMP
JOB: 15167	SCALE: 1" = 50'	FILE: 15167 BOR

145 LISBON ST. - SUITE 601
LEWISTON, ME 04240
Tel.: (207) 576-3313

173 PLEASANT STREET
ROCKLAND, ME 04841
Tel.: (207) 318-7761

SUMMIT
GEOENGINEERING SERVICES
www.summitgeoeng.com

APPENDIX B

EXPLORATION LOGS

EXPLORATION COVER SHEET

The exploration logs are prepared by the geotechnical engineer from both field and laboratory data. Soil descriptions are based upon the Unified Soil Classification System (USCS) per ASTM D2487 and/or ASTM D2488 as applicable. Supplemental descriptive terms for estimated particle percentage, color, density, moisture condition, and bedrock may also be included to further describe conditions.

Drilling and Sampling Symbols:

SS = Split Spoon Sample
UT = Thin Wall Shelby Tube
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RW = Rotary Wash
SV = Shear Vane
PP = Pocket Penetrometer
RC = Rock Core Sample
Hyd = Hydraulic Advancement of Drilling Rods
Push = Direct Push of Drilling Rods
WOH = Weight of Hammer
WOR = Weight of Rod
PI = Plasticity Index
LL = Liquid Limit
W = Natural Water Content
USCS = Unified Soil Classification System

Water Level Measurements:

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable groundwater levels. In impervious soils, the accurate determination of groundwater elevations may not be possible, even after several days of observations. Groundwater monitoring wells may be required to record accurate depths and fluctuation.

Gradation Description and Terminology:

Boulders:	Over 12 inches
Cobbles:	12 inches to 3 inches
Gravel:	3 inches to No.4 sieve
Sand:	No.4 to No. 200 sieve
Silt:	No. 200 sieve to 0.005 mm
Clay:	less than 0.005 mm

Trace:	Less than 5%
Little:	5% to 15%
Some:	15% to 30%
Silty, Sandy, etc.:	Greater than 30%

Density of Granular Soils and Consistency of Cohesive Soils:

CONSISTENCY OF COHESIVE SOILS		DENSITY OF GRANULAR SOILS	
SPT N-value blows/ft	**Consistency**	**SPT N-value blows/ft**	**Relative Density**
0 to 2	Very Soft	0 to 4	Very Loose
2 to 4	Soft	5 to 10	Loose
5 to 8	Firm	11 to 30	Compact
9 to 15	Stiff	31 to 50	Dense
16 to 30	Very Stiff	>50	Very Dense
>30	Hard		

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	New Office Building	Boring #:	B-101
Location:	16 Union Wharf	Project #:	15167
City, State:	Portland, Maine	Sheet:	1 of 2
		Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	8.5 ft. +/-
Driller:	C. Coolidge, P.E.	Reference:	City of Portland GIS countour mapping
Summit Staff:	M. Hardison, E.I.	Date started: 9/1/2015	Date Completed: 10/6/2015

DRILLING METHOD		SAMPLER	
Vehicle:	Tracked	Length:	24" SS
Model:	AMS Power Probe	Diameter:	2"OD/1.5"ID
Method:	3" Casing	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
9/1/2015	5.5 ft	3.0 ft.	4.5' of casing in hole, 10:00 am

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
						3" Pavement Surface, crumbly and poor condition		PAVEMENT
1	S-1	24/8	0.5 to 2.5	8		Olive Silty CLAY, stiff, humid, CL	PP = 4,000 psf	
				8				
2				5				FILL
				9		Brown Gravelly SILT, little Sand, dry to humid, loose, ML		
3	S-2	24/2	2.5 to 4.5	6				
				6				
4				6		same as above, cobble piece in spoon tip		
				6				
5	S-3	24/6	4.5 to 6.5	6		Brown Gravelly SAND, little to some Silt, humid, loose,		
				2		brick fragment, SM	Groundwater	
6				2				
				1			PP < 500 psf	
7	S-4	24/20	6.5 to 8.5	2		Olive gray Silty CLAY, frequent black streaking, soft,		
				3		occasional wood pieces, white Ash in spoon tip, wet, CL		
8				9				
				3				
9	S-5	24/24	8.5 to 10.5	1		same as above, occasional shells, no ash, angular rock		
				1		fragments in spoon tip		
10				1				
				12				
11	S-6	24/12	10.5 to 12.5	21*		same as above	PP < 500 psf	
				10		*driller remark: blow count may be due to timber		
12				8		cribbing		
				4		Black ASH, little gray Gravel and Silt, petroleum odor		
13	S-7	24/16	12.5 to 14.5	2		Gray Clayey SILT, trace Sand and Gravel, wet, very		
				1		loose, SM		MARINE SEDIMENTS
14				3				
				2				
15	S-8	24/24	14.5 to 16.5	2		same as above, frequent wood pieces		
				2			PP < 500 psf	
16				2				
				2				
17	S-9	24/24	16.5 to 18.5	1		Gray Clayey SILT, trace Sand, wet, very loose, organic		
				2		odor, frequent shell pieces, ML		
18				3				
				3				
19	S-10	24/24	18.5 to 20.5	2		same as above		
				3				
20				2				
				3				
21	S-11	24/24	20.5 to 22.5	1		same as above, some fine Sand seams		
				3				
22				3				
				3		Gray Silty CLAY, wet, soft to stiff, CL	PP = 4,000 psf	

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	New Office Building	Boring #:	**B-101**
Location:	16 Union Wharf	Project #:	15167
City, State:	Portland, Maine	Sheet:	2 of 2
		Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	8.5 ft. +/-
Driller:	C. Coolidge, P.E.	Reference:	City of Portland GIS countour mapping
Summit Staff:	M. Hardison, E.I.	Date started: 9/1/2015	Date Completed: 10/6/2015

DRILLING METHOD		SAMPLER	
Vehicle:	Tracked	Length:	24" SS
Model:	AMS Power Probe	Diameter:	2"OD/1.5"ID
Method:	3" Casing	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
9/1/2015	5.5 ft	3.0 ft. +/-	4.5' of casing in hole, 10:00 am

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
21						sample from 20.5 feet to 22.5 feet (see previous log for sample information)		MARINE SEDIMENT
22						Gray Silty CLAY, wet, soft to stiff, CL		
23				PROBE		Attempted Field Vane at 24' depth, could not push past 23.5'. Failed field vane attempted at 23.5', (maximum reading of 50 ft-lbs, no shearing occurred, likely sand seam)		
24								
25								
26						Probed with vibrated speartip		
27								
28								
						Note: Future probe will be advanced to refusal		
103								
								BEDROCK

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	New Office Building	Boring #:	B-102
Location:	16 Union Wharf	Project #:	15167
City, State:	Portland, Maine	Sheet:	1 of 1
		Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	7.5 ft. +/-
Driller:	C. Coolidge, P.E.	Reference:	City of Portland GIS countour mapping
Summit Staff:	M. Hardison, E.I.	Date started: 9/1/2015	Date Completed: 9/1/2015

DRILLING METHOD		SAMPLER	
Vehicle:	Tracked	Length:	24" SS
Model:	AMS Power Probe	Diameter:	2"OD/1.5"ID
Method:	3" Casing	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
9/1/2015	5.0 ft	2.5 ft. +/-	casing pulled, 2:10 pm

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
						5.5" Pavement Surface, crumbly and poor condition		PAVEMENT
1	S-1	24/6	0.5 to 2.5	8		Dark brown to black Sandy SILT, little Gravel, trace Clay, loose, Clay in spoon tip, SM		
				5				
2				3				FILL
				2				
3	S-2	24/5	2.5 to 4.5	2		Olive gray Clayey SILT, large brick fragment at 4' depth, wood (decomposed) pieces, humid, loose, ML		
				2			PP < 500 psf	
4				4				
				4				
5	S-3	24/10	4.5 to 6.5	3		same as above, little black Ash, few brick pieces, black staining from Ash	Groundwater	
				4				
6				6				
				5				
7	S-4	24/10	6.5 to 8.5	5		same as above, wet, slight petroleum odor		
				5				
8				5				
				5				
9	S-5	24/12	8.5 to 10.5	5		Black Sandy SILT, little to some black Ash, occasional brick fragments, wet, trace white Ash and Clay, ML		
				3				
10				3				
				5				
11	S-6	24/16	10.5 to 12.5	3		same as above, slight petroleum odor		
				3				
12				5				
				5				
13	S-7	24/14	12.5 to 14.5	2		same as above, increasing petroleum odor and white Ash content		
				7				
14				7				
				13				
15	S-8	24/12	14.5 to 16.5	2		Black Sandy SILT, little black and white Ash, trace Clay, wood pieces, ML		
				3				
16				4				
				3				
17	S-9	24/24	16.5 to 18.5	2		Gray Clayey SILT, little to some Sand, very soft to soft, wet, ML		
				3				
18				2				MARINE SEDIMENTS
				3				
19	S-10	24/24	18.5 to 20.5	3		same as above, wood and shells, strong organic odor		
				5				
20				5				
				5				
				PROBE		Probed ahead with vibrated speartip		
						Note: Future probe will be advanced to refusal		
80								
						End of Probe at 80', no refusal		

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	New Office Building	Boring #:	B-103
Location:	16 Union Wharf	Project #:	15167
City, State:	Portland, Maine	Sheet:	1 of 1
		Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	8.0 ft. +/-
Driller:	C. Coolidge, P.E.	Reference:	City of Portland GIS countour mapping
Summit Staff:	M. Hardison, E.I.	Date started: 9/1/2015	Date Completed: 10/6/2015

DRILLING METHOD		SAMPLER	
Vehicle:	Tracked	Length:	24" SS
Model:	AMS Power Probe	Diameter:	2"OD/1.5"ID
Method:	3" Casing	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
9/1/2015	2.7 ft	5.3 ft. +/-	5' casing in hole, 3:30 pm

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
						5" Asphalt Surface, fair to good condition		ASPHALT
1	S-1	24/6	0.5 to 2.5	8		Light tan Silty SAND, little Gravel, humid, compact, SM		
				9				
2				13				FILL
				11		Dark gray to brown Sandy SILT, trace Clay and Gravel,		
3	S-2	24/5	2.5 to 4.5	7		humid, ML	Groundwater	
				6				
4				5		same as above		
				3		5" Olive Silty CLAY, slight black streaking, slight	PP = 3,000 psf	
5						petroleum odor, intermixed Sand and Gravel, CL	to 6,000 psf	
	S-3	24/10	5 to 7	9		Light brown Gravelly SILT, wet, trace Clay and Sand,		
6				4		compact, ML		
				8				
7				8		same as above, timber pieces in spoon tip (likely timber		
	S-4	24/6	7 to 9	5		cribbing)		
8				50/5				
						Refusal on likely timber cribbing, offset hole 1' and		
9						drove casing to 10' depth:		
10								
	S-5	24/16	10 to 12	4		Light brown Silty fine to medium SAND, wet, loose, SM		
11				3				
				4				
12				1		Black SILT, little to some black Ash, trace Clay, wet,		
	S-6	24/10	12 to 14	1		black Ash in spoon tip, slight petroleum odor, ML		
13				2				
				4		same as above, little Sand, strong petroleum odor		
14				2				
15								
	S-7	24/24	15 to 17	WH		Olive gray Silty CLAY, little intermixed Sand, frequent		MARINE SEDIMENT
16				WH		wood pieces, strong organic odor, wet, very soft, CL		
				WH				
17				WH				
18				PROBE				
19								
20								
107								
108								
						End of Probe at 108', refusal on likely Bedrock		BEDROCK

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

Widgery Wharf

COMPANY: Summit Geoengineering Services
FILENAME:
TEST ID: cpt1
PROJECT: 14137
SITE: Widgery Wharf

LOCATION: cpt1
OPERATOR: C. Coolidge, P.E.
CREW: B. Peterlein, P.E.
CLIENT: Archetype
CLIENT REP:

TEST DATE: Mon 18/Aug/2014
START TIME: 14:54:28
GPS: 0, 0, 0, 0, 0
WEATHER: CLEAR

COMMENTS:

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

APPENDIX C

LABORATORY TEST RESULTS

SUMMIT
GEOENGINEERING SERVICES

ATTERBERG LIMIT TEST - ASTM D4318

Method "A" (Multi-point)

PROJECT NAME:	Widgery Wharf	PROJECT NUMBER:	14137
CLIENT:	Archetype Architects	SAMPLE NUMBER:	UT-1
SOURCE:	Boring B-2	DEPTH:	20' - 22'
DATE:	8/21/2014	TECHNICIAN:	Erika Hawksley, E.I.

DATA

Source	Depth	LL	PL	PI	Classification
B-2	20' - 22'	39	20	19	Gray Silty CLAY, CL

Notes:

145 Lisbon Street (PO Box 7216), Lewiston, Maine 04243, (207) 576-3313
173 Pleasant Street, Rockland, Maine 04841, (207) 318-7761

SUMMIT
GEOENGINEERING SERVICES

Laboratory Determination of Water (Moisture) Content of Soil ASTM D2216 / D4643

PROJECT NAME:	Widgery Wharf	PROJECT #:	14137.0
CLIENT:	Archetype Architects	DRYING METHOD:	Oven Dried
SOURCE:	Boring B-2	DESCRIPTION:	Various Clay Samples
DATE:	8/19/2014	TECHNICIAN:	Erika Hawksley, E.I.

Location	Sample No.	Depth	Moisture Content	Remarks
B-2	S-3	5' - 7'	24.5%	
B-2	S-4	7' - 9'	25.1%	
B-2	S-7	15' - 17'	58.8%	Organic particles & odor
B-2	S-8	17' - 19'	54.8%	Organic particles & odor
B-2	S-9	25' - 27'	38.8%	

REMARKS:

145 Lisbon Street (PO Box 7216), Lewiston, Maine 04243, (207) 576-3313
173 Pleasant Street, Rockland, Maine 04841, (207) 318-7761

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Procedures for demolition and removal of existing building elements.
2. Removal of designated building equipment and fixtures.
3. Salvaged items.
4. Salvaged material.
5. Salvaged items for re-use.

1.2 SYSTEM DESCRIPTION

A. The extent of Selective Demolition Work is that Work necessary, and required to facilitate the new construction indicated.

B. Demolition shall be such that all construction, new and existing, can be performed, and completed in accordance with the construction documents.

C. Verify the scope of the Work under this Section including salvage material.

1.3 QUALITY ASSURANCE

A. Engage only personnel who can demonstrate not less than five years successful experience in Work of similar character.

B. Performance Criteria:
1. Requirements of Structural Work: Do not cut structural work in a manner resulting in a reduction of load-carrying capacity of load/deflection ratio.
2. Operational and Safety Limitations: Do not cut operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in a manner intended or resulting in a decreased operational life, increased maintenance or decreased safety.
3. Visual Requirements: Do not cut work which is exposed on the exterior or exposed in occupied spaces of the building in a manner resulting in a reduction of visual qualities or resulting in substantial evidence of the demolition work judged by the Architect to be cut and patched in a visually unsatisfactory manner.
4. Loading: Do not superimpose loads at any point upon existing structure beyond design capacity including loads attributable to materials, construction equipment, demolition operations and shoring and bracing.

5. Vibration: Do not use means, methods, techniques or procedures which would induce vibration into any element of the structure.
6. Fire: Do not use means, methods, techniques or procedures which would produce any fire hazard unless otherwise approved by Contracting Officer.
7. Water: Do not use means, methods, techniques or procedures which would produce excessive water run-off, and water pollution.
8. Air Pollution: Do not use means, methods, techniques or procedures which would produce uncontrolled dust, fumes or other damaging air pollution.

1.4 PROJECT SITE

A. The Contractor shall verify all existing conditions and notify the Contracting Officer of discrepancies before proceeding with the Work.

B. Perform the removal, cutting, drilling, etc., of existing work with extreme care, and using small tools in order not to jeopardize the structural integrity of the building.

C. The Contractor shall have full use of the facility during construction.

D. Condition of Structure: The Owner assumes no responsibility for the actual condition of portions of the structure to be demolished.

E. Partial removal: Items of salvageable value to the Contractor may be removed from the structure as the work progresses if not claimed by the Owner. Salvaged items must be transported from the site as they are removed.

F. Protection: Make sure that the safe passage of persons around the area of demolition is maintained during the demolition operation. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.

1.5 PROTECTION OF EXISTING CONSTRUCTION

A. Provide temporary protection of existing construction (floors, roof, and walls) when adjoining new work and in traffic areas.

B. Provide temporary construction, constructed of framing and plywood, to protect existing construction and surrounding surfaces from damage by movement of materials and personnel.

C. The contractor is responsible for all damage to existing structure and shall replace or repair all areas of damage.

D. Repair, replace, or rebuild existing construction as required or as directed which has been removed, altered or disrupted to allow for new construction. Existing construction shall be corrected to match adjacent construction, new or existing.

E. Perform cutting of existing concrete and masonry construction with saws and core drills. Do not use jack-hammers or explosives.

1.6 SHORING AND BRACING

A. Provide temporary shoring of existing construction to allow removal of existing structural elements. Maintain shoring until new structural elements are in place and accepted.

PART 2 - PRODUCTS

2.1 SALVAGED ITEMS

A. The Contract Documents indicate the existing materials that are to be reinstalled in the new construction. The Contractor shall remove, protect and reinstall these items as indicated.
   1. Items for "Reinstallation" include the cabinetry & trim and are indicated as such within the Contract Documents.

B. Coordinate with the Owner on disposition of salvage items note scheduled for reinstallation, demolished materials, and equipment.

2.2 SALVAGED MATERIALS

A. Removed and salvaged materials of value not designated for reinstallation, unless claimed as salvage by the Owner, shall become the property of the Contractor and shall be removed from the premises by the Contractor.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

C. Report in writing to the Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

A. Temporary Support: Provide adequate temporary support for work to be cut to prevent failure. Do not endanger other work.

B. Provide adequate protection of other work during selective demolition to prevent damage and provide protection of the work from adverse weather exposure.

3.3 PROCEDURE

A. Employ only skilled tradesmen to perform selective demolition.

B. Cut work by methods least likely to damage work to the retained and work adjoining.

C. In general, where physical cutting action is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete and masonry work.

D. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

E. Where selective demolition terminates at a surface or finish to remain, completely remove all traces of material selectively demolished, including mortar beds. Provide smooth, even, substrate transition.

3.4 POLLUTION CONTROLS

A. Use temporary enclosures and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level.

B. Comply with governing authorities pertaining to environmental protection.

C. Clean adjacent portion of the structure and improvement of dust, dirt and debris caused by demolition operations, as directed by the Owner and governing authorities. Return adjacent areas to conditions existing prior to the start of the work.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. Collect, recycle, reuse, and dispose of demolished materials per governing regulatory authorities.

3.6 SCHEDULE OF SELECTIVE DEMOLITION

A. Exterior Masonry:
   1. Locate portion of existing masonry wall to be removed.
   2. Using small power tools, remove only that portion of the exterior wall which is required for the indicated new construction.

B. Interior Walls and Partitions:
   1. All interior wall and partitions shall be removed unless otherwise indicated on drawings.
   2. Remove all top and bottom framing tracks and over head braces.

C. Mechanical System:
   1. Remove all mechanical equipment and related ductwork.
   2. Provide temporary weathertight protection of all openings in roof and exterior walls.
   3. Remove all accessories to the mechanical system including hanger straps.

D. Plumbing:
   1. Remove all plumbing fixtures and accessories including all exposed supply, waste, and vent piping.
   2. Concealed piping within and below slab construction shall be identified, and capped a minimum of 3 inches (8 cm) below finish floor.

E. Electrical Service:
   1. All electrical circuits within the existing structure shall be abandoned from the existing service entrance section, beyond.
   2. Remove all abandoned electrical conduit, boxes, and wiring back to the existing electrical service which is to remain.

F. Provide additional selective demolition as indicated and required by the Owner and as required for indicated new construction.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 DESCRIPTION OF WORK:

A. Work includes, but is not limited to formwork, reinforcing, cast-in-place concrete, accessories, and casting in of items specified under other Sections of the Specifications or furnished by Owner that are required to be built-in with the concrete.

1.02 REFERENCE SPECIFICATIONS:

A. ACI 211.1-91 "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete."

B. ACI 212.3R-91 "Chemical Admixtures for Concrete."

C. ACI 301-89 "Specifications for Structural Concrete for Buildings."

D. ACI 302.1R-89 "Guide for Concrete Floor and Slab Construction."

E. ACI 304R-89 "Guide for Measuring, Mixing, Transporting and Placing Concrete."

F. ACI 304.2R-91 "Placing Concrete by Pumping Methods."

G. ACI 306 R-88 "Cold Weather Concreting."

H. ACI 308-92 "Standard Practice for Curing Concrete."

I. ACI 309R-87 "Guide for Consolidation of Concrete."

J. ACI 315-80 (86) "ACI Detailing Manual."

K. ACI 318-89 "Building Code Requirements for Reinforced Concrete."

L. ACI 347R-88 "Guide to Formwork for Concrete."

M. Concrete Reinforcing Steel Institute, "Placing Reinforcing Bars," 1992.

1.03 SUBMITTALS:

A. Product Data: Submit manufacturer's product data as requested by Architect.

B. Shop Drawings:Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315.

C. Samples: Submit samples of materials as requested by Architect

PART 2 PRODUCTS

2.01 FORM MATERIALS:

A. Forms for Exposed Finish Concrete: Use plywood complying with U.S. Product Standard PS-1 "B-B Plywood", Class I, Exterior Grade or better.

B. Forms for Unexposed Finish Concrete: Form concrete surfaces with plywood, lumber or metal. Provide lumber dressed on at least 2 edges and one side for tight fit.

C. Form Coatings: Provide commercial formulation form coating compounds that will not bond with, stain nor adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS:

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

1. For reinforcing of pile caps , grade beams and lobby base mats reinforcing bars shall be epoxy-coated per ASTM A 775

B. Fiber Reinforcing: ASTM C 1116, Type III virgin polypropylene fibers

C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

2.03 CONCRETE MATERIALS:

A. Portland Cement: ASTM C 150, Type I or Type II,

B. Normal Weight Aggregates: ASTM C 33.

C. Water: Potable.

D. Air-Entraining Admixture: ASTM C 260.

E. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G containing not more than 1% chloride ions.

F. Normal range water reducing admixture: ASTM C 494 Type A containing no calcium chloride.

G. Accelerating Admixture: ASTM C 494, Type C or E.

2.04 PROPORTIONING AND DESIGN OF MIXES:

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301.

B. Proportion design mixes to provide concrete with the following properties:

1. Elevated Slabs:
   a. Strength: 4000 psi @28 days, 3/4" aggr.
   b. W/C Ratio: 0.48
   c. Entrained Air: 4% ± 1%
   d. Slump: 3" ±

2. Pile Caps, Grade Beams, Tie Beams and all other concrete below elev 13’-6”:
   a. Strength: 4000 psi @28 days, 3/4" aggr.
   b. W/C Ratio: 0.40
   c. Entrained Air: 6% ± 1%
   d. Slump: 3" ±
   e. DCI Corrosion Inhibitor by Grace: 3 1/2 gal/cy.
      Add @ Batch Plant

PART 3 EXECUTION

3.01 FORMS:

A. Design, construct, erect, maintain, and remove forms for cast-in-place concrete work in compliance with ACI 347.

3.02 PLACING REINFORCEMENT:

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports.

3.03 INSTALLATION OF EMBEDDED ITEMS:

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto. Notify other trades to permit installation of their work.

3.04 INSTALLATION OF GROUT

A. Place grout for base plates in accordance with manufacturer's recommendations. Grout below setting plates as soon as practicable to facilitate erection of steel and prior to removal of temporary bracing and guys. If leveling bolts or shims are used for erection grout shall be installed prior to addition of any column load.

3.05 CONCRETE PLACEMENT:

A. General: Comply with ACI 304.

B. Preplacement Review: Footing bottoms, reinforcement and all work shall be subject to review by the Architect. Notify Architect 48 hours prior to scheduled placement and obtain approval or waiver of review prior to placement.

C. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 18 inches and in a manner to avoid inclined construction joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping.

2. Use vibrators designed to operate with vibratory equipment submerged in concree maintaining a speed of not less than 8000 impulses per minute and of sufficient amplitude to consolidate the concrete effectively.

D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

3.06 CONCRETE CURING AND PROTECTION:

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 306.

3.07 QUALITY CONTROL TESTING DURING CONSTRUCTION:

A. The Owner shall employ a testing laboratory to inspect, sample and test the materials and the production of concrete and to submit test reports. Testing shall include the following:

1. Slump: ASTM C 143.l

2. Air Content: ASTM C 231.

3. Concrete Temperature:

4. Compression Test Specimen: ASTM C 31.

5. Compressive Strength Tests: ASTM C 39.

END OF SECTION

SECTION 04 20 00

UNIT MASONRY

1. GENERAL

1.1 DESCRIPTION OF WORK

A. Drawings and general provisions of Contract, including General Conditions and Division 1 specifications, apply to work in this section.

B. Extent of Unit Masonry is shown on the drawings.

C. In addition to work shown on the drawings and specified elsewhere in this Section, build in steel lintels, anchors, inserts and sleeves.

1.2 QUALITY ASSURANCE

A. Standards: Comply with recommendations of Brick Institute of America (BIA), and National Concrete Masonry Assoc. (NCMA).

1.3 SUBMITTALS

A. Issue submittals in accordance with Section 01 31 00, Submittals.

B. Submit product data and installation recommendations for masonry units, cementitious products for mortar and grout, coloring pigments, throughwall flashing, and masonry accessories.

C. Submit samples of exposed masonry units and mortar, illustrating full range of colors and textures.

~~D. Build 4 x 4 sample wall on site for Architect's inspection. Sample wall to include back up wall finishes, weeps, brick ties.~~

2 PRODUCTS

2.2 CONCRETE MASONRY UNITS

A. Except as shown on Drawings or specified otherwise, all concrete masonry units shall be as follows:

1. Hollow-type complying with ASTM C 90, Type 1 (moisture-controlled), Grade N.

2. Compressive strength: 2500 psi net, 1250 psi gross (average of three units). Prism strength fm=2500 psi in Pier A, fm=2000 elsewhere.

3. Normal-weight, with sand and gravel aggregate complying with ASTM C 33, approximate oven-dry unit weight of 135 lbs. per cu. ft.

2.3 MORTAR AND GROUT

A. Mortar shall comply with ASTM C 270, BIA Technical Notes 8 and 8A, and local Building Code.

B. Materials shall conform to applicable ASTM specifications including the following:

1. Portland Cement: ASTM 150, Types I, II, or III (do not use Types IA, IIA, or IIIA).

2. Masonry Cement: ASTM C 91.

3. Hydrated Lime: ASTM C 207, Type S only (do not use Type N).

4. Natural or manufactured sand aggregate: ASTM C 144, gradation conforming to Table 1 in BIA Technical Note 8.

5. Masonry cement shall not contain ground limestone.

6. Water: clean, potable, and free of deleterious amounts of acids, alkalies or organic materials.

C. Mortar Type

1. General:

a. Use 1800 psi minimum Type S mortar for reinforced masonry and where indicated.

b. Use 750 psi minimum Type N mortar for exterior, above-grade loadbearing and non-loadbearing walls, and for other applications where another type is not indicated.

D. Grout

1. Grout shall conform to ASTM C 476 and to match existing.

2. Fine and coarse aggregate for grout mixes shall be defined in ASTM C 404.

a. Fine grout shall consist of one part portland cement, 0 to 1/10 part lime, 2-1/4 to 3 parts fine sand.

b. Coarse grout shall consist of the fine grout mix described in "a" above plus 1 to 2 parts coarse aggregate.

c. Use coarse grout (pea gravel aggregate) except where minimum horizontal core dimension is under 4 in., in which case use fine grout (sand aggregate). Ordinary concrete (maximum 1 in. aggregate) may be used where minimum core dimension exceeds 6 inches.

E. During cold-weather construction at exterior walls, use Type III (high-early strength) cement and Type S hydrated lime. A non-calcium-chloride-based accelerator such as Dur-o-Wal, Dur-o-Guard, or Euco Accelguard 80 may be used, in quantities recommended by manufacturer for expected ambient temperature. Calcium chloride may not be used. Refer to EXECUTION portion of this Section for general provisions governing cold weather construction.

2.4 METAL REINFORCING, TIES, ANCHORS

A. Acceptable manufacturers: Hohmann & Barnard, Inc., or approved equal.

~~B. Brick ties at masonry veneer construction:~~

~~1. HB-200X adjustable veneer anchors, 14 Ga., stainless steel Type 304, with Pintle Length and Legs fabricated to accommodate 2 inch rigid exterior insulation. Min. 2" into bed joints. ***Ties to be stainless steel.***~~

~~2. Secure anchors to sheathing with s/s wood screws as recommended by anchorage manufacturer.~~

~~3. Maximum spacing: 24 in. o.c. vertically, 16 in. o.c. horizontally or closer spacing as required at expansion joints, corners, floors, etc., or to secure directly to studs.~~

~~4. Material: stainless steel.~~

2.5 THROUGHWALL FLASHING

A. Through-wall flashing: Thru wall flashing at base and all window and door heads to be equal to "EPRA"- max EPDM. Flashing to be extended sufficiently beyond jambs and form end dams. Thru wall flashing with H & B # DP stainless steel drip plate as manufactured by Hohmann & Barnard Inc. "Henry Thru Wall", blue skin is also an acceptable product.

B. Through-wall flashing sealant: Shall be Sandell Trowel Mastic, as manufactured by Sandell Manufacturing Co., Inc.

2.6 AIR BARRIER

A. Typar Metro-Wrap Air Moisture Barrier (located behind exterior rigid insulation). Refer to Specification Section 07 21 16.

2.7 MASONRY ACCESSORIES

A. Weepholes: medium-density polyethylene, 3/8 in. diameter, full depth of outer wythe.

B. Chemical cleaning agents for newly-installed masonry: ProSoco Sure-Klean liquid masonry cleaners or equal by Diedrich, as recommended by manufacturer for particular condition. Recommended cleaners include Sure-Klean No. 600 Detergent, No. 101 Lime Solvent, and Vana Trol.

C. Apply water proofing – Karnac 920 A.F. or Henry 785 Asphalt Emulsion trowel grade, on all block face bearing brick veneer.

3. EXECUTION

3.1 MASONRY WORK IN GENERAL

A. Erect all masonry work in compliance with the line and level tolerances specified herein. Correct, or replace, as directed by the Architect, non-conforming masonry work at no additional cost to the Contract.

B. Lay no face brick or concrete masonry unit having chipped edges or face defects where such unit or piece would be exposed to view. Remove any such unit or piece, if installed, replace with new matching material, and bear all costs therefore.

C. Examine all Drawings as to requirements for the accommodation of work of other trades. Provide all required recesses, chases, slots, cutouts, and set loose lintels. Place anchors, bolts, sleeves and other items occurring in the masonry work. Take every precaution to minimize future cutting and patching. Closely coordinate the location and placement of such items.

D. Protect all masonry from rain prior to, and during the installation thereof. If the temperature is in excess of 80 degrees F. at time of installation, lightly moisten contact surfaces or masonry units by brushing with water.

E. Lay all masonry in full mortar beds, and completely butter all concealed from view vertical edges with mortar. Completely fill cells of masonry units with mortar where vertical reinforcement is to be installed therein and in other locations specified or indicated on the Drawings.

F. Provide complete protection against breakage and weather damage to all masonry work, including substantial wood boxing around door jambs, over the tops of walls and wherever

necessary to protect work at all stages of completion. Protect masonry when not roofed over, at all times when masons are not working on the walls. Apply non-staining tarpaulins or waterproof paper, properly weighted, or nailed, to assure their remaining in place to protect masonry from all possible hazards.

G. Fit masonry into bucks and frames so as not to distort alignment of such items, and fill backs of such items with mortar, except where joints are indicated to receive caulking and sealant and have no compressible filler therein, in which case rake joints to a uniform depth of ¾ inch for proper installation of caulking and sealant material.

H. Use only power saw, equipped with carborundum blade, for cutting exposed masonry, as needed to assure straight, evenly-cut edges.

I. Lay out coursing before setting to minimize cutting closures or jumping bond. Do not spread any more mortar than can be covered before surface of mortar has begun to dry. Do not endanger bond or mortar by moving masonry when once laid. If necessary to re-adjust any items, remove entirely, clean-off mortar, and reset with fresh mortar.

J. Except for cleaning down and pointing, finish all new masonry as the walls and partitions are carried up.

K. Point and fill all holes and cracks in mortar joints with additional fresh mortar; do not merely spread adjacent mortar over defect or use dead mortar droppings. Do all pointing while mortar is still soft and plastic. If hardened, chisel defect out and refill solidly with fresh additional mortar, and tool as specified.

3.2 JOB CONDITIONS

A. Store cement, lime and other cementitious materials under cover in a dry place.

B. Keep steel reinforcing, ties and anchors free from oil, dirt, rust, and other materials which would destroy bond.

C. Store masonry above ground on level platforms which allow air circulation under stacked units. Masonry units shall be dry and free from soil and ice before being laid in wall.

D. Keep installed walls dry and clean at all times. Immediately remove grout or mortar from face of masonry to be left exposed or painted. Protect previously installed elements such as louvers, doors, frames, and windows from mortar droppings and construction damage, using masking elements, dropcloths, etc.

E. Cover exposed walls at end of working day with well-secured canvas tarpaulins. Protect base of exterior walls from splashing mud and mortar by spreading sand, raw, and sawdust or plastic sheeting 3 to 4 ft. horizontally and up face of wall. Turn scaffold boards near wall on edge at end of day to prevent splashing mortar or dirt.

F. Securely brace partially completed walls against wind damage. Walls shall have been completed 24 hours minimum before application of distributed loads, 72 hours before concentrated loads.

G. Comply with cold-weather construction specifications in NCMA-TEK 16 and BIA Technical Note 1A:

1. Maintain masonry above 32 degrees F. for 24 hours minimum using insulated blankets or heated enclosures. Construct windbreaks at wind velocities over 15 mph. Maintain mortar on board at 40 degrees F. minimum, heating mixing water and sand as required.

2. Sprinkle units with high rates of absorption with heated water. Refer to mortar paragraph under PRODUCTS in this Section for provisions governing cold-weather additives to mortar. If standard instead of Type III high-early strength cement must be used, maintain installed masonry above freezing for 48 instead of 24 hours.

3. Do no masonry work at temperatures below 38 degrees F and falling or 35 degrees F and rising, until General Contractor has contacted Architect.

3.3 INSTALLATION

A. Verify that substrate is dry and free from frost, dirt, laitance, loose sand and other material which would prevent satisfactory bond. Lay first course in full mortar bed including face shells and webs of concrete masonry units. Keep cells to be grouted free from mortar.

B. Dampen masonry units as required to prevent excess suction of mortar. Lay concrete masonry units to form continuous unobstructed vertical spaces within wall. Provide full mortar coverage on horizontal and vertical face shells. Also bed webs adjacent to reinforced cores to prevent grout leakage, except omit web bedding at fully grouted walls to permit grout to flow laterally. Lay face brick with full vertical and bed joints, except as specified below to provide weepholes. Cut exposed masonry units, where necessary, with a power saw. Avoid the use (by proper layout) of less-than-half-size units.

C. Install masonry units in the bond pattern indicated, or if none is indicated, in running bond.

D. Step back unfinished work -- toothing is not permitted. Do not adjust installed units -- where necessary, completely remove and reinstall using fresh mortar.

E. Maximum variation of installed walls from plumb, level, or plan grid shall not exceed 1/4 in. in 10 ft. Wall thickness shall not vary more than 1/4 in. plus or minus from dimension shown on drawings.

F. Mortar:

1. Measure materials in calibrated containers, or by similar easily-controlled and maintained method. Do not use shovel measurement.

2. Mix materials in a mechanical mixer at least three minutes with minimum amount of water necessary to produce a workable consistency. Retemper stiffened mortar as required to restore evaporated water, but do not place mortar any later than 2-1/2 hours after mixing.

3. Exposed-to-view joints shall be approximately 3/8 in. wide, to meet coursing shown, tooled when thumbprint hard with a round bar to produce a dense, slightly concave surface well-bonded to masonry edges.

4. After tooling, cut off mortar tailings with a trowel and brush off excess. Concealed joints, including those on cavity side of masonry veneer, and joints in masonry to be plastered or stuccoed shall be struck off flush, with no protrusions.

5. Mortar not tight at time of tooling shall be raked out, pointed with fresh mortar, and retooled. Where sealant is shown, rake out joint 3/4 in., ready for backer rod and sealant specified in Division 7 sealants Section.

G. Through-wall flashing:

1. Install flashing to the profiles shown on the drawings.

2. Masonry and concrete surfaces receiving through wall flashings shall be thoroughly dry, free from loose material, and reasonably smooth. There shall be no slopes that will form pockets or prevent free drainage of water to exterior surfaces of wall.

3. Set flashing in sealant. Hold sealant back 1/4 inch from face of lintel. Hold flashing 1/2 inch back from face of lintel.

4. At wall openings, extend flashing 6 in. beyond each side of opening and turn up to form pan. Fold all corners, do not cut.

5. Lap joints between lengths of flashing 6 in. minimum and seal with mastic. Seal penetrations through flashing with mastic or overlapping piece of flashing.

H. Provide weepholes at 24 inches on center maximum spacing through outer face of masonry at all through-wall flashing.

I. At masonry veneer construction over gypsum sheathing, provide rubber washers or bituminous dampproofing compound at all penetrations made in sheathing board or

paper as part of work under this Section, including screw heads and veneer-tie anchorage.

J. Provide openings and chases as required for structural members, ductwork, large pipes, etc. Cut exposed masonry with carborundum saw to ensure straight even edges. Neatly block around and patch penetrations. Provide compressible filler around edges of openings to accommodate vibration and structural deflection. Ensure that joint reinforcement remains uncut or is well-lapped.

K. Provide control and expansion joints at locations shown, and keep clean of mortar droppings. Install Joint Sealers in accordance with Section 07 92 00.

L. Build other work into the masonry work as shown, fitting masonry units around other work, and grouting to secure anchorage.

3.4 ALLOWABLE TOLERANCES FOR MASONRY WORK

A. Maximum variation from true surface level for exposed to view walls and partitions:

1. Unit-to-unit tolerance: 1/8 inch.

2. Surface, overall tolerance: ¼ inch in 10 feet in any direction when tested with ten foot long straightedge. Where both faces or wall or partition will be exposed to view, request and obtain decision from the Architect as to which face will be required to conform to the specified surface level tolerance.

B. Maximum variation from true vertical plumb lines:

1. In lines of walls and arises:

a. ¼ inch in 10 feet.
b. 3/8 inch in any story, or up to 20 feet maximum.
c. ½ inch in 40 feet maximum.

2. For external corner lines, control joints, and other conspicuous lines:

a. ¼ inch in any story, or up to 20 feet maximum.

C. Maximum variation from horizontal level or grades for exposed sills, lintel blocks, and other conspicuous lines:

1. ¼ inch in any bay, or up to 20 feet maximum.

2. ½ inch in 40 feet maximum.

D. Maximum variation of linear building line from an established position in plan and related portions of walls and partitions:

1. ½ inch in any bay or up to 20 feet.

2. ¾ inch in 40 feet maximum.

3.5 WALL AND PARTITION CONSTRUCTION

A. General:

1. Build the masonry walls and partitions in the various combinations and thickness as indicated on the Drawings and as herein specified.

2. Build in anchorage items and loose lintels as the work progresses.

3. Lay first course of masonry on a smooth bed or mortar, after supporting concrete has been cleaned. Fill cells of first course concrete masonry units with mortar in all cases. Completely fill cells of concrete masonry units wherever vertical reinforcing rods are installed therein.

4. For exterior masonry cavity walls, install cavity insulation, through wall membrane flashings, weep wicks, and peastone, as specified herein.

5. Fill pressed metal frames occurring in masonry with mortar, as the masonry is erected.

3.6 GROUT

A. Lay masonry units with core cells vertically aligned and cavities clear of mortar and unobstructed.

B. Permit mortar to cure three (3) days before placing grout.

C. ACI Building Code requirements for Masonry Structures and ACI Specifications for Masonry Structures are made part of this specification as are all pertinent sections of the ACI Building Code.

3.6 CLEANING MASONRY

A. Masonry cleaning procedures shall follow recommendations of NCMA-TEK 45 and BIA Technical Note 20 (revised).

B. Dry brush masonry work at end of each day's work.

C. After new mortar has cured 14 days minimum, remove large mortar particles with non-metallic scrapers, chisels, or wooden paddles. Wash off dirt and other foreign materials with clean water and light concentration of soap or detergent.

D. For mortar smears, construction dirt, stains, efflorescence, etc., not removable by above methods, use proprietary cleaners specified under PRODUCTS. Muriatic acid may not be used. Adhere strictly to manufacturer's recommendations.

E. Apply and scrub cleaning solutions with non-metallic fibrous brushes. Thoroughly rinse cleaned area before cleaning solution can dry, using water hosed under moderate pressure.

END OF SECTION

SECTION 05 21 00
STEEL JOISTS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK:

A. Work specified within this section includes, but is not limited to providing all open web joists and joist girders and all necessary bracing and bridging for same.

1.02 REFERENCE SPECIFICATIONS:

A. Steel Joist Institute (SJI) Standard Specifications, Load Tables and Weight Tables for Open Web Steel Joists and Joist Girders.

B. AWS D1.1 - 90 "Structural Welding Code" - Steel.

1.03 SUBMITTALS:

A. Product Data: Submit manufacturer's specifications and installation instructions for each type of joist and accessories. Include manufacturer's certification that joists comply with SJI Specifications".

B. Shop Drawings: Submit detailed drawings showing layout of joist units, special connections, jointing and accessories. Include mark, number, type, location and spacing of joists and bridging.

PART 2 PRODUCTS

2.01 MATERIALS:

A. Steel: Comply with SJI "Specifications".

B. Unfinished Threaded Fasteners: ASTM A 307, Grade A.

C. Steel Prime Paint: Manufacturer's standard.

2.02 FABRICATION:

A. General: Fabricate steel joists in accordance with SJI "Specification".

B. Extended Ends: Provide extended ends on joists where shown.

C. Bridging: Provide horizontal or diagonal type bridging and bridging anchors complying with SJI "Specifications".

D. Shop Painting: Apply one shop coat of primer paint to steel joists and accessories by spray, dipping, or other method to provide a continuous dry paint film of 2.0 to 3.5 dry mils thickness.

PART 3 EXECUTION

3.01 ERECTION:

A. General: Place and secure steel joists in accordance with SJI "Specifications", final shop drawings.

B. Placing Joists: Place joists on supporting work, adjust and align in accurate location and spacing before permanently fastening.

C. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

D. Fastening: Field weld or bolt joists to supporting steel framework in accordance with SJI "Specifications" for type of joists used.

E. Touch-up painting: Clean field welds, bolted connections, and abraded areas, and apply same type of paint as used in shop.

END OF SECTION

SECTION 05 31 00
METAL DECKING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Work specified in this section includes, but is not limited to providing all metal floor and roof deck and cold formed metal deck accessories for same

1.02 REFERENCE SPECIFICATIONS

A. AISI "Specification for the Design of Cold Formed Steel Structural Members.

B. AWS D1.1 "Structural Welding Code" - Steel

C. AWS D1.3 "Structural Welding Code" - Sheet Steel

D. SDI " Design Manual for Floor Decks and Roof Decks."

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each type of decking and accessories.

B. Shop Drawings: Submit detailed drawings showing layout and types of deck panels, anchorage details, and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Acceptable Manufacturers: Epic Metals Corporation, Wheeling Corrugating Co., United Steel Deck and Vulcraft

B. Materials:

1. Steel for Painted Deck Units: ASTM A611, Grade C.

2. Steel for Galvanized Deck Units: ASTM A446, Grade A.

3. Sheet metal Accessories: ASTM A526, commercial quality, galvanized.

4. Galvanizing: ASTM A525, G60.

2.02 FABRICATION:

A. General: Form deck units in lengths to span 3 or more supports, with flush, telescoped or nested 2" laps at ends and interlocking or nested side laps.

3.01 INSTALLATION:

A. Install deck units and accessories in accordance with manufacturer's recommendations and final shop drawings.

B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before permanently fastened. Do not stretch or contact side lap interlocks.

C. Fasten metal deck to supporting steel members with a minimum of 5/8" diameter puddle welds spaced not more than 12" o.c. with a minimum of 2 welds per unit at each support. Secure deck to each supporting member in ribs where sidelaps occur. Use welding washers for all deck lighter than 22 gage. Fasten sidelaps of adjacent roof deck units between supports as indicated on the drawings, but not less than 2 welded sidelaps per span.

D. Touch-Up Painting: After decking installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.

END OF SECTION

SECTION 05 41 00
LIGHTGAGE METAL FRAMING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.02 DESCRIPTION OF THE WORK

A. Work specified within this Section includes, but is not necessarily limited to, the following:

1. Provide and install lightgage framing for exterior walls and stair tower roofs.

2. Provide and install lateral strap bracing as required.

3. Provide and install miscellaneous fasteners, hat channels, stiffeners, expansion joints, and accessories necessary to complete the work.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Interior Partition Walls: Section 09250 - Gypsum Wallboard Systems

1.04 QUALITY ASSURANCE

A. Materials and installation shall conform to recommendations of the following publications:

1. American Iron and Steel Institute Cold-Formed Steel Design Manual, Parts I & II "Specification for the Design of Cold-Formed Steel Structural Members".

2. AWS D1.1-90 "Structural Welding Code" - Steel.

3. AWS D1.3-89 "Structural Welding Code" - Sheet Steel.

4. ASTM C 954, "Specification for Steel Drill Screws for the Application of Gypsumboard or Metal Plaster Bases to Steel Studs from 0.033 in. to 0.112 in. Thickness."

5. ASTM C 955, "Specification for Load-Bearing (Transverse and Axial)Steel Studs, Runners (Tracks), and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases.

6. ASTM C 1007 “Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.”

7. ASCE 7-88 "Minimum Design Loads for Building and Other Structures," (formerly ANSI A58.1).

B. Maximum Allowable Deflections: Deflection limitations, (either horizontal or vertical), include the effect of studs only, not sheathing or facing material. Spans are measured in inches between the attachments to structural steel or concrete.

1. Supporting Masonry or Brick Veneer: 1/600 of span.

2. Supporting other Exterior Veneer Material: 1/360 of span.

C. Design wind pressures: Wind pressures shall be calculated in accordance with ASCE 7-05 for Components and Cladding.

D. Slip Track Tolerances: Where non-bearing light gage framing abuts the structure, provide a slip joint capable of accommodating the vertical movement of the structure. Slip joint gaps shall allow for deflections of the supporting member as shown on Drawings.

1.04 SUBMITTALS

A. Product Data: Submit Manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications.

1. Steel Studs

2. Anchors and anchor bolts

3. Self drilling screws

B. Shop Drawings:

1. General: Submit shop drawings showing the following:

a. Stud gages and spacings.

b. Sizes, gages and fastenings for all built-up members including but not limited to headers and jambs.

c. Shop Coatings

d. Type, size, quantity, locations and spacings of all anchorages and self drilling screws.

e. Details of attachment to structure and adjacent work.

f. Supplemental strapping, bracing, splices, bridging, hat channels and other accessories required for proper installation.

g. Critical installation procedures.

C. Design Calculations: Submit design calculations prepared and stamped by a Professional Engineer, registered in the State of Maine illustrating the design of steel stud wall systems and all necessary stiffeners and bracing.

PART 2 - PRODUCTS

2.01 FRAMING MEMBERS

A. Steel Studs:

2. Provide channel-shaped load-bearing studs, channel-shaped joists, runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, stiffeners, fasteners, and other accessories recommended by manufacturer for complete framing system.

3. Steel framing materials shall comply with ASTM A 446, A 570, or A 611, as applicable. Fabricate all components from structural quality sheet steel with the following minimum yield points:

a. 16 ga. and heavier 50,000 psi

b. 18 ga., 37,000 psi

4. Manufacture of studs, runners (track), and other framing members shall comply with ASTM C 955.

5. Framing components shall be galvanized per ASTM A 525, minimum G-60 coating.

B. Screws and other attachment devices:

1. Provide a protective coating equivalent to cadmium or zinc plating and comply with ASTM A 165 type NS.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All framing components shall be cut squarely or at an angle to fit squarely against abutting members. Members shall be held firmly in position until properly fastened.

B. Attachment: Components shall be joined by self-drilling screws, so that connection meets or exceeds required design loads. Wire tying of framing components will not be permitted. Field welding will be permitted only where shown on the drawings or approved by the engineer.

C. Anchorage to Structure: Securely anchor studs and track to floor construction and overhead structure. Provide slip joints where non-bearing vertical studs meet floor or roof structural steel, or as indicated on the drawings.

D. Openings: Frame openings larger than 2 ft. square with double studs. Provide suitable reinforcements (double studs, headers, jack studs, cripples, bracing, etc.) at control joint intersections, corners, and other special conditions.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

1. GENERAL

1.1 REFERENCES

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specifications, apply to work in this section.

B. Rough Carpentry: Section 06 10 00

C. Finish Carpentry: Section 06 20 00

D. Roofing and Flashing: Section 07 53 00

E. Painting: Section 09 90 00

F. American Society of Testing Materials (ASTM)

G. Steel Structures Painting Council (SSPC)

H. National Association of Architectural Metal Manufacturers (NAAMM)

1.2 DESCRIPTION OF WORK

A. Extent of Metal Fabrications is shown on the drawings.
B. Railings.

1.3 QUALITY ASSURANCE

A. Refer to Section 01 33 10, Products and Substitutions, for general provisions covering product selection, substitutions, material storage, and installation.

B. Refer to Section 01 45 00, Quality Control Services, for provisions for testing and inspection.

1.4 SUBMITTALS

A. Issue submittals in accordance with Section 01 33 00, Submittals.

B. Submittals under this section include:

1. Shop drawings showing details of fabrication, assembly, and installation showing all connections to other work.
2. Samples of materials and finished products as may be requested by the Architect.

2. PRODUCTS

2.1 MATERIALS

1. Railing assembly shall withstand a minimum concentrated load of 200 lbs. applied in any direction at any point on top rail. Intermediate rails, balusters, and panel fillers shall be designed for uniform load of not less than 25 lbs./sq. ft. over gross area of guard. Assembly shall comply with all provisions of the applicable Building Codes.

2. Accurately miter and cope intersections, and weld all around. Form rail-to-end post connections and changes in rail direction with mitered corners or radius bends, as detailed. Form elbow bends and wall returns to uniform radius, free from buckles and twists.

3. EXECUTION

3.1 FABRICATION

A. GENERAL

1. Use materials of size and thickness shown, or if not shown, of required size, grade, and thickness to produce strength and durability in finished product.

2. Provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes on exposed surfaces.

3. Form metalwork to required shapes and sizes, with true lines, curves and angles. Provide necessary rebates, lugs and brackets for assembly and installation. Use concealed fasteners wherever possible. Mill joints to tight hairline fit; cope or miter corners.

4. Welding:
   a. Weld corners and seams continuously; grind exposed welds smooth and flush.
   b. Welding Electrodes and Filler Metal: Type and alloy to match metal to be welded.

5. Anchors and Inserts: Furnish as required for installation in other work. Use copper, cadmium or galvanized anchors and inserts for exterior work.

6. Fasteners
   a. Type and alloy to match metal to be fastened; use Phillips flat-head screws for exposed fasteners if not otherwise indicated.
   b. Provide bolts, nuts, lag bolts, machine screws, wood screws, toggle bolts, masonry anchorage devices, lock washers as required for application indicated and complying with applicable Federal standards. Hot-dip galvanize fasteners for exterior applications to comply with ASTM A 153.

7. Shop Finishing

a. Comply with NAAMM "Metal Finishes Manual".
b. Apply shop primer to surface of metal fabrications except those embedded in concrete or galvanized; comply with SSPC-PA1.
c. Surface Preparation: Comply with SSPC-SP6 "Commercial Blast Cleaning" for exterior work, and with SSPC-SP3 "Power Tool Cleaning" for interior work.
d. Shop Primer: Fabricator's standard, fast-curing, lead-free, "universal" primer complying with performance requirements of FS TT-P-645.
e. Stripe paint edges, corners, crevices, bolts, welds and sharp edges.
f. Protect finished metal items.

3.2 INSTALLATION

A. Perform cutting, drilling and fitting required for installation; set work accurately in location, alignment and elevation, measured form established lines and levels.

B. Provide anchorage devices and fasteners where necessary for installation to other work.

C. Repair or replace damaged items as directed by the Architect.

D. Touch-up shop paint after installation. Clean field welds, bolted connections and abraded areas, and apply same type paint as used in shop.

E. Restore damaged protective coverings after installation. Maintain until other work in same areas is completed. Remove protective coverings and clean exposed surfaces prior to final inspection.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART I - GENERAL

1.01 GENERAL REQUIREMENTS

A. RELATED DOCUMENTS: The drawings and the general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

A. Work covered by this Section includes the furnishing of all labor, material, equipment and accessories, and the performing of all operations in connection with the wood framing, other carpentry as indicated on the Drawings and/or specified within this Section.

B. The work covered by this Section includes, but is not necessarily limited to, the following:

1. Furnishing and installing all rough carpentry, including miscellaneous grounds, blocking, sills, plates, shoes, shims, and furring, framing, framing anchors, and fasteners.

2. Furnishing and installing plywood wall back up panels and backer boards for telephone and electrical equipment.

3. Drilling concrete and masonry and drilling and tapping of metal work as required for installation of rough carpentry.

4. Any other items of carpentry necessary to complete work properly.

1.03 RELATED WORK SPECIFIED ELSEWHERE:

A. Finish Carpentry - Section 06 20 00.

B. Roofing and Flashing - Section 07 53 00.

C. Joint Sealants - Section 07 92 00.

D. Glazing - Section 08 81 00.

E. Finish Hardware - Section 08 71 00.

1.04 QUALITY ASSURANCE

A. Codes and Standards:

1. International Building Code - 2009

2. AITC Timber Construction Manual – Sixth Edition

3. NFPA National Design Specification for Wood Construction - 2012

PART 2 - PRODUCTS

2.01 LUMBER

A. Lumber shall conform to American Softwood Lumber Standard Voluntary Product Standard PS20-05. Lumber shall bear the grade and trademark of the Association under whose rules it is produced and a mark of mill identification.

B. Protect all lumber and keep dry, both in transit and at the job site.

C. All lumber shall be well seasoned and contain not more than 15% moisture content (marked "S-Dry").

D. All two inch nominal framing lumber shall have the following minimum base values, unless otherwise noted:

1. Extreme Fiber Stress in Bending, F_b = 750 psi.

2. Horizontal Shear, F_v = 70 psi.

3. Compression Perpendicular to Grain, $F_{c\text{Á}}$ = 335 psi.

4. Compression Parallel to Grain, F_c = 975 psi.

5. Tension Parallel to Grain, F_t = 325 psi.

6. Modulus of Elasticity, E = 1,100,000 psi.

2.02 PRESERVATIVE TREATED LUMBER

A. The following wood members shall be Southern Yellow Pine Treated with CCA to 0.4 #/CF in accordance with AWPA C-18. Lumber embedded in or in contact with soil shall be treated to 0.6#/CF. Wood shall be air dried or kiln-dried to reduce maximum moisture content to 15 percent. Each piece shall bear the AWPA stamp, indicating the plant number, preservative symbol, symbol of standard, date of treatment and moisture content after treatment:

1. Wood sills plates, rough bucks and frames in exterior masonry wall openings.

2. Wall plates and furring in contact with exterior masonry or concrete.

3. Nailers that are set into, or are in contact with, concrete or masonry.

4. Blocking and nailers for roof deck, sub-fascia members, roof cants and saddles.

5. Lumber in contact with the ground, embedded in or in contact with concrete or masonry and all exterior trim.

B. Cut Surfaces: Cut surfaces of preservative-treated materials shall be brush coated with at least two coats of the same preservative used in the pressure treatment.

C. Odors and Compatibility: Treated wood exposed in the final structure shall be free from objectionable odors and shall not be harmful or corrosive to adjacent materials or anchorages.

D. Plywood Backer Panels:

1. Plywood telephone and electrical backer panels, roof framing, and any other wood designated as fire-retardant treated on drawings, shall be pressure-treated with fire-retardant 2 chemicals to achieve a UL FR-S rating, designating a surface-burning characteristics rating of 25 or less for flame-spread, fuel contributed, and smoke developed, per ASTM E 84, in compliance with AWPA C 20 (lumber) and AWPA C 27 (plywood). Each piece shall be dried to a 15-to-19 percent moisture content after treatment.

2. Acceptable products include: Koppers Dricon, Osmose Flame-Proof, and Hoover Pro-Tex.

1. Strength reduction factors used in the design of fire retardant treated wood shall be in accordance with the NFPA "National Design Specification."

PART 3 – EXECUTION

3.01 INSTALLATION

A. Wood Framing:

1. General Requirements:

a. Wood construction practices shall conform to recommendations of the NFPA "National Design Specification" and the AITC "Timber Construction Manual". Wall framing will conform to the Optimum Value Engineering framing practices detailed in Appendix A of this section.

b. All members are to be installed as shown on the drawings.

c. When individual members have built-in camber, the members shall be placed with camber up.

d. No cutting of holes or notches in trusses for pipe, conduit or other reasons will be allowed.

e. All bearing surfaces shall be horizontal and even over the entire width of support.

f. Accurately and properly fit and brace all work. Secure in proper position and orientation. Framing, studding and blocking shall be as indicated on the Design Drawings, or as required by the work.

g. Cooperate with all other trades as required.

h. Use acoustical sealant along shoe and header of all party walls.

2. Cutting and Patching: Do all cutting, patching, heading and blocking required for work of all trades. Notify Telephone Company to place jacks at rough-in stages.

3. Blocking and Supports:

a. Install 2" nominal blocking in stud partitions for anchoring all cabinets, mirrors, towel bars, grab bars, handrail brackets, wall mounted door stops and other items applied to or in the walls.

b. Set all blocking required to erect all exterior and interior woodwork, cabinets, plumbing, electrical and mechanical equipment, rough bucks and blocking for roofing work.

c. Backing Boards: Install 3/4" plywood backer boards for electrical and mechanical trades as required.

d. Provide pressure-treated blocking at exterior window openings in steel stud walls.

B. Fastening:

1. Fastening shall be as indicated on the Design Drawings, or in accordance with Table 2304.9.1 of the International Building Code.

2. Framing supported by concrete or masonry shall be anchored with built-in threaded bolts or lags, as indicated on the design drawings. Powder actuated fasteners shall not be substituted, except in the attachment of wall furring strips.

3. Fasteners shall be non-corrosive on exposed and exterior locations.

C. Firestops: Firestops of 2" nominal stock, shall be provided in all concealed spaces not otherwise cut off from passage of air from one space to another.

3.02 CLEAN-UP

A. Keep the premises and working surfaces in a neat, safe, and orderly condition at all times during execution of this portion of the work.

1. At the end of each day, or more often if necessary, remove accumulation of sawdust, cut-ends, and other debris to proper storage areas for disposal.

B. Upon completion of this portion of the work, thoroughly clean up the area.

END OF SECTION

SECTION 06 20 00

FINISH CARPENTRY

1. GENERAL

1.1 GENERAL PROVISIONS: Drawings and general provisions of Contract, including General Conditions and Division 1 specifications, apply to work in this section.

1.2 DESCRIPTION OF WORK:

A. The extent of work shall be as shown on Drawings and called for in these Specifications. Performance shall meet the requirements of these Specifications. The work covered by this section of Specifications consists of the following:

1. All finished carpentry work and millwork as required by Drawings and as specified under this section.
2. Installation of metal and other items furnished by other trades, if specifically noted in these Specifications.

2. PRODUCTS:

2.1 BOARD LUMBER shall comply with the American Lumber Standards Simplified Practice Recommendation No. 16. Grade of board lumber shall be suitable for its intended use. Finish lumber is to be painted and shall be dressed free of tool marks and other objectionable defects. All exposed lumber to be architectural quality grade: Custom.

2.2 PUBLIC SPACES: See base and trim details on drawings.

2.3 NAILS: 6d for 1/2" finish stock and 4d finish for thinner wood. Use 8d generally for nailing 3/4" wood trim to framing.

2.4 SCREWS, BOLTS & OTHER FASTENERS: as shown on Drawings with penetration into framing or blocking adequate to support loads shown. Where not shown, consult Architect.

2.10 COUNTERTOPS: REFER TO INTERIOR DESIGN PACKAGE.

2.11 PLASTIC LAMINATE: REFER TO INTERIOR DESIGN PACKAGE.

3. EXECUTION:

3.1 ALL ITEMS OF MILLWORK shall be carefully erected, leveled and plumbed with tight-fitting joints and square corners, carefully cut and secured. Exposed nails shall be set adequately for putty. Moulds and faces shall be free from hammer or other tool marks, clean-cut and true pattern. All work shall be thoroughly cleaned and sanded to receive the finish. Sharp corners of small members of finished woodwork shall be slightly rounded. All trim baseboards, etc. fastened to walls shall be secured to wall framing members and nails set. Care shall be taken to avoid splitting ends of trim boards.

3.2 INTERIOR TRIM: Install trim with finishing nails and glue where required to assure permanent, tight joints, according to Drawing details.

END OF SECTION

SECTION 07 21 16
THERMAL AND ACOUSTIC INSULATION

1 GENERAL

1.1 GENERAL PROVISIONS: Drawings and general provisions of Contract, including General Conditions and Division 1 specifications, apply to work in this section.

1.2 DESCRIPTION OF WORK: The extent of work shall be as shown on Drawings and called for in these Specifications. Performance shall meet the requirements of the Specifications. The work covered by this section of Specifications consists of the following:

1. Installation of rigid insulation on inside foundation wall and sill sealer, where shown on Drawings.
2. Installation of rigid insulation, fiberglass batts, and blown insulation and sound insulation in exterior walls, interior walls, ceilings and floors where shown on Drawings.
3. Vapor barriers to be installed as shown.

2 PRODUCTS

2.1 SPRAY APPLIED INSULATION: Closed cell spray foam by Corbond or equal. *Refer to Spec Section 07 21 19.*

2.2 BATT INSULATION TYPE: Fiberglass by Owens-Corning- Fiberglass, or approved equal, 6" or 4” to suit wall thickness.

2.3 BLOWN INSULATION TYPE: Cellulose Blowing Insulation by National Fiber or equal. *Refer to Spec Section 07 21 26.*

2.4 INTERIOR WALL SOUND INSULATION: Owens Corning Fiberglas Unfaced Sound Attenuation Blanket, 3” thickness.

2.5 AIR INFILTRATION BARRIER: *Refer to Spec Section 07 27 00.*

2.6 RIGID BOARD INSULATION (on exterior walls): sizes as shown on Drawings. **Styrofoam XPS** or **Thermax** square edge insulation by Dow Chemical, or approved equal.

3 EXECUTION

3.1 RIGID INSULATION on foundation walls must extend to top of footing.

3.2 FIBERGLASS INSULATION

A. Sound attenuation batts shall be installed in all interior walls on this project.

3.3 AIR INFILTRATION BARRIER:

A. Apply to outside face of wall sheathing according to manufacturer's procedures, with imprint facing outward. Staple at 30" + and maintain overlap of six inches (6") at all joints.

B. If material is degraded by sunlight (verify with manufacturer), do not store outside. Cover with siding as soon as possible and within manufacturer's recommended time period.

END OF SECTION

SECTION 07 21 19

MOISTURE AND THERMAL PROTECTION
SPRAY FOAM INSULATION

CORBOND® III ***Performance Insulation System®***

All spray applied insulation as shown on drawings or Specified herein shall be the **CORBOND** Performance Insulation System® as manufactured by Corbond Corporation of Bozeman, Montana OR EQUAL.

CORBOND shall be installed by technicians in accordance with manufacturer's instructions.

I. GENERAL

A. Related documents: The general provisions of the contract and all codes and standards referenced.

B. Description of the Work:

1. The extent of **CORBOND** insulation is shown on the drawings.
2. The applications of **CORBOND** include the following:
   a. Rigid spray-in-place perimeter floor header (box sill, rim joist) insulation. Provide minimum R-Value of 21 at all exterior wall applications. (Thermal barrier requirement exception at floor header for class 1, 1.5 – 2.0 lb. spray foam when applied at 3.25 thickness or less per IBC/IRC).

3. **Related Work:**
   a. Spray-on Thermal Barrier: Division 7 (071).
   b. Spray-on Ignition Barrier: Division 7 (071).
   c. Gypsum Drywall System: Division 9 (092000).

4. **Quality assurance:**
   a. Thermal Conductivity: K = .15 (ASTM-C-518).
   b. R-Factor = 6.6 per inch.
   c. Density = 2.0 lbs/cu ft. in-place (ASTM D-1622).
   d. Permeance = .90 at 2.5 inch thickness (ASTM-E-96).
   e. Surface Burning Characteristics: Class I (ASTM-E-84-91a) **Flame Spread <25, Smoke Density <450. (1.5 inch, 4inch, 6inch)
   f. Recognizable lavender trademark color.
5. **Product handling:**
   a. Do not store containers in direct sunlight. Keep drums covered. Empty container disposal by technicians in accordance with current law and industry standard practice.
   b. Store raw materials at 60° F to 70° F.
   c. Fire hazard class of raw material stored on site: Combustible liquid, Class 3B.
   d. Transportation Class 55, NOIBN, Non-Hazardous

e. WARNING: Breathing hazard during application of insulation materials. Do not enter without proper respiratory protection. No smoking or open flame.
f. Process materials in accordance with **CORBOND** published Technical Data.

6. **Job Conditions:**
   a. Examination of substrate: Technicians will examine the substrate and conditions under which the spray insulation work is to be performed, and notify the contractor in writing of any unsatisfactory conditions, such as: 1. Excessive dirt or oil on substrate. 2. Excessive moisture present as dampness, dew, frost or water. 3. Substrate temperatures outside applicable limits.
   b. Cover tools and work of other trades as required to prevent damage from overspray.
   c. Do not weld or torch near **CORBOND**. Cover as soon as possible with subsequent work.

II. PRODUCTS

A. Materials:

1. Crawlspace perimeter and floor header (box sill, rim joist) insulation: **CORBOND** Performance Insulation System® installed to thickness required to provide R-Value of 21.

III. EXECUTION

A. Installation:

Installation of the **CORBOND** Performance Insulation System® is performed by technicians familiar with the processing of two component polyurethane foams and in complete accord with application instructions provided by the manufacturer. These technicians employ equipment with preset component ratio and electronically controlled heat input to assure in-place consistency of finished product and performance. Contact **CORBOND** Corporation, Bozeman, Montana, (888) 949-9089 or direct at (406) 586-4585.

END OF SECTION

SECTION 07 24 00
EXTERIOR INSULATION AND FINISH SYSTEM

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:

1. This document is to be used in preparing specifications for an Exterior Insulation and Finish System (EIFS).

B. Related Requirements:

1. 03 30 00 Cast-in-place Concrete
2. 04 20 00 Unit Masonry
3. 05 41 00 Lightgage Metal Framing
4. 07 92 00 Joint Sealants
5. 08 41 13 Aluminum-Framed Entrances and Storefronts
6. 08 51 13 Aluminum Windows

1.02 REFERENCES

A. Reference Standards:

1. ASTM Standards:

a. ASTM B 117 Standard Practice for Operating Salt Spray (Fog) Apparatus
b. ASTM C 67 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
c. ASTM C 150 Standard Specification for Portland Cement
d. ASTM C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
e. ASTM C 1397 Standard Practice for Application of Class PB Exterior Insulation and Finish System (EIFS) and EIFS with Drainage
f. ASTM D 968 Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
g. ASTM D 2247 Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
h. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
i. ASTM D 4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
j. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
k. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials
l. ASTM E 119 Standard Method for Fire Tests of Building Construction and Materials
m. ASTM E 331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference

n. ASTM E 2098 Test Method for Determining the Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for use in Class PB Exterior Insulation and Finish Systems (EIFS), after Exposure to Sodium Hydroxide Solution
o. ASTM E 2134 Test Method for Evaluating the Tensile-Adhesion Performance of Exterior Insulation and Finish Systems (EIFS)
p. ASTM E 2430 Standard Specification for Expanded Polystyrene (EPS) Thermal Insulation Boards for use in Exterior Insulation and Finish Systems (EIFS)
q. ASTM E 2485 Standard Test Method for Freeze-Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water-Resistive Barrier Coatings
r. ASTM E 2486 Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
s. ASTM E 2568 Standard Specifications for PB Exterior Insulation and Finish Systems (EIFS)

2. National Fire Protection Association (NFPA) Standards:

a. NFPA 268 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Source
b. NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies Containing Combustible Components

3. Manufacturer's Standards and Documents:

a. DS131 Dryvit Expanded Polystyrene Insulation Board Specification
b. DS152 Dryvit Cleaning and Recoating
c. DS153 Dryvit Expansion Joints and Sealants
d. DS248 Dryvit Compound Warranty Program

1.03 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meetings

B. Sequencing

1. Provide jobsite grading prior to installation of Exterior Insulation and Finish System so that the system may be terminated at or above 6" above grade as required by code.

2. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors, and other penetrations of the exterior walls.

3. Provide protection of rough openings before installing windows, doors, and other penetrations of the exterior walls.

4. Coordinate installation of windows and doors with flashing contractor to provide a continuous barrier.

5. Install window and door head flashings immediately after windows and doors are installed.

6. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior.

7. Install copings and sealants immediately after installation of the Exterior Insulation and Finish System.

8. Attach penetrations through Exterior Insulation and Finish System to structural support and provide water-tight seals at penetrations.

1.04 ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

A. Submit product data as required by Section 01 33 00, Administrative Requirements.

B. For panelized EIFS, submit shop drawings showing wall layout, connections, details, expansion joints, and installation sequence.

C. Submit two (2) samples of the Exterior Insulation and Finish System for each finish, texture, and color to be used on the project. Use the same tools and techniques proposed for the actual installation. Make the samples of sufficient size to accurately represent each color and texture being utilized on the project.

D. Submit a current copy of the manufacturer's Trained Contractor Certificate for the system specified.

E. Submit Owner/Architect-requested test results verifying the performance of the Exterior Insulation and Finish System. Refer to Outsulation Performance Criteria Data Sheet.

F. Submit a copy of the manufacturer's installation details and application instructions.

1.05 CLOSEOUT SUBMITTALS

A. Submit a copy of the manufacturer's recommended maintenance and repair manual.

B. Submit a copy of the Exterior Insulation and Finish System manufacturer's standard warranty.

1.06 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. A member in good standing of the EIFS Industry Members Association (EIMA).

2. Manufacture Exterior Insulation and Finish System materials at a facility covered by a current ISO 9001:2008 and ISO 14001:2004 certification. Certification of the facility is done by a registrar accredited by the American National Standards Institute, Registrar Accreditation Board (ANSI-RAB).

B. Contractor Qualifications:

1. Knowledgeable in the proper installation of the Exterior Insulation and Finish System.

2. Possess a current Outsulation System Trained Contractor Certificate* issued by Dryvit Systems, Inc.

3. Successfully complete a minimum of three (3) projects of similar scope and scale to the specified project.

C Insulation Board Manufacturer Qualifications:

1. Listed by Dryvit Systems, Inc., and capable of producing the Expanded Polystyrene (EPS) in accordance with the current Dryvit Specification for Insulation Board, DS131.
2. Subscribe to the Dryvit Third Party Certification and Quality Assurance Program.

D. Panel Fabricator Qualifications:

1. Experienced and competent in the fabrication of architectural wall panels.

2. Possess a current Outsulation System Trained Contractor Certificate* issued by Dryvit Systems, Inc.

E. Panel Erector Qualifications:

1. Experienced and competent in the installation of architectural wall panel systems.

2. Shall be:
   a. The panel fabricator or
   b. An erector approved by the panel fabricator or
   c. An erector under the direct supervision of the panel fabricator

F. Mock-Up:

1. Provide the owner/architect with a mock-up for approval.

   a. Of suitable size as required to accurately represent the products being installed, as well as each color and texture to be utilized on the project.
   b. Prepared with the same products, tools, equipment and techniques required for the actual applications. Use finish from the same batch that is being used on the project.
   c. Available and maintained at the jobsite.

G. Regulatory Requirements:

1. Separate the EPS insulation board from the interior of the building by a minimum 15-minute thermal barrier.

2. Comply with local building codes for the use and maximum thickness of EPS insulation board.

H. Inspections:

1. Cooperate with independent, third-party inspectors when required by code or by contract documents.

1.07 DELIVERY, STORAGE AND HANDLING

1. Deliver all Exterior Insulation and Finish System components and materials to the job site in the original, unopened packages with labels intact.

2. Inspect all Exterior Insulation and Finish System components and materials upon arrival for physical damage, freezing or overheating. Do not use questionable materials.

3. Store all Exterior Insulation and Finish System components and materials at the jobsite in a cool, dry location, out of direct sunlight, protected from weather and other sources of damage. Maintain minimum and maximum storage temperature as stated in the product data sheets or specifications for the materials selected. **NOTE**: **Finishes exposed to temperatures over the published maximum storage temperature for even short periods may exhibit skinning and increased viscosity.**

4. Protect all products from inclement weather and direct sunlight.

1.08 SITE CONDITIONS

A. Ambient Conditions

1. Do not apply wet materials during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are completely dry.

2. Verify the minimum air and wall surface temperatures at the time of application as stated in the product data sheets or specifications for the materials selected.

3. Maintain these temperatures with adequate air ventilation and circulation for a minimum of 24 hours (48 hours for Ameristone, TerraNeo and Lymestone) thereafter, or until the products are completely dry.

1.09 WARRANTY

A. Manufacturer's Warranty

1. Provide manufacturer's standard warranty.

B. Contractor Warranty

1. Sub-contractor to provide warranty of installation. Manufacturer assumes no liability for installation of Exterior Insulation and Finish System.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers List:

1. Dryvit Systems, Inc., 1 Energy Way, West Warwick, RI 02893, 800-556-7752, www.dryvit.com.

B. Substitution Limitations:

1. All components of the Outsulation System shall be supplied or obtained from Dryvit or its authorized distributors. Substitutions or additions of materials manufactured or supplied by others will void the system warranty.

C. Product Options:

1. Field Applied: The Outsulation System is applied to the substrate system in place.

2.02 DESCRIPTION

A. System Description:

1. The Dryvit Outsulation System is an Exterior Insulation and Finish System (EIFS); consisting of:

   a. Fluid-applied flashing at all rough openings
   b. Adhesive – installed in vertical ribbons to facilitate egress of incidental moisture
   c. Rigid plastic foam insulation board
   d. Base Coat
   e. Reinforcing Mesh
   f. Finish Coat

B. Materials:

1. Flashing:

   a. AquaFlash® fluid-applied water-based polymer coating.
   b. AquaFlash polyester reinforcing mesh.
   c. Dryvit Flashing Tape™ polyethylene film on one side with layer of rubberized asphalt adhesive available in rolls 102 mm (4 in), 152 mm (6 in), and 229 mm (9 in) wide by 23 m (75 ft) long.
   d. Dryvit Flashing Tape Surface Conditioner™ water-based surface conditioner and adhesion promoter.

2. Adhesives:

   a. Liquid polymer-based adhesive field mixed with Portland cement.
      1) Dryvit Primus®
      2) Dryvit Genesis®
   b. Ready mixed dry blend cementitous, copolymer-based adhesive field mixed with water.
      1) Dryvit Primus® DM
      2) Dryvit Genesis® DM
      3) Dryvit Genesis® DMS
      4) Rapidry DM 35-50
      5) Rapidry DM 50-75

3. Insulation Board:

   a. Expanded Polystyrene; minimum thickness 25 mm (1 in); meeting Dryvit Specification DS131 and ASTM E 2430.

4. Base Coat:

   a. Liquid polymer-based adhesive field mixed with Portland cement.
      1) Dryvit Primus
      2) Dryvit Genesis
   b. Noncementitious factory-mixed, fully formulated, water-based product.
      1) NCB
   c. Ready mixed dry blend cementitous, copolymer-based adhesive field mixed with water.
      1) Dryvit Primus DM
      2) Dryvit Genesis DM
      3) Dryvit Genesis DMS
      4) Rapidry DM 35-50
      5) Rapidry DM 50-75

5. Reinforcing Mesh:

   a. Open-weave, glass fiber fabric treated for compatibility with other system materials.

Reinforcing Mesh[1]/Weight g/m² (oz/yd²)	**Minimum Tensile Strengths**	**EIMA Impact Classification**	**EIMA Impact Range Joules (in-lbs)**		**Impact Test Results Joules (in-lbs)**	
Standard - 146 (4.3)	27 g/cm (150 lbs/in)	Standard	3-6	(25-49)	4	(36)
Standard Plus - 203 (6)	36 g/cm (200 lbs/in)	Medium	6-10	(50-89)	6	(56)
Intermediate - 407 (12)	54 g/cm (300 lbs/in)	High	10-	(90-150)	12	(108)
Panzer® 15* - 509 (15)	71 g/cm (400 lbs/in)	Ultra High	>17	(>150)	18	(162)
Panzer 20* - 695 (20.5)	98 g/cm (550 lbs/in)	Ultra High	>17	(>150)	40	(352)
Detail Mesh® Short Rolls -	27 g/cm (150 lbs/in)	n/a	n/a	n/a	n/a	n/a
Corner Mesh™ - 244 (7.2)	49 g/cm (274 lbs/in)	n/a	n/a	n/a	n/a	n/a
*Used in conjunction with Standard Mesh (recommended for areas exposed to high traffic). 1. Colored blue for product identification bearing the Dryvit logo.						

6. Finish: To Be Confirmed

   a. Water-based, acrylic coating with integral color and texture; formulated with Dirt Pickup Resistance (DPR) chemistry.
      1) Available textures:
         a) Quarzputz® DPR – open texture
         b) Sandblast® DPR – medium texture
         c) Freestyle® DPR – fine texture

d) Sandpebble® DPR – pebble texture
e) Sandpebble® Fine – fine pebble texture
f) Finesse™ DPR – fine texture

b. Hydrophobic (HDP™) Finishes: 100% acrylic coating with integral color and texture and formulated with hydrophobic properties:
1) Available textures:
a) Quarzputz® HDP
b) Sandblast® HDP
c) Sandpebble® HDP
d) Sandpebble® Fine HDP
e) Lymestone™ HDP

c. Lightweight, water-based acrylic coating with integral color and texture; formulated with Dirt Pickup Resistance (DPR) chemistry.
1) Available textures:
a) Quarzputz® **E**
b) Sandpebble® **E**
c) Sandpebble Fine® **E**

d. Factory mixed, water-based specialty finishes:

1) Ameristone – multi-colored quartz aggregate with a flamed granite appearance.
2) Stone Mist® - ceramically colored quartz aggragate.
3) Custom Brick – acrylic polymer-based finish used in conjunction with a proprietary template system to create the look of stone, brick, slate, or tile.
4) TerraNeo – acrylic-based finish with large mica chips and multi-colored quartz aggregates.
5) Lymestone – premixed, acrylic-based finish designed to replicate the appearance of limestone blocks.
6) Reflectit – acrylic coating providing a pearlescent appearance.

e. Elastomeric, water-based acrylic coating with integral color and texture; formulated with Dirt Pickup Resistance (DPR) chemistry:

1) Weatherlastic® Quarzputz
2) Weatherlastic® Sandpebble
3) Weatherlastic® Sandpebble Fine
4) Weatherlastic® Adobe

f. Medallion Series water-based, acrylic coating with integral color and texture; formulated with Proven Mildew Resistance (PMR™) chemistry:

1) Quarzputz® PMR
2) Sandblast® PMR
3) Freestyle® PMR
4) Sandpebble® PMR
5) Sandpebble® Fine PMR

g. Coatings, Primers, and Sealants:
   1) Demandit
   2) HDP Paint
   3) Weatherlastic® Smooth
   4) Tuscan Glaze™
   5) Revyvit
   6) Color Prime
   7) Prymit®
   8) SealClear™

C. Jobsite-Mixed Materials:

1. Portland cement: verify is Type I or II, meeting ASTM C 150, white or gray in color, fresh and free of lumps.

2. Water: verify is clean and free of foreign matter.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:

1. Verify access to electric power, clean water and a clean work area at the location where the Dryvit materials are to be applied.

2. Verify that wall surface on which Exterior Insulation and Finish System is to be installed is a manufacturer-approved substrate:

   a. Exterior grade gypsum sheathing meeting ASTM C 1396.
   b. Exterior glass-mat gypsum sheathing meeting ASTM C 1177.
   c. Exterior fiber reinforced cement or calcium silicate boards.
   d. APA Exterior or Exposure 1 Rated Plywood, Grade C-D or better, nominal 12.7 mm (1/2 in) minimum 4-ply.
   e. Exterior grade fire retardant treated (FRTW) plywood.
   f. APA Exposure 1 Rated Oriented Strand Board (OSB) nominal 11.1 mm (7/16 in) minimum
   g. Unglazed brick, cement plaster, concrete or masonry.

3. Verify the deflection of the substrate does not exceed 1/240 times the span.

4. Verify substrate is flat within 6.4 mm (1/4 in) in a 1.2 m (4 ft) radius.

5. Verify substrate is sound, dry, connections are tight; has no surface voids, projections, or other conditions that may interfere with the Exterior Insulation and Finish System installation or

performance. Verify the slope of inclined surfaces is not less than 6:12 (27 °), and the length of the slope does not exceed 305 mm (12 in).

6. Verify metal roof flashings have been installed in accordance with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) standards.

7. Verify all rough openings are flashed in accordance with the Exterior Insulation and Finish System manufacturer's installation details, or as otherwise necessary to prevent water penetration.

8. Verify chimneys, balconies and decks have been properly flashed as necessary to prevent water penetration.

9. Verify windows and doors are installed and flashed per manufacturer's requirements and installation details.

10. Notify general contractor of all discrepancies prior to the installation of the Exterior Insulation and Finish System.

11. Verify that expansion joints are installed:

    a. Where the Exterior Insulation and Finish System abuts dissimilar materials.
    b. In continuous elevations at intervals not exceeding 23 m (75 ft).
    c. Where significant structural movement occurs, such as changes in roof line, building shape or structural system.

3.02 PREPARATION

A. Protect the Exterior Insulation and Finish System materials by permanent or temporary means from inclement weather and other sources of damage prior to, during, and following application until completely dry.

B. Protect adjoining work and property during installation of the Exterior Insulation and Finish System.

C. Prepare the substrate to be free of foreign materials, such as oil, dust, dirt, form-release agents, efflorescence, paint, wax, water repellants, moisture, frost, and any other condition that may inhibit adhesion.

3.03 INSTALLATION

A. Install the system in accordance with ASTM C1397 and the Exterior Insulation and Finish System manufacturer's application instructions.

B. Apply base coat sufficient to fully embed the reinforcing mesh. The recommended method is to apply the base coat in two (2) passes.
C. Apply sealant only to base coat treated with Dryvit Demandit or Color Prime coatings.
D. Install high impact reinforcing mesh as specified at ground level, high traffic areas and other areas exposed to or susceptible to impact damage as designated on contract drawings.

3.04 SITE QUALITY CONTROL

A. Exterior Insulation and Finish System manufacturer assumes no responsibility for on-site inspections or application of its products.

B. EIFS sub-contractor to certify in writing the quality of work performed relative to the substrate system, details, installation procedures, and as to the specific products used.

C. EPS supplier, if requested, to certify in writing that the EPS insulation board meets the Exterior Insulation and Finish System manufacturer's specifications.

E. The sealant contractor, if requested, to certify in writing that the sealant application is in accordance with the sealant manufacturer's and the Exterior Insulation and Finish System manufacturer's recommendations.

3.05 CLEANING

A. Remove all excess Exterior Insulation and Finish System materials from the job site by the contractor in accordance with contract provisions and as required by applicable law.

B. Leave all surrounding areas, where the Exterior Insulation and Finish System has been applied, free of debris and foreign substances resulting from the EIFS sub-contractor's work.

END OF SECTION

SECTION 07 27 00
WATER RESISTIVE AND AIR BARRIER ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Weather resistive barrier.

B. Water resistive and air barrier assemblies.

1.2 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry: substrate.

1.3 REFERENCES

A. ASTM International:
1. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.
2. ASTM D 779 - Standard Test Method for Water Resistance of Paper, Paperboard, and Other Sheet Materials by the Dry Indicator Method.
3. ASTM D 903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
4. ASTM D 1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
5. ASTM D 2523 - Standard Practice for Testing Load-Strain Properties of Roofing Membranes.
6. ASTM D 5733 - Standard Test Method for Tearing Strength of Nonwoven Fabrics by the Trapezoid Procedure.
7. ASTM E 96 Standard Test Method for Water Vapor Transmission of Materials.
8. ASTM E 283 Standard - Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
9. ASTM E 1677 - Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls.
10. ASTM E 2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights.

B. AATCC- 27 Hydrostatic Head Test.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation and maintenance methods.

C. Test Results: Submit copies of test results showing performance characteristics equaling or exceeding those specified.

D. Verification Samples: For each finish product specified submit 12 inch (305 mm) square sample for approval by the Architect.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain primary materials from a single manufacturer regularly engaged in manufacturing building wraps. Obtain secondary materials from a source acceptable to the primary materials manufacturer.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of two years demonstrated experience in installing products of the same type and scope as specified.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and products in unopened factory labeled packages.

B. Store and handle in strict compliance with manufacturer's instructions and recommendations.

C. Prevent damage or contamination to materials by construction activities.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Fiberweb Typar, which is located at: 70 Old Hickory Blvd. Old Hickory, TN 37138; Toll Free Tel: 800-284-2780; Tel: 615-847-7000; Email: request info (moreinfo@typarhousewrap.com); Web: www.typar.com

B. Substitutions: Approved equal.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 33 10.

D. Obtain products from a single manufacturer.

2.2 MATERIALS

A. Water Resistive and Air Barrier Assembly: Typar® MetroWrap™ by Fiberweb™, for use in exterior walls with the following characteristics:
   1. Thickness: 12.1 mils (0.31 mm).
   2. Breaking Strength Test: 94 pounds (418 N) mean value per ASTM D5034.
   3. Water Vapor Transmission: 10-20 perms (grains per hr.in.Hg.sq.ft.) per ASTM E 96, desiccant method.
   4. Pliability: No signs of cracking per AC38, Sec. 3.3.4.
   5. Ultraviolet Exposure: Not to be installed more than 12 months prior to

exterior cladding coverage.
6. Accelerated Aging Cycling: No signs of failure at 21 days per AC38.
7. Water Resistance Test: Exceeds one hour per ASTM D 779.
8. Elongation: 1.9 inches (4.8 cm) per ASTM D 5034, 4 inch (10.2 cm) wide sample.

2.3 ACCESSORIES

A. Sealing Tape:
1. Product: Typar® Construction Tape by Fiberweb™.
2. Description: Elastomeric polymer based, butyl rubber, rubber based, meeting ASTM C 920 evaluation.

B. Mechanical Fasteners:
1. Plastic cap nails.
2. Plastic cap staples.
3. Rust-resistant screws with washers.
4. Sealant: Polyurethane based, meeting ASTM C 920 evaluation.
5. Mechanical: Masonry fastener with washer.

C. Self-Adhering Sheet Flashing: Typar® Flashing Flex by Fiberweb™ with the following characteristics.
1. Face Material Composition: Conformable textured polyolefin.
2. Face Color: Dark gray.
3. Adhesive Composition: Butyl adhesive.
4. Thickness: 60 mil.
5. Release Liner: Siliconized paper.
6. Dimensions: 6 in (15.2 cm) x 75 ft (22.9 m), 9 in (22.7 cm) x 75 ft (22.9 m).
7. Low Temperature Flex: Meets or exceeds ASTM D 903.
8. Nail Sealability: Meets or exceeds ASTM D 1970.
9. Tensile Strength: Meets or exceeds ASTM D 2523.
10. Maximum Exposure Limit: 90 days.

D. Self-Adhering Sheet Flashing: Typar® Flashing BA by Fiberweb™ with the following characteristics.
1. Face Material Composition: Conformable Textured Polyolefin.
2. Face Color: Gray.
3. Adhesive Composition: Butyl adhesive.
4. Thickness: 25 mil.
5. Release Liner: Siliconized paper.
6. Dimensions: 4 in (10.2 cm), 6 in (15.2 cm) x 75 ft (22.9 m), 9 in (22.7 cm) x 75 ft (22.9 m).
7. Low Temperature Flex: Meets or exceeds ASTM D 903.
8. Nail Sealability: Meets or exceeds ASTM D 1970.
9. Tensile Strength: Meets or exceeds ASTM D 2523.
10. Maximum Exposure Limit: 180 days.

E. Self-Adhering Sheet Flashing: Typar® Flashing RA by Fiberweb™ with the following characteristics.

1. Face Material Composition: Polyolefin.
2. Face Color: Gray.
3. Adhesive Composition: Rubberized asphalt.
4. Thickness: 25 mil.
5. Release Liner: Siliconized paper.
6. Dimensions: 4 in (10.2 cm) x 75 ft (22.9 m), 6 in (15.2 cm) x 75 ft (22.9 m), 9 in (22.7 cm) x 75 ft (22.9 m), 12 in (30.5 cm) x 75 ft (22.9 m).
7. Low Temperature Flex: Meets or exceeds ASTM D 903.
8. Nail Sealability: Meets or exceeds ASTM D 1970.
9. Tensile Strength: Meets or exceeds ASTM D 2523.
10. Maximum Exposure Limit: 90 days.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Prior to start of installation, inspect existing conditions to ensure surfaces are suitable for installation of specified products, including removal of sharp protrusions and that substrate is dry.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Installation of Typar® MetroWrap™: Comply with manufacturer's installation instructions including but not limited to the requirements specified in this section. Sequence construction such that Typar® MetroWrap™ is not exposed for more than 12 months before covering material is applied.
   1. Overlaps: Install shingle style to shed water, with minimum 6 inch (15 cm) overlap vertically and horizontally, and 12 inches (30 cm) overlap at corners, at all locations where this is possible.
   2. Fasteners at Wood Studs: Use manufacturer's recommended fasteners with plastic heads. Use 2 inch (5 cm) long plastic headed nails or plastic headed screws when 1/2 inch (1.2 cm) thick OSB sheathing is used.
   3. Fasteners at Metal Studs: Use manufacturer's recommended fasteners with 2 inch (5 cm) plastic disk around shank of No. 10 stainless steel self-taping screws. Use 2 inch (5 cm) long screws when 1/2 inch (1.2 cm) thick gypsum board is used.

4. Fastening at Concrete Block and Poured Concrete: Adhesive Recommended by manufacturer.
5. Fastener Pattern: Attach one fastener or more every 24 inches (61 cm) in horizontal and vertical direction or at 16 inches (40 cm) in horizontal and 24 in the vertical if using 16 inch stud spacing.
6. Edge Seal Where Material is Sealed to Itself: Typar® Construction Tape.
7. Edge Seal Where Material is Sealed to Adjacent Material: Install approved sealant on them substrate 1 inch (2.5 cm) to 2 inches (5 cm) back from the edge of the Typar® MetroWrap™. Press MetroWrap into the sealant to create air and water seal. If required by location of termination, provide furring strip to hold the Typar® MetroWrap™ in place.
8. Edge Seal at Penetrations: Install approved sealant on the substrate 1 inch (2.5 cm) back from the edge of the cut. Press MetroWrap into the sealant to create air and water seal. Install Typar® Flashing Flex, Typar® Flashing BA or Typar® Flashing RA as specified on the exterior of the Typar® MetroWrap™ to join the material to the penetration.
9. Final Inspection of Typar® MetroWrap™: When each section is complete, the installer shall visually inspect the installation and verify that all rows of material have overlapped the row below it, that all materials and components have been installed in a shingle fashion, that the fasteners are the proper ones, that the nailing pattern is correct, that all penetrations and terminations have been done correctly and that doors and windows have been properly flashed and integrated into the MetroWrap material.
10. The installer shall repair any cuts or tears with Typar® Construction Tape.

B. Install prior to installation of window over exterior sheathing or open studs, in accordance with manufacturer's instructions. Install air tight and free from holes, tears, and punctures.

C. Flash and seal window and door penetrations per ASTM E 2112, AMMA guidelines and manufacturer instructions.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 53 23
ELASTOMERIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Fully adhered EPDM sheet roofing, roof insulation, wood blocking, metal edge strip and elastomeric flashing.

1.02 CODES, REGULATIONS AND STANDARDS

A. Contractor Responsibility: The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State and local codes, regulations and standards pertaining to work practices, hauling, disposal, protection of workers and visitors to the site, and persons occupying areas adjacent to the site. This includes modification of procedures to comply with changes to codes, regulations and standards which occur during the work of this contract. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State and local regulations. The Contractor shall hold the Owner and Owner's Representatives harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulations on the part of himself, his employees or his subcontractors.

1.03 QUALITY ASSURANCE

A. Roofing contractor to be approved in writing by the membrane manufacturer. Contractor shall be able to substantiate that he has been trained by the membrane manufacturer.

B. Roofing and flashing workmanship to comply with industry standards. The National Roofing Contractors Association's (NRCA) ***ROOFING AND WATERPROOFING MANUAL*** along with ***ARCHITECTURAL SHEET METAL MANUAL*** as published by Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) will be used to establish industry standards.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials in their original, unopened containers, clearly labeled with manufacturer's name. All material to be stored in waterproof trailers or sheds, up on raised platforms and under lock and key until use. Do not use materials damaged in handling or storage. Replace damaged material with new material. Store adhesives between 60 and 80 degrees F. Should they be exposed to lower temperatures, restore to room temperature for three to five days prior to use.

1.05 WARRANTY

A. The roofing contractor shall furnish the Owner with his personal two (2) year watertight warranty.

PART 2 PRODUCTS

2.01 ROOF INSULATION

A. Roof insulation to be polyisocyanurate closed-cell foam core with manufacturer's standard facing laminated to both sides, complying with FS HH-I-1972/2, Class 1. Roof insulation to be ISO 95+ by Firestone, H-Shield by Hunter Panels or approved equal.

2.02 EPDM MEMBRANE ROOFING

A. Membrane roofing to be fully adhered 0.060" EPDM sheet roofing furnished by Firestone, Johns Manville, Carlisle or Versico.

B. Use the roof membrane for flashing of curbs and walls per the manufacturer's standard details.

C. Adhesives, sealants, thinner, cleaner and accessories to be furnished by the membrane manufacturer.

D. **Six inch (6") wide seam tape will be required for all field seams**.

2.03 FASTENERS

A. Use fasteners recommended by the membrane manufacturer to secure anchor bars and termination bars.

B. Fasteners used to secure roof insulation to be #14-10 Heavy Duty Roofing Fasteners with CR-10 coating, a minimum shank diameter of 0.170" and a thread diameter of 0.125". Pressure plates to be 3" diameter Galvalume plates. Screws and plates to be manufactured by Olympic Fasteners or approved equal.

2.04 WOOD NAILERS AND BLOCKING

A. All wood nailers and blocking shall be #2 or better kiln dried spruce, fir or pine.

2.05 METAL FLASHING

A. Edge strip to be formed to match existing.

PART 3 EXECUTION

3.01 PREPARATION OF SURFACES

A. Surfaces on which the roofing system is to be applied shall be clean, smooth, dry, free of fins, rot, sharp edges, loose and foreign materials, oil and grease.

B. It is required that the **membrane be dark gray in color without streaks** before proceeding with any bonding or splicing activity. The cleaned area must be larger than the repair area.

1. Cleaning may be achieved by one of the following methods:
    a. Clean EPDM roof membrane by hand, using a solution of mild dish-soap and water and a stiff bristle brush. Rinse the receiving surface with water until clean. Take care not to flood the receiving surface (and cause leaks).
    b. Use an electric floor scrubber and a wet vacuum. Rinse the receiving surface with water until clean. Take care not to flood the receiving surface (and cause leaks).
    c. Use a power washer and a wet vacuum. Take care not to flood the receiving surface (and cause leaks).
2. Allow the receiving surface to thoroughly dry. If necessary, dry the washed surface with clean towels or rags. Make sure that no moisture can be trapped.
3. Wash the existing EPDM **TWICE** with the manufacturer's recommended in-service membrane cleaner and clean white cotton rags, allowing the surface to evaporate and dry between washings. **CHANGE CLEANING RAGS OFTEN.** No cleaning of self-curing EPDM or pressure sensitive flashing is required.

4. If self-curing EPDM or pressure sensitive flashing becomes dirty, it must not be used.
5. "Clean" membrane must be **dark gray in color without streaking**.

3.02 ROOF INSULATION

A. Insulation shall be tightly butted with joints not more than 1/8" in width. Stagger joints with those in layer below.

B. Fasten insulation to the roof deck with the appropriate screws and plates. Fastener quantity and layout must meet the requirements of the EPDM manufacturer.

C. Stagger joints in one direction for each course. For multiple layers, stagger joints in both directions between courses, leaving no gaps and allowing a complete thermal envelope to be formed.

3.03 ROOF MEMBRANE

A. Adhere the 0.060" EPDM membrane in strict accordance with the manufacturer's specifications.

B. **Six inch (6") wide seam tape will be required for all field seams**.

3.04 EDGE STRIPS

A. Bottom edge of edge strips to be secured with continuous cleats. Nail top flange with annular-ring nails, three inches (3") on center. Strip top flange with 6" pressure sensitive flashing.

3.05 FLASHING - - WALLS AND PARAPETS

A. Use the longest pieces of material which are practical. All flashing and terminations shall be done in accordance with the applicable manufacturer's details.

3.06 WOOD NAILERS AND BLOCKING

A. Securely fasten new wood nailers to structural members so as to resist a force of 200 pounds per lineal foot in any direction.

3.07 TEMPORARY WATER CUT-OFF

A. Temporary water cut-offs are to be constructed at the end of each working day to protect the insulation, roofing, building and building interior from damage due to wind, snow and rain.

B. Temporary water cut-offs are to be detailed by the contractor and approved by the manufacturer and Owner.

3.08 CLEAN UP

A. Site clean-up shall be complete and to the satisfaction of the Owner.

B. All roofs, building, landscape and parking areas shall be cleaned of all trash, debris and dirt caused by or associated with this work.

C. Any areas stained, dirtied, discolored or otherwise damaged due to this work shall be cleaned, restored and replaced as required.

D. All debris shall be removed from the premises promptly and the construction area left clean daily.

3.09 INSPECTION AND TESTING

THE OWNER RESERVES THE RIGHT TO INSPECT AND TEST ALL CONSTRUCTION OPERATIONS AND MATERIALS.

A. Any defect or noncompliance discovered by inspection shall be reported to the contractor who shall promptly remove any defective material from the site.

B. The Owner reserves the right to inspect the work or parts of it as he chooses. His failure to inspect the work in progress shall not relieve the contractor of the responsibility for properly executing the contracted work nor shall it impair the Owner's right to reject deficiencies he may subsequently discover.

PART 4 JOB CONDITIONS

A. Roofing to be applied in dry weather.

B. This project is subject to compliance with all requirements of the Occupational Safety and Health Administration (OSHA). All work on this project must meet the requirements of all applicable state and local codes, laws and ordinances.

END OF SECTION

SECTION 07 62 00

Through Wall Penetration
FLASHING PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flashing panels to weatherproof plumbing, mechanical and electrical penetrations in exterior walls.

1.2 RELATED SECTIONS

A. Section 23 00 00 & 22 00 00 -Mechanical: Plumbing piping, venting.

B. Section 26 00 00 - Electrical: Electrical boxes.

1.3 REFERENCES

A. ASTM D 412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.

B. ASTM D 638 – Standard Test Method for Tensile Properties of Plastics.

C. ASTM D 792 – Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.

D. ASTM D 1505 – Standard Test Method for Density of Plastics by the Density-Gradient Technique.

E. ASTM D 2240 – Standard Test Method for Rubber Property—Durometer Hardness.

1.4 SUBMITTALS

A. Comply with Section 01330 (01 33 00) – Submittal Procedures.

B. Product Data: Submit manufacturer's product data, including installation instructions.

C. Warranty: Submit manufacturer's standard warranty.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.

C. Handling: Protect materials during handling and installation to prevent damage.

1.6 WARRANTY

A. Warranty Period: 10 years.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Quickflash Weatherproofing Products, Inc., 4129 Wagon Trail Avenue, Las Vegas, Nevada 89118. Phone (702) 614-6100. Fax (702) 614-4090. Website www.quickflashproducts.com. E-mail qfinfo@quickflashproducts.com.

2.2 FLASHING PANELS

A. Flashing Panels: Quickflash Weatherproofing Flashing Panels.

B. Plumbing Flashing Panels:
   1. Materials:
      a. Panel: Combination of high-density polyethylene (HDPE) and low-density polyethylene (LDPE).
         1) HDPE, Specific Gravity, ASTM D 1505: 0.953 g/cm^3.
         2) HDPE, Tensile Strength at Yield, ASTM D 638: 3,100 psi.
         3) LDPE, Specific Gravity, ASTM D 792: 0.917 g/cm^3.
         4) LDPE, Tensile Strength at Yield, ASTM D 638: 1,300 psi.
      b. Weatherproof Seal: Thermoplastic elastomer.
         1) Hardness, ASTM D 2240, Shore A, 10 Seconds: 46.
         2) Specific Gravity, ASTM D 792: 1.05 g/cm^3.
         3) Tensile Strength, ASTM D 412: 490 psi.
   2. Model: P-50.
      a. Fits: 1/2-inch to 3/4-inch pipes; copper, rigid, PVC, and ABS.
      b. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
   3. Model: P-100.
      a. Fits: 1-inch to 1-1/4-inch pipes; copper, rigid, PVC, and ABS.
      b. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
   4. Model: P-150.
      a. Fits: 1-1/2-inch to 1-3/4-inch pipes; copper, rigid, PVC, and ABS.
      b. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
   5. Model: P-200.
      a. Fits: 2-inch to 2-1/2-inch pipes; copper, rigid, PVC, and ABS.
      b. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
   6. Model: P-300.
      a. Fits: 3-inch pipes, ABS.
      b. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
   7. Model: P-400.
      a. Fits: 4-inch pipes, ABS.
      b. Size: 12-1/2 inches by 12-1/2 inches by 3/32 inch.
   8. Model: P-600.

a. Fits: 6-inch sheet metal duct.
b. Size: 12-1/2 inches by 12-1/2 inches by 3/32 inch.

9. Model: P-2PS.
   a. Fits: Cut out center to fit 1/2-inch to 2-inch copper pipes with exterior tees sweated on.
   b. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch. 2-piece panel.

C. Electrical Flashing Panels:
1. Material: Thermoplastic elastomer.
   a. Hardness, ASTM D 2240, Shore A, 10 Seconds: 93.
   b. Specific Gravity, ASTM D 792: 1.05 g/cm^3.
   c. Tensile Strength, ASTM D 412: 1,300 psi.
2. Model: E-3/0 B, electrical 3/0 box flashing panel.
   a. Use: 3-coat stucco and lap siding.
   b. Fits: Specified electrical 3/0 plastic boxes.
   c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
3. Model: E-4/0 B, electrical 4/0 box flashing panel.
   a. Use: 3-coat stucco and lap siding.
   b. Fits: Specified electrical 4/0 plastic boxes.
   c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
4. Model: E-PC 3/0, electrical pancake 3/0 box flashing panel.
   a. Use: 3-coat stucco and lap siding.
   b. Fits: Specified electrical pancake 3/0 metal boxes.
   c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
5. Model: E-PC 4/0, electrical pancake 4/0 box flashing panel.
   a. Use: 3-coat stucco and lap siding.
   b. Fits: Specified electrical pancake 4/0 metal boxes.
   c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
6. Model: E-SGB, electrical single-gang box flashing panel.
   a. Use: 3-coat stucco and lap siding.
   b. Fits: Specified electrical single-gang plastic boxes.
   c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
7. Model: E-SGR, electrical single-gang 1/2-inch raised-plaster-ring cover flashing panel.
   a. Use: 3-coat stucco and lap siding.
   b. Fits: Specified electrical single-gang raised-plastic-ring cover.
   c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive flashing panels.

B. Notify Architect of conditions that would adversely affect installation or subsequent use.

C. Do not begin installation until unacceptable conditions are corrected.

3.2 PREPARATION

A. Copper Pipes:
   1. Heat sweat copper pipes before installation of flashing panels.

3.3 INSTALLATION

A. Install flashing panels in accordance with manufacturer's instructions.

B. Plumbing Flashing Panels, 1 Piece:
   1. Select flashing panel required for specific pipe sizes.
   2. Push flashing panel over pipe with label facing to exterior to form weatherproof seal around pipe.
   3. Nail flashing panels to walls with corrosion-resistant nails at top of panels.

C. Electrical Flashing Panels:
   1. Select flashing panel required for specific electrical boxes.
   2. Push flashing panel over electrical box with label facing to exterior to form weatherproof seal around box.
   3. Ensure flashing panel collar edge is flush with electrical box opening edge.
   4. Nail flashing panels to walls with corrosion-resistant nails at top of panels.

D. Weather Barriers:
   1. Place weather barrier up behind bottom of flashing panel to bottom of pipe or electrical box.
   2. Place second layer of weather barrier over top of flashing panel to bottom front edge or further down.

3.4 PROTECTION

A. Protect installed flashing panels from damage during construction.

END OF SECTION

SECTION 07 84 13
FIRESTOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

Only tested firestop systems shall be used in specific locations as follows:

A. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

B. Safing slot gaps between edge of floor slabs and curtain walls.

C. Openings between structurally separate sections of wall or floors.

D. Gaps between the top of walls and ceilings or roof assemblies.

E. Expansion joints in walls and floors.

F. Openings and penetrations in fire-rated partitions or walls containing fire doors.

G. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:

1. Section 03 30 00 - Cast-In-Place Concrete
2. Section 04 20 00 - Unit Masonry
3. Section 07 90 00 - Joint Sealants

4. Section 09 20 00 - Plaster and Gypsum Board
6. Section 21 00 00 - Fire Suppression
7. Section 22 00 00 - Plumbing
8. Section 23 00 00 - Heating, Ventilating, and Air Conditioning (HVAC)
9. Section 26 00 00 - Electrical
10. Section 26 00 00 - Communications

1.05 REFERENCES

A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"

B. Test Requirements: UL 1479, “Fire Tests of Through-Penetration Firestops”

C. Test Requirements: UL 2079, “Tests for Fire Resistance of Building Joint Systems”

D. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.

1. UL Fire Resistance Directory:
   a. Firestop Devices (XHJI)
   b. Fire Resistance Ratings (BXRH)
   c. Through-Penetration Firestop Systems (XHEZ)
   d. Fill, Voids, or Cavity Material (XHHW)
   e. Forming Materials (XHKU)
   f. Joint Systems (XHBN)
   g. Perimeter Fire Containment Systems (XHDG)

2. Alternate Systems: “Omega Point Laboratories Directory” (updated annually).

E. Test Requirements: ASTM E 1966, “Standard Test Method for Fire Resistive Joint Systems”

F. Test Requirements: ASTM E 2307, “Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus”

G. Inspection Requirements: ASTM E 2174, “Standard Practice for On-site Inspection of Installed Fire Stops”

H. ASTM E 84, “Standard Test Method for Surface Burning Characteristics of Building Materials”

I. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments

J. International Building Code (IBC 2009)

K. NFPA 101 - Life Safety Code

L. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide through-penetration fire stop systems and fire-resistive joint systems that comply with specified requirements of tested systems.

B. Fire stop System installation must meet requirements of ASTM E 814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed fire stop materials and methods shall conform to applicable governing codes having local jurisdiction.

D. Fire stop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

1.07 SUBMITTALS

A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of qualified tested firestop systems to be used and manufacturer's installation instructions to comply with Section 01 30 00.

B. Manufacturer's engineering judgment identification number and document details when no qualified tested system is available for an application. Engineering judgment must include both project name and contractor’s name who will install firestop system as described in document.

C. Submit material safety data sheets provided with product delivered to job-site.

1.08 INSTALLER QUALIFICATIONS

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A supplier’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

B. Installation Responsibility: assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single sole source firestop specialty contractor.

C. The work is to be installed by a contractor with at least one of the following qualifications:

FM 4991 Approved Contractor
UL Approved Contractor
Hilti Accredited Fire Stop Specialty Contractor

D. Firm with not less than 3 years experience with fire stop installation.

E. Successfully completed not less that 3 comparable scale projects using similar systems.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

A. Do not use materials that contain flammable solvents.

B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.01 FIRESTOPPING - GENERAL

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

C. Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

1. F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.

D. Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

1. F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
2. T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.

E. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.

F. Mold Resistance: Provide penetration firestoppping with mold and mildew resistance rating of 0 as determined by ASTM G21.

G. Firestopping Materials are either “cast-in-place” (integral with concrete placement) or “post installed.” Provide cast-in-place firestop devices prior to concrete placement.

2.02 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with through penetration firestop systems (XHEZ), joint systems (XHBN), and perimeter firestop systems (XHDG) listed in Volume 2 of the UL Fire Resistance Directory; provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma
   800-879-8000
   www.us.hilti.com
   Chris Allington 508-509-8316
   Chris.allington@hilti.com

2. Substitution requests shall be considered in accordance with contract provisions.

2.03 MATERIALS

A. Use only firestop products that have been UL 1479, ASTM E 814 or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Pre-installed firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors and/or gypsum walls, the following products are acceptable:

1. Hilti Cast-In Place Firestop Device (CP 680-P)
   a. Add Aerator Adaptor when used in conjunction with aerator system.
2. Hilti Tub Box Kit (CP 681) for use with tub installations.
3. Hilti Cast-In Place Firestop Device (CP 680-M) for use with noncombustible penetrants.
4. Hilti Speed Sleeve (CP 653) for use with cable penetrations.
5. Hilti Firestop Drop-In Device (CFS-DID) for use with noncombustible and combustible penetrants.
6. Hilti Firestop Block (CFS-BL)

C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:

1. Hilti Intumescent Firestop Sealant (FS-ONE)
2. Hilti Self-leveling Firestop Sealant (CP 604)
3. Hilti Fire Foam (CP 620)
4. Hilti Flexible Firestop Sealant (CP 606)
5. Hilti Elastomeric Firestop Sealant (CP 601S)

D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti Elastomeric Firestop Sealant (CP 601S)
2. Hilti Flexible Firestop Sealant (CP 606)
3. Hilti Intumescent Firestop Sealant (FS-ONE)

E. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:

1. Hilti Firestop Joint Spray (CFS-SP WB)
2. Hilti Elastomeric Firestop Sealant (CP 601S)
3. Hilti Flexible Firestop Sealant (CP 606)
4. Hilti Self-leveling Firestop Sealant (CP 604)

F. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.

1. Hilti Speed Plugs (CP 777)
2. Hilti Speed Strips (CP 767)

G. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:

1. Hilti Intumescent Firestop Sealant (FS-ONE)

H. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti Intumescent Firestop Sealant (FS-ONE)
2. Hilti Fire Foam (CP 620)
3. Hilti Elastomeric Firestop Sealant (CP 601S)
4. Hilti Flexible Firestop Sealant (CP 606)

I. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti Firestop Putty Stick (CP 618)
2. Hilti Firestop Plug (CFS-PL)

J. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:

1. Hilti Firestop Putty Pad (CP 617)
2. Hilti Firestop Box Insert

K. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:

1. Hilti Firestop Collar (CP 643N)
2. Hilti Firestop Collar (CP 644)
3. Hilti Wrap Strips (CP 648E/648S)

L. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:

1. Hilti Firestop Mortar (CP 637)
2. Hilti Firestop Block (CFS-BL)
3. Hilti Fire Foam (CP 620)
4. Hilti Firestop Board (CP 675T)

M. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:

1. Hilti Firestop Block (CFS-BL)
2. Hilti Firestop Board (CP 675T)

N. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:

1. Hilti Firestop Joint Spray (CFS-SP WB)
2. Hilti Elastomeric Firestop Sealant (CP 601S)
3. Hilti Flexible Firestop Sealant (CP 606)
4. Hilti Self-leveling Firestop Sealant (CP 604)

O. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:

1. Hilti CFS-BL Firestop Block
2. Hilti CFS-PL Firestop Plug

P. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

Q. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction joint assembly.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.
2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

A. Coordinate construction of openings, penetrations and construction joints to ensure that the fire stop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration fire stop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

C. Coordinate fire stopping with other trades so that obstructions are not placed in the way prior to the installation of the fire stop systems.

D. Do not cover up through-penetration fire stop and joint system installations that will become concealed behind other construction until each installation has been examined by the building inspector.

3.03 INSTALLATION

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
3. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

E. Manufacturer's Field Services: During Installation, provide periodic destructive testing inspections to assure proper installation/application. After installation is complete, submit findings in writing indicating whether or not the installation of the tested system identified was installed correctly.

3.05 IDENTIFICATION & DOCUMENTATION

A. The firestop contractor is to supply documentation for each single application addressed. This documentation is to identify each penetration and joint location on the entire project.

A.1 The Documentation Form for through penetrations is to include:

1. A Sequential Location Number
2. The Project Name
3. Date of Installation
4. Detailed description of the penetrations location
5. Tested System or Engineered Judgment Number
6. Type of assembly penetrated
7. A detailed description of the size and type of penetrating item
8. Size of opening
9. Number of sides of assemblies addressed
10. Hourly rating to be achieved
11. Installers Name

A.2 The Documentation Form for Construction Joints is to include:

1. A Sequential Location Number
2. The Project Name
3. Date of Installation
4. Detailed description of the Construction Joints location
5. Tested System or Engineered Judgment Number
6. Type of Construction Joint
7. The Width of the Joint
8. The Lineal Footage of the Joint
9. Number of sides addressed
10. Hourly rating to be achieved
11. Installers Name

B. Copies of these documents are to be provided to the general contractor at the completion of the project.

C. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be

visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. The words: "Warning -Through Penetration Firestop System-Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's Name, address, and phone number.
3. Through-Penetration firestop system designation of applicable testing and inspecting agency.
4. Date of Installation.
5. Through-Penetration firestop system manufacturer's name.
6. Installer's Name.

3.06 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

3.07 LABOR USE TO INSTALL FIRESTOP SYSTEMS

A. To ensure complete harmony on the project site, the installation of each scope of work is to be performed jurisdictionally correct per existing trade agreements.

END OF SECTION

SECTION 07 84 13 Appendix 1

FIRESTOPPING SCHEDULE

CONCRETE FLOORS		UL-CLASSIFIED SYSTEMS
TYPE OF PENETRANT	**F-RATING HR**	**HILTI**
CIRCULAR BLANK OPENINGS	1	FA 0006, CAJ 0070
	2	FA 0006, CAJ 0070
	3	CAJ 0055
SINGLE METAL PIPES OR CONDUIT	1	CAJ 1226, CAJ 1278, FA 1017
	2	CAJ 1226, CAJ 1278, FA 1017
	3	CAJ 1226, CAJ 1278, FA 1017
	4	CAJ 8095, CBJ 1034
SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, ENT)	1	CAJ 2109, CAJ 2168, FA 2054, FA 2067
	2	CAJ 2109, CAJ 2168, FA 2054, FA 2067
	3	CAJ 2109, CAJ 2168, FA 2054,
	4	N/A*
SINGLE OR BUNDLED CABLES	1	FA 3007,

		CAJ 3095,
	2	FA 3007, CAJ 3095,
	3	FA 3007, CAJ 3095,
	4	N/A*
CABLE TRAY	1	CAJ 4034, CAJ 4054, CAJ 4017
	2	CAJ 4034, CAJ 4054, CAJ 4017
	3	CAJ 4034, CAJ 4017
	4	N/A*

CONCRETE FLOORS (CONTINUED)		**UL-CLASSIFIED SYSTEMS**
TYPE OF PENETRANT	**F-RATING HR**	**HILTI**
SINGLE INSULATED PIPES	1	FA 5016, FA 5017, CAJ 5090, CAJ 5091,
	2	FA 5016, FA 5017 CAJ 5090, CAJ 5091,
	3	FA5016, CAJ 5061, CAJ 5090,
	4	CBJ 5006
ELECTRICAL BUSWAY	1	CAJ 6006, CAJ 6017
	2	CAJ 6006, CAJ 6017
	3	CAJ 6006, CAJ 6017
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	CAJ 7046

		CAJ 7051
	2	CAJ 7046 CAJ 7051
	3	CAJ 7046 CAJ 7051
MIXED PENETRANTS	1	CAJ 8056, CAJ 8095, CAJ 8099
	2	CAJ 8056, CAJ 8095, CAJ 8099
	3	CAJ 8056, CAJ 8095, CAJ 8099
	4	CAJ 8095
CONCRETE OR BLOCK WALLS		**UL-CLASSIFIED SYSTEMS**
TYPE OF PENETRANT	**F-RATING**	**HILTI**
CIRCULAR BLANK OPENINGS	1	CAJ 0055, CAJ 0070
	2	CAJ 0055, CAJ 0070
	3	CAJ 0055
SINGLE METAL PIPES OR CONDUIT	1	CAJ 1226, CAJ 1278,
	2	CAJ 1226, CAJ 1278,
	3	CAJ 1226, CAJ 1278,
	4	CAJ 8095, CBJ 1034, WJ 1042
SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, ENT)	1	CAJ 2109, WJ 2108, WJ 2121
	2	CAJ 2109, WJ 2108,

		WJ 2121
	3	CAJ 2109, CAJ 2168, WJ 2091
	4	WJ 2091
SINGLE OR BUNDLED CABLES	1	CAJ 3095, WJ 3060 WJ 3074
	2	CAJ 3095, WJ 3060 WJ 3074
	3	CAJ 3095, WJ 3050
	4	WJ 3050
CABLE TRAY	1	CAJ 4034, CAJ 4054, WJ 4016,
	2	CAJ 4034, CAJ 4054, WJ 4016,
	3	CAJ 4034, WJ 8007
	4	WJ 8007

CONCRETE OR BLOCK WALLS (CONT)		**UL-CLASSIFIED SYSTEMS**
TYPE OF PENETRANT	**F-RATING**	**HILTI**
SINGLE INSULATED PIPES	1	CAJ 5090, CAJ 5091, WJ 5042
	2	CAJ 5090, CAJ 5091, WJ 5042
	3	CAJ 5090, CAJ 5091,
	4	WJ 5028, CBJ 5006
ELECTRICAL BUSWAY	1	CAJ 6006, CAJ 6017
	2	CAJ 6006, CAJ 6017
	3	CAJ 6006,

		CAJ 6017
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	CAJ 7046, WJ 7029, WJ 7022
	2	CAJ 7046, WJ 7029, WJ 7022
	3	CAJ 7046 CAJ 7051
MIXED PENETRANTS	1	CAJ 8096, CAJ 8099 WJ 8007
	2	CAJ 8096, CAJ 8099 WJ 8007
	3	CAJ 8099 WJ 8007
	4	WJ 8007
WOOD FLOORS		**UL-CLASSIFIED SYSTEMS**
TYPE OF PENETRANT	**F-RATING**	**HILTI**
METAL PIPES OR CONDUIT	1	FC 1009, FC 1059
	2	FC 1009, FC 1059
NON-METALLIC PIPE OR CONDUIT	1	FC 2025, FC 2126
	2	FC 2025, FC 2126
SINGLE OR BUNDLED CABLES	1	FC 3012, FC 3044
	2	FC 3012
INSULATED PIPES	1	FC 5004, FC 5036, FC 5037

	2	FC 5004
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	FC 7013
MIXED PENETRANTS	1	FC 8014, FC 8026
	2	N/A*
GYPSUM WALLBOARD ASSEMBLIES		**UL-CLASSIFIED SYSTEMS**
TYPE OF PENETRANT	**F-RATING**	**HILTI**
METAL PIPES OR CONDUIT	1	WL 1054, WL 1164
	2	WL 1054, WL 1164
	4	WL 1110
NON-METALLIC PIPE OR CONDUIT	1	WL 2078, WL 2075, WL 2128
	2	WL 2078, WL 2075, WL 2128
	4	WL 2184, WL 2245
SINGLE OR BUNDLED CABLES	1	WL 3065
	2	WL 3065
	4	WL 3139
CABLE TRAY	1	WL 4011, WL 4019
	2	WL 4011, WL 4019
	4	WL 8014
INSULATED PIPES	1	WL 5029, WL 5096
	2	WL 5029, WL 5096
	4	WL 5073

NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	WL 7040, WL 7042
	2	WL 7040, WL 7042
MIXED PENETRANTS	1	WL 8004, WL 8013
	2	WL 8004, WL 8013
	4	WL 8014

NOTES:

1 Jobsite conditions of each through-penetration firestop system must meet all details of the UL-Classified System selected.

2 If jobsite conditions do not match any UL-classified systems in the schedules above, contact firestop manufacturer for alternative systems or Engineer Judgment Drawings.

3 Coordinate work with other trades to assure that penetration-opening sizes are appropriate for penetrant locations, and vice versa.

4 For 3-hour rated gypsum walls, contact the firestop manufacturer for a UL-classified system or engineer judgment drawing.

5 The Contractor shall verify that the schedule is current at the time of construction, and that each referenced system is suitable for the intended application.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Exterior polyurethane sealants.
2. Exterior and interior polyurethane traffic sealants.
3. Interior polyurethane sealants.
4. Interior latex sealants.
5. Interior sanitary silicone sealants.
6. Exterior and interior water immersed polyurethane sealants.
7. Metal lap joint sealants.
8. Threshold and sheet metal bedding sealants.
9. Joint accessories.

B. Related Sections:
1. Section 08 80 00 – Glazing: Glazing sealants and protective glazing systems.

1.2 REFERENCES

A. ASTM International Inc.
1. ASTM C 510 - Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants.
2. ASTM C 719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
3. ASTM C 794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
4. ASTM C834 - Standard Specification for Latex Sealants.
5. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.
8. ASTM C 1193 - Standard Guide for Use of Joint Sealants.
9. ASTM C 1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants.
10. ASTM C 1311 - Standard Specification for Solvent Release Sealants.
11. ASTM D 2203 - Standard Test Method for Staining from Sealants.

1.3 SUBMITTALS

A. Shop Drawings:
1. Submit details to show installation and interface between sealants and adjacent work.

B. Product Data:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;

C. Samples:
   1. Submit color charts for each sealant type for initial selection.
   2. Submit standard cured color samples for each sealant type illustrating selected colors.

D. Manufacturer's Installation Instructions:
   1. Submit manufacturer’s published installation procedures.
   2. Include instructions for completing sealant intersections when different materials are joined.
   3. Include instructions for removing existing sealants and preparing joints for new sealant.

E. Manufacturer's Certificate:
   1. Certify products are suitable for intended use and products meet or exceed specified requirements.
   2. Certify applicator is approved by manufacturer.

F. Qualifications Data:
   1. Submit applicator's qualifications, including reference projects of similar scope and complexity, with current phone numbers and contact names of architects and owners for verification.

G. Manufacturer's Field Reports:
   1. Indicate time present at project site.
   2. Include observations, indicate compliance with manufacturer's installation instructions, and supplemental instructions provided to installers.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:
   1. Submit recommended inspection intervals.
   2. Submit instructions for repairing and replacing failed sealant joints.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with the following:
   1. Building Joints: ASTM C 1193.

B. Field Pre-Construction Testing:
   1. Test each elastomeric sealant and joint substrate in accordance with the following, before beginning work of this section:
      a. Install sealants in field samples using joint preparation methods determined by laboratory pre-construction testing.
      b. Remove existing sealant, clean joint, and install new sealant using manufacturer's recommended joint preparation methods.
      c. Install field-test joints in location as approved by Architect.
      d. Test Method: Manufacturer's standard field adhesion test to verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.

e. When test indicates sealant adhesion failure, modify joint preparation, primer, or both and retest until joint passes sealant adhesion test.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.

B. Applicator Qualifications:
1. Company specializing in performing work of this section with minimum three years documented experience, minimum three successfully completed projects of similar scope and complexity, and approved by manufacturer.
2. Designate one individual as project foreman who shall be on site at all times during installation.

1.7 MOCKUP

A. Install sealants in mockups specified in other sections including sealant and joint accessories to illustrate installation quality and color.

B. Incorporate accepted mockup as part of Work.
1. Repair seal joint mockups used for field adhesion testing.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in manufacturers unopened original packaging. Inspect for damage.

B. Store primers and sealants in cool dry location with ambient temperature range of 60 to 80 degrees F.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not install primers or sealants when atmospheric temperatures or joint surface temperatures are less than 40 degrees F.

1.10 SCHEDULING

A. Schedule work so waterproofing, water repellents and preservative finishes are installed after sealants, unless sealant manufacturer approves otherwise in writing.

B. Ensure sealants are cured before covering with other materials.

1.11 WARRANTY

A. Submit signed copies of the following warranties against adhesive and cohesive failure of sealant and against infiltration of water and air through sealed joint for period of 3 years from date of completion.
1. Manufacturer's standard warranty covering sealant materials.
2. Applicator's standard warranty covering workmanship.

PART 2 PRODUCTS

2.1 Caulking for joints at all junctions as necessary to obtain complete watertight construction.

2.2 MANUFACTURERS

A. Tremco Sealant/Weatherproofing Division of RPM International, Inc.

B. Or equal

2.3 URETHANE SEALANTS

A. Multi-Component Urethane: two component, chemical curing, nonstaining, nonbleeding, color as selected.
1. Dymeric 240
2. Dymeric 240FC
3. Or equal

B. Single Component Urethane: single component, moisture curing, nonstaining, non-bleeding, color as selected.
1. Dymonic FC
2. Or equal

2.4 SILICONE SEALANTS

A. Multi-Component Silicone: ASTM C920, Type M, Grade NS, Class 50; Uses NT, M, G, A and O: multi-component, neutral curing, nonstaining, nonbleeding, color as selected
1. Spectrem 4-TS.
2. Or equal

B. Single Component Silicone: ASTM C920, Type S, Grade NS, ; Uses NT, M, G, A and O: single component, nonstaining, nonbleeding, color as selected.
1. Spectrem 1.
2. Spectrem 2.
3. Spectrem 3.
4. Or equal

C. Single Component Silicone: ASTM C920, Type S, Grade NS, Class 25; Uses NT, G, A and O: single component, nonstaining, nonbleeding, color as selected.
1. Proglaze.
2. Tremsil 200.

2.5 OTHER SEALANTS

A. Latex Sealant: ASTM C 834; single component, solvent curing, nonstaining, nonbleeding, nonsagging; color as selected.
1. Tremflex 834.

B. Synthetic Rubber Sealant:

1. Acoustical Sealant.

C. Butyl Sealant: ASTM C 1311, butyl or polyisobutylene, single component, nondrying, non-skinning, non-curing.
   1. Butyl Sealant.

2.6 ACCESSORIES

A. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

B. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

C. Joint Backing: Round foam rod compatible with sealant; oversized 25 to 50 percent larger than joint width; recommended by sealant manufacturer to suit application

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

E. Masking tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrate surfaces and joint openings are ready to receive work.
   1. Verify joint surfaces are clean and dry.
   2. Ensure concrete surfaces are fully cured.

B. Report unsatisfactory conditions in writing to the Architect;

C. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Prepare joints in accordance with ASTM C 1193 and manufacturer's instructions.

B. Clean joint surfaces to remove dirt, dust, oils, wax, paints, and other contamination capable of affecting primer and sealant bond.
   1. Clean concrete joint surfaces to remove curing agents and form release agents.

C. Protect elements surrounding the Work of this section from damage or disfiguration. Apply masking tape to adjacent surfaces when required to prevent damage to finishes from sealant installation.

3.3 EXISTING WORK

A. Mechanically remove existing sealant.

B. Clean joint surfaces of residual sealant and other contaminates capable of affecting sealant bond to joint surface.

C. Allow joint surfaces to dry before installing new sealants.

3.4 SEALANT INSTALLATION

A. INTERIOR CAULKING shall be applied to seal all penetrations through top plates of interior walls, (due to electrical or plumbing), and at tubs, showers, counter tops, bottom of party walls GWB, full perimeter of all exterior walls, and other as shown on Drawings.

B. ALL POTENTIAL INFILTRATION cracks & joints to be caulked. Caulking shall be done only by workmen who are thoroughly experienced in this work. Exterior caulking shall be applied around windows, doors, vents, utilities, and any other infiltration "crack".

C. IN GENERAL see Drawings for any additional applications. Joints and spaces to be caulked shall be dry and free from dust. Finished caulking "bead" shall be neat and smooth, free of gaps and sags and run continuously. Complete all caulking work and allow to stand for the manufacturer's recommended time period before painting. Prime if required before finish coat of paint is applied.

D. Install primer and sealants in accordance with ASTM C 1193 and manufacturer's instructions.

E. Caulking shall apply to sealing of joints less than 3/4 inches in width. Any joint in excess of this width shall be filled with a low-expansion closed cell foam insulation or as directed by Architect.

F. Install joint backing to maintain the following joint ratios:
   1. Joints up to 1/2 inch Wide: 1:1 width to depth ratio.
   2. Joints Greater than 1/2 inch Wide: 2:1 width to depth ratio; maximum 1/2 inch joint depth.

G. Install bond breaker where joint backing is not used.

H. Apply primer where required for sealant adhesion.

I. Install sealants immediately after joint preparation.

J. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

K. Tool exposed joint surface concave.

L. Building Envelope:

1. Gaskets or sill seals under mud sills along foundation walls.
2. Seal first floor band joists to the adjoining mud sills and plywood decking using adhesive or caulk. Use construction adhesive or caulking between multiple sill plates.
3. Seal any band joists between upper floors to the adjoining top plate and plywood decking.
4. Use construction adhesive or caulking between multiple tops plates.
5. Seal bottom plates of exterior walls to the sub-floor with construction adhesive or caulking.
6. Window frames and doorjambs must be sealed to their rough openings using low expansion foam, backer rod or caulk but NOT fiberglass.
7. All penetrations through building must be carefully sealed. Typical Penetrations include chimney, duct and plumbing chases and penetrations of pipes and wires through the top plates of top story walls. It is particularly important to seal all possible air paths to the attic.
8. Electrical boxes on exterior walls and ceilings should either be air-sealed or placed in airtight enclosures (i.e. Lesco Boxes). Electrical boxes in unit demising walls shall be caulked to the gyp surface to provide full compartmentalization eliminating air leakage between units.
9. SPECIAL NOTE: THIS BUILDING WILL BE "BLOWER DOOR TESTED" TO VERIFY THE EFFECTIVENESS OF THE AIR SEALING PROCEDURES. ALL COST BEYOND THE INITIAL TEST ASSOCIATED WITH THE RE-TESTING AND RE-SEALING, SHOULD THE FIRST TEST FAIL TO MEET MAINEHOUSINGS STANDARDS, SHALL BE BORNE BY THE CONTRACTOR. IT IS THEREFORE INCUMBENT UPON THE CONTRACTOR TO HAVE IN PLACE AN AIR-SEALING PROGRAM, AS DEFINED IN THE DRAWINGS AND SPECIFICATIONS AND MAINEHOUSING'S STANDARDS, AT THE OUTSET OF FRAMING AND CONTINUOUSLY MONITORED DURING FINISHING OF THE SHELL.

3.5 MANUFACTURER'S FIELD SERVICES

A. Require sealant manufacturer to be present at project site to:
1. Observe sealant mockup installation and to issue reports of observations.
2. Conduct field pre-construction testing.

3.6 CLEANING

A. Remove masking tape.

B. Clean adjacent surfaces soiled by sealant installation.

3.7 SCHEDULE – SEALANT JOINTS

A. Exterior Sealant Joint [Type A]:
1. Applications:
a. Control and expansion joints in cast-in-place concrete.
b. Joints between architectural precast concrete units.
c. Control and expansion joints in unit masonry.
d. Control and expansion joints in stone masonry.
e. Butt joints between metal panels.

f. Joints between different materials listed above.
g. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
h. Control and expansion joints in soffits and overhead surfaces.
i. Other exterior joints in vertical surfaces and non-traffic horizontal surfaces for which no other sealant is specified.
j. Or equal

2. Multi-Component Urethane Sealants:
   a. Dymeric 240/240FC.
   b. Vulkem 227.
   c. Or equal
3. Single Component Urethane Sealants:
   a. Dymonic FC.
   b. Dymonic.
   c. Vulkem 116.
   d. Or equal
4. Multi-Component Silicone Sealants:
   a. Spectrem 4-TS. D.O.E
5. Single Component Silicone Sealants:
   a. Spectrem 1.
   b. Spectrem 2.
   c. Spectrem 3.
   d. Or equal

B. Interior Sealant Joint [Type C]:
1. Applications:
   a. Control and expansion joints on exposed interior surfaces of exterior walls.
   b. Perimeter joints on exposed interior surfaces of exterior openings.
   c. Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefronts, louvers, elevator entrances and similar openings.
   d. Other interior joints in vertical surfaces and non-traffic horizontal surfaces subject to movement for which no other sealant is specified.
2. Multi Component Urethane Sealants:
   a. Dymeric 240/240FC.
   b. Vulkem 227.
   c. Or equal
3. Single Component Urethane Sealants:
   a. Dymonic FC.
   b. Dymonic.
   c. Vulkem 116.
   d. Or equal
4. Single Component Silicone Sealants:
   a. Spectrem 1.
   b. Spectrem 2.
   c. Spectrem 3.
   d. Or equal

5. Other Sealants:
    a. Tremflex 834.
    b. Or equal

C. Interior Sanitary Sealant Joint [Type G]:
1. Applications:
    a. Joints in toilet room and bathroom counter tops.
    b. Joints between plumbing fixtures and adjacent materials.
    c. Other interior joints in wet areas where needed to limit mold and mildew growth.
2. Single Component Silicone Sealants:
    a. Tremsil 200.
    b. Or equal

D. Concealed Metal Lap Sealant Joint [Type J]:
1. Applications:
    a. Concealed lap and hook joints in sheet metal flashing and trim.
2. Single Component Non-Curing Sealants:
    a. Tremco Butyl Sealant.
    b. Or equal

E. Concealed Bedding Sealant Joint [Type K]:
1. Applications:
    a. Bedding joints under metal thresholds and saddles.
    b. Bedding joints between sheet metal flashing and other materials.
2. Single Component Urethane Sealants:
    a. Dymonic FC.
    b. Dymonic.
    c. Vulkem 116.
    d. Or equal
3. Single Component Silicone Sealants:
    a. Proglaze.
    b. Spectrem 2.
    c. Spectrem 3.
    d. Or equal
4. Single Component Non-Curing Sealants:
    a. Tremco Butyl Sealant.
    b. Tremco Acoustical Sealant.
    Or equal

END OF SECTION

STEEL DOORS AND FRAMES

SECTION 08 11 13

PART 1 – GENERAL

1.01 GENERAL PROVISIONS:

A. The CONDITIONS OF THE CONTRACT and all Sections of Division 1 are hereby made a part of this section.

1.02 DESCRIPTION OF WORK:

A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this section. Extent of steel doors and frames required is indicated on drawings and in schedules.

1. Furnish and Install:
   a. Steel frames for hollow metal doors
   b. Steel frames for wood doors
   c. Steel sidelite, borrowed lite, and transom frames
   d. Hollow metal doors
2. Install Only: Finish hardware for hollow metal doors as specified in Section 08 71 00 Finish Hardware.

B. Related work specified elsewhere:

1. SECTION 08 14 16: WOOD DOORS
2. SECTION 08 71 00: FINISH HARDWARE
3. SECTION 09 90 00: PAINTING

1.03 QUALITY ASSURANCE; SUBMITTALS:

A. General: Comply with requirements of SECTION 01 31 00 - SUBMITTALS, MEETINGS & RECORD DOCUMENTS and SECTION 01 45 00 - QUALITY CONTROL SERVICES.

B. Manufacturer: Provide steel doors and frames complying with these specifications from one of the following:

1. CECO
2. Curries
3. Steelcraft

C. Supplier: A recognized hollow metal supplier, with in-house fabrication facilities, who has been furnishing doors and frames in the project's vicinity for a period of not less than five years.

D. Product Data: Submit four copies of manufacturers technical product data for each item. Include whatever information may be necessary to show compliance with requirements, and include instructions for installation and maintenance.

E. Door Schedule: Submit final door schedule in manufacturer's standard format and as outlined below. Coordinate doors, frames and related work to ensure proper size, thickness, hand, function, and fasteners.

1. **NOTE: Contractor shall make all submittals for finish hardware, doors, frames and related items simultaneously, only after proper review and coordination by own staff beforehand.**

2. Final Door Schedule Content: Based on doors and frames in drawings, organize door schedule to indicate complete designations of every item required for each door or opening. Include the following information:

   a. Type, style, hand, size and construction of each item.

   b. Anchors and fastenings to related work.

   c. Corner construction of welded and/or knocked down frames.

   d. Location of door and frame cross-referenced to indications on drawings both on floor plans and in hardware schedule.

   e. Explanation of all abbreviations, symbols, codes, etc. contained in schedule.

   f. Mounting locations for hardware.

   g. Door construction and materials.

   h. Gage and finish of all materials.

3. Shop Drawings: Submit separate detail drawings, referenced to door schedule, showing size, hand, construction, fasteners, anchors and all other details pertinent to the fabrication of doors and frames for this project.

1.04 APPROVAL OF SUBSTITUTIONS:

A. Manufacturers and model numbers specified herein are to establish a standard of quality. If products other than those specifically identified herein are to be considered for this Project, they must be submitted for approval of the Architect not less than ten (10) calendar days prior to receipt of General Bids.

B. Requests for approval of substitutions shall be in writing, accompanied by catalog cuts, technical information and physical samples.

C. Approval of substitutions shall only be valid when issued by Architect to all bidders in the form of Addendum.

1.05 REFERENCES:

A. ANSI A115 Series: Standards for Steel Doors And Frames.

B. NFPA 80, NFPA 101.

C. Other applicable building and life safety codes.

D. Door and Hardware Institute: "Recommended Locations for Builder's Hardware.

E. ANSI A117.1: American National Standard Providing Accessibility and Usability for Physically Handicapped People.

F. Other applicable industry standards.

1.06 PRODUCT PACKAGING AND HANDLING:

A. Tag each item or package separately, with identification related to final door schedule.

B. All doors shall be packaged in full cartons and securely banded.

C. Doors and frames shall be received by the contractor at the jobsite and handled in a manner so as not to be damaged. They shall be stored upright in a protected area on wood runners or skids and shall be covered with vented tarpaulins or plastic.

1.07 WARRANTY: Doors and frames specified for this Project shall be guaranteed against defects in material and workmanship for a period of one (1) year from date of Substantial Completion of Project.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Doors shall be manufactured from commercial quality cold-rolled steel sheets. Exterior doors shall be A60 hot-dipped galvanized.

B. Frames shall be manufactured from commercial quality cold-rolled steel sheets. Exterior frames shall be *WELDED* A60 hot-dipped galvanized.

C. Steel shall conform to ASTM standards A366 or A620 and A568 (uncoated), ASTM A526 or A642 and A525 (galvanized).

D. All doors and frames shall be chemically treated for paint adhesion and prime painted to meet performance requirements of ANSI A224.1.

E. U Factor of 1.5 or less.

2.02 DOOR FABRICATION:

A. Interior doors shall be 1-3/4” thick, manufactured from two 18 gage steel sheets. A one piece resin-impregnated honeycomb core with sanded edges shall be securely bonded to both face sheets. Doors shall have mechanically interlocked vertical edges, flush face sheets, and hairline seam edges. The top and bottom of the door shall be closed flush by 16 gage steel channels (where concealed door bottoms are specified, bottom channel shall be reversed to allow insertion of door bottom into door web). At contractor option, in lieu of honeycomb cores, doors may be provided with a rigid polystyrene foam core, continuously bonded to the face sheets, and completely filling the door.

B. Exterior doors shall be 1-3/4" thick, manufactured from two 16 gage galvanized steel sheets. The interior of the doors shall be completely filled with a foamed-inplace polyurethane core, chemically bonded to all interior surfaces. Doors shall have mechanically interlocked vertical edges, flush face sheets, and hairline seam edges. The top and bottom of the door shall be closed flush by 16 gage steel channels (where concealed door bottoms are specified, bottom channel shall be reversed to allow insertion of door bottom into door web).

C. All doors shall be handed type with factory preparation for all concealed or mortised Finish Hardware scheduled. Door closer reinforcements shall be provided for all doors whether scheduled to received closer or not. Reinforce doors for all surface applied hardware.

D. Non-handed doors, and/or filler plates for cutouts not required for scheduled hardware preparation shall NOT be acceptable.

2.03 FRAME FABRICATION:

A. General: Frames shall be knocked down and field assembled or welded type at contractor option. **All exterior frames shall be welded.**

B. Standard knockdown or welded frames shall be manufactured form 16 gage steel sheets with 2" face and 5/8" integral stop. Jamb depth to be determined by wall thickness in accordance with the drawings. Supply appropriate anchors for wall construction.

C. Drywall frames shall be manufactured form 16 gage steel sheets with 2" face and 5/8" integral stop and double back bend to grip the partition firmly without marring the wall surface. Jamb depth to be determined by wall thickness in accordance with the drawings. Provide adjustable plumb anchors to insure square and plumb installation. Supply standard floor anchors for bottom of each jamb.

D. Prepare frames for all concealed or mortised hardware and reinforce for all surface applied hardware.

E. Provide plaster guards for all hardware cutouts.

F. Prepare frames to receive pneumatic type silencers: two for each pair frame, three for each single frame.

G. Exterior frames shall be 16 ga welded, galvanized with thermally broken jambs.

2.04 FIRE RATED ASSEMBLIES

A. All labeled fire doors and frames shall be of a type tested in accordance with ANSI/UL-10b, ASTM E-152, NFPA-252, or UL-305, and shall provide the degree of fire protection, heat transmission, panic-loading capabilities, and/or smoke control as indicated on the label and required by the drawings.

B. Labeled doors and frames shall bear the label of Underwriters Laboratories, Warnock Hersey, or Factory Mutual and shall meet all requirements of the labeling agencies current procedures and policies.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Doors and frames shall be assembled, installed, and erected plumb and in true alignment and in conformance with manufacturer's recommendations and final approved shop drawings. Preparation for surface applied hardware shall be performed on the jobsite. Frames shall be rigid and securely anchored in place. Doors shall be installed in a manner to achieve functional operation and appearance.

B. Install hardware in compliance with 08 71 00 FINISH HARDWARE.

END OF SECTION

SECTION 08 12 16
ALUMINUM FRAMES

PART 1 – GENERAL

1.1 Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary

A. Section Includes: Kawneer Architectural Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.

1. Types of Kawneer Aluminum Storefront Systems include:
   a. InFrame™ Interior Framing System - 2" x 6" (50.8 x 152.4) nominal dimension; Non-Thermal; Center Glazed, Screw Spline, Punched Opening Fabrication.

B. Related Sections:

1. 07 27 00 Water Resistive & Air Barrier Assemblies
2. 07 92 00 Joint Sealants
3. 08 41 13 Aluminum-Framed Entrances and Storefronts
4. 08 51 13 Aluminum Windows
5. 08 80 00 Glazing

1.3 Definitions

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG)

1.4 Performance Requirements

A. Storefront System Performance Requirements: Interior framing system.

1.5 Submittals

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum frames indicated.
B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.
C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.
D. Samples for Verification: For aluminum frames and components required.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum frames, made from 12" (304.8 mm) lengths of full-size components and showing details of the following:
   1. Joinery, including concealed welds.
   2. Anchorage.
   3. Expansion provisions.
   4. Glazing.
   5. Flashing and drainage.

F. Other Action Submittals:
   1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.6 Quality Assurance

A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of providing aluminum frames that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum frames through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum frames and are based on the specific system indicated. Refer to Division 01 Section “Product Requirements”. Do not modify size and dimensional requirements.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockup for type(s) of storefront elevation(s) indicated, in location(s) shown on Drawings.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination”.

1.7 Project Conditions

A. Field Measurements: Verify actual dimensions of aluminum frame openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.8 Warranty

A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.

B. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS

2.1 Manufacturers

A. Basis-of-design Product:
   1. Kawneer Company Inc.
   2. InFrame™ Interior Framing System (Non-Thermal)
   3. System Dimensions: 2" x 6" (50.8 x 152.4) nominal dimension
   4. Glass: Center Plane

B. Substitutions: Refer to Substitutions Section for procedures and submission requirements.

2.2 Materials

A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.8 mm) wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.
B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components.
C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 Storefront Framing System

A. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
B. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
C. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action
D. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
E. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

2.4 Glazing Systems

A. Glazing: As specified in Division 08 Section “Glazing”.
B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
   1. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.

2.5 Entrance Door Systems

A. Entrance Doors: As specified in Division 084113 Section “Aluminum-Framed Entrances and Storefronts”.

2.6 Accessory Materials

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section “Joint Sealants”.
B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil (0.762 mm) thickness per coat.

2.7 Fabrication

A. Extrude aluminum shapes before finishing.
B. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fit joints; make joints flush, hairline and weatherproof.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   5. Provisions for field replacement of glazing.
   6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
D. Storefront Framing: Fabricate components for assembly using manufacturer’s standard installation instructions.
   1. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 Aluminum Finishes

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes:
B. Factory Finishing
   1. Kawneer Permanodic™ AA-M10C22A41, AAMA 611, Architectural Class I Clear Anodic Coating (Color #14 Clear)

PART 3 - EXECUTION

3.1 Examination

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight aluminum frame installation.
   1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
   2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
   3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
   4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum framed storefront system, accessories, and other components.
B. Install aluminum framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
C. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 Field Quality Control

A. Manufacturer's Field Services: Upon Owner’s written request, provide periodic site visit by manufacturer’s field service representative.

3.4 Adjusting, Cleaning, and Protection

A. Clean aluminum surfaces immediately after installing aluminum framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

SECTION 08 41 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary

A. Section Includes: Kawneer Architectural Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.
   1. Types of Kawneer Aluminum Storefront Systems include:
      a. Trifab™ VG 451T Framing System – 2" x 4-1/2" (50.8 mm x 114.3 mm) nominal dimension; Thermal; Front, Center, Back, Multi-Plane, Structural Silicone or Weatherseal Glazed (Type B); Screw Spline, Shear Block, Stick or Punched Opening Fabrication.

B. Related Sections:

   1. 07 27 00 Water Resistive & Air Barrier Assemblies
   2. 07 92 00 Joint Sealants
   3. 08 41 13 Aluminum-Framed Entrances and Storefronts
   4. 08 51 13 Aluminum Windows
   5. 08 80 00 Glazing

1.3 Definitions

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 Performance Requirements

A. Storefront System Performance Requirements:

   1. Wind loads: Provide storefront system; include anchorage, capable of withstanding wind load design pressures of 25 lbs./sq. ft. inward and 30 lbs./sq. ft. outward. The design pressures are based on the IBC Building Code; 2009 Edition and ASCE 7-05.
   2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft2 (0.3 l/s · m2) at a static air pressure differential of 6.24 psf (300 Pa).
   3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 10 psf (479 Pa) as defined in AAMA 501.

4. Uniform Load: A static air design load of 20 psf (958 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:
   a. Glass to Exterior – 0.47 (low-e) or 0.61 (clear).
   b. Glass to Center – 0.44 (low-e) or 0.61 (clear).
   c. Glass to Interior – 0.41 (low-e) or 0.56 (clear).
6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:
   a. Glass to Exterior – 70frame and 69glass (low-e) or 69frame and 58glass (clear).
   b. Glass to Center – 62frame and 68glass (low-e) or 63frame and 56glass (clear).
   c. Glass to Interior – 56frame and 67glass (low-e) or 54frame and 58glass (clear).
7. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested to AAMA Specification 1801 and in accordance with ASTM E1425 and ASTM E90, the STC and OITC Rating shall not be less than:
   a. Glass to Exterior – 38 (STC) and 31 (OITC).
   b. Glass to Center – 37 (STC) and 30 (OITC).
   c. Glass to Interior – 38 (STC) and 30 (OITC).

1.5 Submittals

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum-framed storefront system indicated.
B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.
C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.
D. Samples for Verification: For aluminum-framed storefront system and components required.
E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed storefront.
F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12" (304.8 mm) lengths of full-size components and showing details of the following:
   1. Joinery, including concealed welds.
   2. Anchorage.
   3. Expansion provisions.
   4. Glazing.
   5. Flashing and drainage.
G. Other Action Submittals:
   1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.6 Quality Assurance

A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.
B. Manufacturer Qualifications: A manufacturer capable of providing aluminum-framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.
C. Source Limitations: Obtain aluminum-framed storefront system through one source from a single manufacturer.
D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum-framed storefront system and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements". Do not modify size and dimensional requirements.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockup for type(s) of storefront elevation(s) indicated, in location(s) shown on Drawings.
F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination".
G. Structural-Sealant Glazing: Comply with ASTM C 1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.
H. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

1.7 Project Conditions

A. Field Measurements: Verify actual dimensions of aluminum-framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.8 Warranty

A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.
   1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS

2.1 Manufacturers

A. Basis-of-Design Product:
   1. Kawneer Company Inc.
   2. Trifab™ 451T (Thermal) Framing System
   3. System Dimensions: 2" x 4-1/2" (50.8 mm x 114.3 mm)
   5. Glass: Exterior
C. Substitutions: Refer to Substitutions Section for procedures and submission requirements

1. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid storefront installation and construction delays.
2. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
3. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for storefront system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum storefronts for a period of not less than ten (10) years. (Company Name)
4. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
5. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.

D. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 Materials

A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.8 mm) wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.
B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components.
C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 Storefront Framing System

A. Thermal Barrier (Trifab™ VG 451T):
   1. Kawneer IsoLock™ Thermal Break with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
      a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposes shall be stainless steel.

F. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action
G. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
H. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

2.4 Glazing Systems

A. Glazing: As specified in Division 08 Section “Glazing”.
B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
   1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
      a. Color: Black
   2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
      a. Color: Matching structural sealant.

2.5 Entrance Door Systems

A. Design Requirements:
   1. Provide aluminum entrance doors from a single source.
   2. When aluminum entrances are part of a building enclosure system, including storefront framing, window wall systems, curtain wall system and related products, provide building enclosure system products from a single source manufacturer.
   3. Fabricate aluminum entrances in accordance with entrance manufacturer's prescribed tolerances.
   4. Material: ASTM B 221; 6063-T5 and T6 alloy and temper.
   5. Major portions of the door members to be 0.125 inch (3 mm) nominal in thickness and glazing molding to be 0.05 inch (1.3 mm) thick.
   6. Provide adjustable glass jack to center the glass in the door opening.
   7. Glazing gaskets shall be EPDM elastomeric extrusions.
   8. Fasteners: Where exposed, shall be aluminum, stainless steel or plated steel.
   9. Perimeter Anchors: Aluminum. When steel anchors are used, provide barrier between steel material and aluminum material to prevent galvanic action.

B. Performance Requirements:
   1. Air Infiltration: For single acting offset pivot or butt hung entrances in the closed and locked position, the test specimen shall be tested in accordance with ASTM E 283 at a pressure differential of 6.24 PSF for single doors and 1.567 PSF for pairs of doors. A single 3 feet by 7 feet entrance door and frame shall not exceed 0.50 CFM per linear foot of perimeter crack. A pair of 6 feet by 7 feet entrance doors and frame shall not exceed 1.0 CFM per linear foot of perimeter crack.
   2. Door Corner Construction: Manufacturer shall provide a limited lifetime warranty for the life of the door under normal use.

C. Basis-of-Design Product:
   1. Kawneer Company Inc.
   2. The door stile and rail face dimensions of the AA™425 Thermal Entrance will be as follows:
      Vertical Stile: 4-1/4"
      Top Rail: 4-1/4"
      Bottom Rail: 10"
   3. Major portions of the door members to be 0.125" nominal in thickness and glazing molding to be 0.05" thick
   4. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
   5. Provide adjustable glass jacks to help center the glass in the door opening.

D. Fabricate thermally broken aluminum-framed entrance doors in sizes indicated. Include a complete system for assembling components and anchoring doors.

E. Fabricate thermally broken aluminum-framed doors that are reglazable without dismantling perimeter framing.
   1. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1" (24 mm) long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.
   2. Accurately fit and secure joints and corners. Make joints hairline in appearance.
   3. Prepare components with internal reinforcement for door hardware.
   4. Arrange fasteners and attachments to conceal from view.

F. Weather-stripping: Provide weather-stripping locked into extruded grooves in door panels or frames as indicated on manufactures drawings and details.

G. Entrance Door Hardware: As specified in Division 08 71 00 Section “Door Hardware”.

2.6 Accessory Materials

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section “Joint Sealants”.

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil (0.762 mm) thickness per coat.

2.7 Fabrication

A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.

2. Accurately fit joints; make joints flush, hairline and weatherproof.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

B. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

C. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

D. Storefront Framing: Fabricate components for assembly using manufacturer's standard installation instructions.

E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 Aluminum Finishes

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:
1. Kawneer Permanodic™ AA-M10C22A41, AAMA 611, Architectural Class I Clear Anodic Coating (Color #14 Clear).

PART 3 - EXECUTION

3.1 Examination

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight framed aluminum storefront system installation.
1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum-framed storefront system, accessories, and other components.

B. Install aluminum-framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
D. Install aluminum-framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within aluminum-framed storefront to the exterior.
E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 Field Quality Control

A. Field Tests: Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
   1. Testing: Testing shall be performed by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements. Testing Standard per AAMA 503, including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 Water Infiltration Test.
      a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft2, whichever is greater.
      b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.24 psf (300 Pa).
B. Manufacturer's Field Services: Upon Owner’s written request, provide periodic site visit by manufacturer’s field service representative.

3.4 Adjusting, Cleaning, and Protection

A. Clean aluminum surfaces immediately after installing aluminum-framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

SECTION 08 81 00

GLAZING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Clear tempered glass.

1.2 REFERENCES

A. American National Standards Institute (ANSI):
   1. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.

B. American Society for Testing and Materials (ASTM):
   1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
   2. ASTM C1036 - Standard Specification for Flat Glass.
   2. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
   3. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.

C. Consumer Product Safety Standards for Architectural Glazing. CPSC 16 CFR, Part 1201.

D. Flat Glass Marketing Association (FGMA):
   1. FGMA - Glazing Manual and Glazing Sealing Systems Manual.

1.3 SUBMITTALS

A. Procedures for submittals.
   1. Product Data:
      a. Glass: Structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
      b. Glazing compound: Provide chemical, functional, and environmental characteristics, limitations, special application requirements.
   2. Samples:
      a Glazing: Submit one sample 12 x 12 inches (300 x 300 mm) in size of each type of glazing, illustrating tinting, and finish of glazing materials. Label each sample indicating kind, quality and manufacturer.
   3. Assurance/Control Submittals:
      a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
      b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.4 QUALITY ASSURANCE

A. Identification: Each unit of tempered glass shall be permanently identified by the manufacturer. The identification shall be etched or ceramic fired on the glass and be visible when the unit is glazed.

B. Perform Work in accordance with FGMA Glazing Manual.

C. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Transport, handle, store, and protect Products.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Environmental Requirements:
   1. Do not install glazing when ambient temperature is less than 40 degrees F.
   2. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 WARRANTY

A. Procedures for closeout submittals.

B. Special Warranty:
   1. Include coverage for cracking, breakage, and replacement of same.
      a. Warranty Period: 1 year.
   2. Include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.
      a. Warranty Period: 10 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
   1. Falconer Glass Industries.
   2. Libbey-Owens-Ford Company, Toledo, OH (800) 526-6557.
   3. PPG Industries, Pittsburgh, PA (412) 434-2858.
   4. Viracon, Owatonna, MN (800) 533-2080.

B. Product options and substitutions. Substitutions: Permitted.

2.2 GLASS MATERIALS

A. Glass Type 1 - Clear Tempered Insulated Glass Units, Low E: Double pane units of clear tempered glass.
   1. Glass Thickness, Inner: ¼ inch.
   2. Glass Thickness, Outer: ¼ inch.
   3. Unit Thickness: 1 inch thick units.

B. Glass Type 2 - Clear Tempered Glass Units. Single pane units with clear tempered glass.
   1. Glass Thickness, Inner: ¼ inch.

2.3 GLAZING COMPOUNDS

A. Polysulphide Sealant: Two component, chemical curing, non-sagging type; cured Shore A hardness of 15-25.

B. Silicone Sealant: Single component, chemical curing; capable of water immersion without loss of properties; non-bleeding, non-staining; cured Shore A hardness of 15-25.
   1. Color: Clear.

C. Acrylic terpolymer compounded especially for glazing; non-hardening, non-staining, and non-bleeding.

2.4 GLAZING ACCESSORIES

A. Setting Blocks: Resilient blocks of 70 to 90 Shore A durometer hardness; compatible with glazing sealant.

B. Spacers: Resilient blocks of 40 to 50 Shore A durometer hardness; self-adhesive on one side; compatible with glazing sealant.

C. Filler Rods: Closed cell or jacketed foam rods of polyethylene, butyl, neoprene, polyurethane, or vinyl; compatible with glazing sealant.

D. Joint Cleaners, Primers, and Sealers: As recommended by glazing sealant manufacturer.

E. Gaskets: ASTM D2000, SBC 415 to 3BC 620; extruded or molded neoprene or EPDM, black.

F. Mastic: Non-solvent type adhesive as recommended by mirrored glass manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

1. Verify that openings for glazing are correctly sized and within tolerance.
2. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

3.3 GLAZING

A. Install glazing from interior only. No exterior glazing permitted. No glazing removal permitted from exterior.

B. Locate setting blocks at quarter points of sill; set in sealant if heel or toe bead is required.

C. Install spacers inside and out except where preshimmed tape or glazing gaskets are to be used.

D. Set each piece in a series to other pieces in pattern draw, bow, or other visually perceptible characteristics.

E. Provide glazing sealants and gaskets as required for particular glazing application. Coordinate with other Sections for material compatibility.

F. Gaskets:
1. Provide adequate anchorage, particularly for driven-in wedge gaskets.
2. Miter and weld ends of channel gaskets at corners to provide continuous gaskets.
3. Seal face gaskets at corners with sealant to close opening and prevent withdrawal of gaskets from corners.

G. Do not leave voids in glazing channels except as specifically indicated or recommended by glass manufacturer. Force sealant into channel to eliminate voids. Tool exposed surfaces to slight wash away from joint. Trim and clean promptly.

H. Do not allow sealant to close weeps of aluminum framing.

I. Provide filler rod where sealants are used in the following locations:
1. Head and jamb channels.

2. Colored glass over 75 united inches in size.
3. Clear glass over 125 united inches in size.

3.4 CONSTRUCTION

A. Interface with Other Work: Coordinate glazing with installation of entrances and storefronts specified in Division 08.

3.5 FIELD QUALITY CONTROL

A. Inspect preparation and installation of glass.

3.6 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.8 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

END OF SECTION

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES ON METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this section includes, but is not limited to, the following:
   1. Gypsum board and accessories
   2. Metal studs and furring
   3. Metal shaftwall systems
   4. Metal suspension systems
   5. Sound-rated construction and accessories
   6. Gypsum board finishing
   7. Trim and accessories

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 05 41 00 Lightgage Metal Framing.
B. Section 06 10 00 Rough Carpentry.
C. Section 07 21 16 Thermal and Acoustic Insulation.
D. Section 07 84 13 Firestopping.
E. Section 09 90 00 Painting

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions with project conditions and materials clearly identified or detailed for each required system.

1.4 SYSTEM REQUIREMENTS

A. Performance Requirements: Fabricate and install systems as indicated but not less than that required to comply with ASTM C754 under the following conditions:
   1. Gypsum board partitions:
      a. Standard systems: Maximum deflection of l/240 of partition height.
   2. Cavity shaftwall systems: Withstand minimum positive and negative pressure of 5 psf.
   3. Interior suspended ceilings and soffits: Maximum deflection of l/360 of distance between supports.
   4. Nonstructural components that are permanently attached to structures and their support attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance to local jurisdiction.

B. Fire Resistance Ratings: Where fire resistance classifications are indicated, provide materials and application procedures identical to those listed by UL or tested according to ASTM E119 for type of construction shown.

C. Acoustical Ratings: Where sound ratings are indicated, provide materials and application procedures identical to those tested by manufacturer to achieve Sound Transmission Class (STC) scheduled or indicated in accordance with ASTM E90.

1.5 QUALITY ASSURANCE

A. Reference Standards:
   1. Applicable requirements of ASTM C754 for installation of steel framing.
   2. Install gypsum board in accordance with applicable requirements and recommendations of Gypsum Association GA 216, "Recommended Specifications for the Application and Finishing of Gypsum Board" except for more stringent requirements of manufacturer.
   3. Apply acoustical sealant in accordance with applicable requirements of ASTM C919.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery:
   1. Deliver material to site promptly without undue exposure to weather.
   2. Deliver in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade.

B. Storage:
   1. Store above ground in dry, ventilated space.
   2. Protect materials from soiling, rusting and damage.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Do not install gypsum board when ambient temperature is below 40°F.
   2. For adhesive attachment of gypsum board, and for finishing of gypsum board, maintain ambient temperature above 55°F from one week prior to attachment or joint treatment, and until joint treatment is complete and dry.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Gypsum Board and Accessories: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL. Or approved equal.

B. Steel Framing and Furring: Company acceptable to installer**.**

C. Grid Suspension Assemblies: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL. Or approved equal.

2.2 BOARD MATERIALS

A. Gypsum Board:
   1. ASTM C1396 (Section 5), regular type except where Type X fire-resistant type is indicated or required to meet UL assembly types.
   2. Edges: Tapered.
   3. Acceptable products:
      a. Typical partitions and ceilings: Equivalent to SHEETROCK® brand SW, FIRECODE® or FIRECODE® "C" Core gypsum panels by USG.

b. OR Equivalent to SHEETROCK® brand Regular, FIRECODE® or FIRECODE® "C" Core gypsum panels by USG.
c. Acceptable product for fire-rated walls: Equivalent to ULTRACODE® Core, 3/4 inch thick, by USG.
d. Use gypsum board and joint compound with little or no VOCs and formaldehyde emissions. Gypsum board shall have a minimum of 5% Post- consumer and 20% Post-industrial (nation-wide average for company) as defined by FTC (Federal Trade Commission) by USG.

B. Moisture & Mold Resistant
1. ASTM C1396 (Section 5), regular type except where Type X fire-resistant type is indicated or required to meet UL assembly types.
2. Edges: Tapered.
3. Thickness: 5/8 inch.
4. Acceptable products: Sheetrock® brand Mold Tough™ Firecode (Type X), Firecode® C Core or ULTRACODE® Core gypsum panels by USG.

C. Shaftwall:
1. Liner boards:
a. ASTM C442, Type SLX.
b. Edges: Beveled.
c. Thickness: 1 inch.
d. Acceptable product: Equivalent to SHEETROCK® gypsum liner panels by USG.
2. Face boards:
a. ASTM C1396 (Section 5), Type X.
b. Thickness: 1/2 inch, unless otherwise indicated.
c. Acceptable product: Equivalent to SHEETROCK® FIRECODE® C Core and FIRECODE® Core gypsum panels by USG.

2.3 METAL FRAMING AND FURRING MATERIALS

A. Metal Studs and Runners:
1. ASTM C645, "C" shaped, gauge:
a. Provide gauge as indicated for studs; runner gauge as recommended by stud manufacturer.
b. Provide runner gauge as recommended by stud manufacturer.
2. Depth of sections: As indicated.
3. Corrosion protection: G40 hot-dipped galvanized coating per ASTM A525.

B. Shaft Wall Supports:
1. Conform to ASTM A446, Grade A, with G40 hot-dipped galvanized coating per ASTM A525.
2. Studs:
a. Shape: "CH", or as standard with manufacturer.
b. Gauge: As required to fulfill performance criteria, minimum 25 gauge. Provide 20 gauge for jamb and lintel components.
c. Size: As indicated.
d. J runners: 24 gauge, size as required for coordination with studs.
e. Jamb struts: 20 gauge with 3 inch back leg for use at elevator frames.

C. Metal Furring Channels:
1. Hat-shaped:

a. ASTM C645, 7/8 inch high, 25 gauge, with G40 hot-dipped galvanized coating per ASTM A525.
b. Provide 20 gauge at furring to receive tile backer board.
c. Acceptable products: DWC-25 for ½" and 5/8" gypsum board and DWC-20 by USG.

2. Z-shaped: ASTM C645, depths as indicated, 24 gauge minimum, with G40 hot-dipped galvanized coating per ASTM A525.
3. Resilient: Manufacturer's standard type designed to reduce sound transmission; 1/2 inch deep, 25 gauge steel with G40 hot-dipped galvanized coating per ASTM A525.

2.4 CEILING AND SOFFIT SUPPORT MATERIALS

A. Hanger Anchorage Devices: Screws, clips, bolts or other devices compatible with indicated structural anchorage for ceiling hangers and whose suitability has been proven through standard construction practices or by certified test data.

B. Hangers:
1. Steel wire or rods, sizes to comply with requirements of ASTM C754 for ceiling or soffit area and loads to be supported.
2. Wire: ASTM A 641, soft, Class 1 galvanized.
3. Rods and flats:
   1. Mild steel components.
   2. Finish: Galvanized or painted with rust-inhibitive paint for interior work; galvanized for exterior work.

C. Framing System:
1. Main runners:
   1. Cold-rolled, "C" shaped steel channels, 16 gauge minimum.
   2. Finish:Galvanized or painted with rust-inhibitive paint for other interior work.
2. Cross furring: Hat-shaped steel furring channels, ASTM C645, 7/8 inch high, 25 gauge, galvanized.
3. Furring anchorages: 16 gauge galvanized wire ties, manufacturer's standard wire-type clips, bolts, nails or screws recommended by furring manufacturer and complying with ASTM C754.
4. Provide compression posts and other accessories as required to comply with seismic requirements.

D. Proprietary Framing System:
1. Framing system for gypsum board panels consisting of cold-rolled steel members conforming to ASTM C635, with exposed surfaces finished in manufacturer’s standard enamel paint finish.
2. Fire rating: 1 hour rating in accordance with UL assembly indicated.
3. Components: Main tees, furring cross channels, furring cross tees, and cross tees.
4. Accessories:
   a. U-shaped channel molding.
   b. Galvanized carbon steel (12 ga.) hanger wire.
5. Acceptable product: Equivalent to Drywall Suspension System by USG.

2.5 ACCESSORIES

A. Metal Trim for Gypsum Board:
1. Conform to profile and dimensions indicated.
2. Material for interior work: Galvanized steel, 26 gauge minimum.
3. Corner beads: Equivalent to Dur-A-Bead No. 103by USG.
4. Casing beads (edge beads): Equivalent to 200A by USG.

5. J-Beads.

B. Adhesives and Joint Treatment Materials:
   1. Conform to requirements of ASTM C475.
   2. Joint compounds:
      a. Drying-type (ready-mixed): Equivalent to SHEETROCK® brand taping joint compound and topping joint compound, or SHEETROCK® all purpose joint compound [or ready-mixed lightweight all purpose joint compound by USG.

C. Gypsum Board Screws: Self-drilling, self-tapping steel screws.
   1. For steel framing less than 0.03 inch thick: Comply with ASTM C1002.
   2. For steel framing from 0.033 inch thick to 0.112 inch thick: Comply with ASTM C954.
   3. Provide Type S or Type S-12 screws.

D. Backer Board Accessories: Provide accessories and corrosion-resistant-coated steel screws as recommended by backer board manufacturer and required for complete installation.

E. Acoustical Sealant: Equivalent to to SHEETROCK® acoustical sealant by USG.

F. Miscellaneous Accessories: Provide as required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction and conditions under which work is to be installed. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install in accordance with reference standards and manufacturer's instructions [and as required to comply with seismic requirements].

B. Tolerances:
   1. Do not exceed 1/8 inch in 8'-0" variation from plumb or level in exposed lines of surface, except at joints between gypsum board units.
   2. Do not exceed 1/16 inch variation between planes of abutting edges or ends.
   3. Shim as required to comply with specified tolerances.

C. Install framing to comply with ASTM C754 and with ASTM C840 requirements that apply to framing installation.

D. Install supplementary framing, blocking and bracing at terminations in gypsum board assemblies to support fixtures, equipment, heavy trim, grab bars, toilet accessories, furnishings or similar construction.

3.3 METAL SUPPORT INSTALLATION

A. Metal Runners:
   1. Align and secure runner tracks accurately to partition layout at both floor and ceiling.
   2. Provide fasteners appropriate to substrate construction as recommended by manufacturer.

B. Metal Studs:
   1. Position metal studs vertically in the runners, spaced as indicated.
   2. Place studs so that flanges face in same direction.
   3. Cut studs 1/2 inch short of full height to provide perimeter relief.
   4. Align and plumb partition framing accurately.
   5. Where partitions abut ceiling or deck construction or vertical structural elements, provide slip or cushion type joint between partition and structure as recommended by stud manufacturer to prevent transfer of structural loads or movements to partitions, and to provide lateral support.
   6. Provide horizontal bracing where necessary for lateral support.
   7. Chase walls:
      a. Position steel studs on opposite sides of chase directly across from each other.
      b. Cut cross-bracing from gypsum board 12 inches high by chase wall width.

C. Ceiling and Soffit Support Systems:
   1. Secure hangers or rods to structural support by connecting directly to structure where possible; otherwise connect to inserts, clips or other anchorage devices or fasteners indicated.
   2. Space main runners, hangers and furring according to requirements of ASTM C754, except as otherwise indicated.
   3. Where spacing of structural members, or width of ducts or other equipment, prevents regular spacing of hangers, provide supplemental hangers and suspension members and reinforce nearest affected hangers to span extra distance.
   4. Install compression posts, splay wires and other accessories as required to comply with seismic requirements.
   5. Extend runners to within 6 inches of walls.
   6. Wire-tie or clip furring members to main runners and to other structural supports indicated. In fire resistance rated assemblies, wire-tie furring members; do not clip.
   7. Do not permit furring or runners to contact masonry or concrete walls.
   8. Provide 1 inch clearance between furring or runners and abutting walls and partitions.

3.4 FINISHING

A. Provide levels of gypsum board finish for locations as follows, in accordance with Gypsum Association GA 214, "Recommended Specification: Levels of Gypsum Board Finish".
   1. Level 1: Ceiling plenum areas and concealed areas, except provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings.
   2. Level 2: Gypsum board substrate at tile [stone], except remove tool marks and ridges.
   3. Level 3: Gypsum board surfaces, where textured finishes or heavy vinyl wall papering will be used [High-build Primer required as specified in Division 09 or USG First Coat primer].
   4. Level 4: Gypsum board surfaces, except where another finish level is indicated High-build Primer required as specified in Division 09 or USG First Coat primer.

END OF SECTION

SECTION 09 29 00

GYPSUM BOARD

1. GENERAL

1.1 REFERENCES:

A. Drawings and general provisions of Contract, including General Conditions and Division 1 specifications, apply to work in this section.

B. NOTE: Selection of Finish colors and patterns in overall color scheme to be made by Architect. Contractor to notify Architect prior to commencing Gypsum Board work, to allow adequate time for color selections, Owner's approval and material ordering lead time.

1.2 DESCRIPTION OF WORK: The extent of work shall be as shown on Drawings and called for in these Specifications. Performance shall meet the requirements of these Specifications. The work covered by this section of Specifications consists of the following:

A. Drywall installation as required by Drawings and noted in these Specifications.
B. Taping and finishing all walls and ceilings, except where other kind of finish is specified.

2. PRODUCTS

2.1 Acceptable Manufactures

- American Gypsum
- Atlantic Group Limited
- Celotix Corporation
- Continental Gypsum Company
- James Hardie Gypsum
- Lafarge Gypsum
- United States Gypsum Company

2.2 NOTE: GWB types are shown as U.S.G. brand names “Sheetrock”, “Firecode”, “Firecode C”, “M.R. Board” and “Shaftwall”. Substitutions must have equal U.L. and STC ratings. See Drawings for Specific assembly.

2.3 EXTERIOR & INTERIOR WALLS & CEILINGS: See rated & non rated assemblies and wall types on the drawings.

2.4 NOTE: Type M.R. in bathrooms, walls and ceiling. See Drawings for double layer of gyp board to cover fiberglass tub flange.

2.5 RESILIENT CHANNEL: USG-RC-1

2.6 USG Drywall Suspension System.

2.7 Corner Bead

3. EXECUTION

3.1 THE DRYWALL CONTRACTOR shall inspect all areas affected by his work to ascertain that all work is complete and has been accepted. Defective installations shall be corrected before finished surfaces are painted or sprayed with acoustical material.

3.2 DRYWALL INSTALLATION. Install drywall as shown on plans, noted in the UL Specifications, and as set forth in U.S.G. Handbook. Installation of non-UL rated drywall assemblies on steel studs shall comply with the following minimum requirements:

A. Spacing for attachment members shall not exceed 24" o.c. for walls and 16" o.c. for ceilings. All drywall shall be screwed with approved drywall screws made specifically for the purpose and of length adequate for wall types. On walls, screws shall not be placed more than 16" apart for 16" o.c. framing or 12" apart for 24" o.c. framing. Screw all edges 12" o.c. maximum. See Structural Drawings S3.2 and S3.3 for shear walls sheathing attachment.

B. The drywall contractor may use a few drywall nails to temporarily secure a sheet of drywall before securing with drywall screws. In this event, the drywall nails must be countersunk prior to taping. Corner beads shall be used on all corners and casing beads used whenever Gypsum Board abuts dissimilar material. Caulking to also be applied at these junctions. At all party and unit/corridor walls, Gypsum Board to be set in caulking (for sound).

C. Drywall shall be laid vertically or horizontally. No tapered joints at floor base. See Structural Drawings for shear walls.

D. Gypsum Sheathing Application
Apply 24” wide sheathing horizontally with tongue edge up. Install supplementary bracing as required by applicable code. Fasten sheathing with nails spaced 8” o.c. along each stud.
Apply 48” wide sheathing vertically with bottom edge bearing on foundation or subfloor. Install supplementary bracing (and adhesive) as required by applicable code. Fasten sheathing to studs and plates with nails 8” o.c.

E. Joint System
Prefill Application

a. Mix SHEETROCK Brand Setting-Type (DURABOND) or Lightweight Setting-Type (EASY SAND) Joint Compound according to directions on bag. Do not over mix, or use extremely cold water or cold joint compound.

b. Prefill all “V” grooves formed by abutting tapered eased edges of SHEETROCK Brand Gypsum Panels, SW Edge, with SHEETROCK Brand Setting-Type (DURABOND) or Lightweight Setting-Type (EASY SAND) Joint Compound using a flexible 5” or 6” joint finishing knife or Ames Pre-Fill Tool. Fill “V” joint flush and wipe off excess compound beyond the “V” groove, leaving a clear depression to receive tape. Allow prefill to harden prior to the next application (tape or embedding coat).
SHEETROCK Brand Joint Tape

c Mix joint compound in strict accordance with manufacturer’s recommendations.

d Apply joint compound in a thin uniform layer to all joints and angles to be reinforced. Immediately apply SHEETROCK Brand Joint Tape centered over joint and seated into compound. Sufficient compound—approx. 1/64" to 1/32"— must remain under the tape to provide proper bond. Follow immediately with a thin skim coat to embed tape, but not to function as a second coat. Fold and embed tape properly in all interior angles to provide a true angle. The tape or embedding coat must be thoroughly dry prior to application of second coat. (Exception: DURABOND Setting-Type and EASY SAND Lightweight Setting-Type Joint Compounds need only have hardened prior to application of next coat.)

e Apply second coat of joint compound over embedding coat, filling panel taper flush with surface; cover tape and feather out at least 2" beyond first coat. On joints with no taper, cover the tape and feather out at least 4" on either side of tape. Allow second coat to dry thoroughly prior to application of finish coat. (Exception: DURABOND Setting-Type and EASY SAND Lightweight Setting-Type Joint Compounds need only have hardened prior to second coat application.)

f Spread finish coat evenly over and extend at least 2" beyond second coat on all joints and feather to a smooth uniform finish. Do not allow finished joint to protrude beyond plane of the surface. Where necessary, sand lightly between coats and following the final application of compound to provide a smooth surface ready for decoration. When sanding, take care not to roughen face paper.

SHEETROCK Brand Fiberglass Drywall Tape

a. Mix joint compound in strict accordance with manufacturer's recommendations.
b. Center and apply SHEETROCK Brand Fiberglass Drywall Tape directly over joint, pressing tape firmly so that it adheres evenly to surface. To eliminate wrinkles and ensure maximum bond, press entire length of taper with drywall knife.
Avoid overlapping tape at intersections. Cut tape with drywall knife.
c. Cover with a layer of SHEETROCK Brand Setting-Type (DURABOND) or Lightweight Setting-Type (EASY SAND) Joint Compound, forcing compound through the tape with a drywall knife/trowel to completely fill and level the joint. Failure to completely fill the joint may result in cracking. Let dry and sand lightly as required.
d. Apply second coat of SHEETROCK Brand Setting-Type (DURABOND) or Lightweight Setting-Type (EASY SAND) Joint Compound or SHEETROCK Brand Drying-Type Joint Compound (powder or ready mixed), feathering approximately 2" beyond first coat. Let dry and sand lightly as required.

Finishing Fasteners

a. Apply a setting-type, all-purpose, or lightweight all-purpose compound to fastener depressions as the first coat. Follow with a minimum of two additional coats of topping or all-purpose compound, leaving all depressions level with the surface. (Exception: Setting-type and lightweight all-purpose joint compounds need only one additional coat.)

F. SHEETROCK Brand Paper Faced Drywall Metal Bead and Trim

Application and Finishing

a. Apply compound to both sides of corner, extending 2" on each side for outer corners, 1-1/2" for inside corners. Cut bead to desired length; align tightly to ceiling and press firmly with fingers along length of corner to set. Do not bend bead. Run taping knife over corner at a 45° angle with even pressure. Remove excess compound using knife to eliminate air bubbles under paper. Allow to dry.

b. For outer corners, apply another coat of compound to both sides, feathering out 5”-6”on each side. Let dry; sand lightly as necessary. For inner corners, apply fill coat to one side, feathering out 1”. Let dry. Apply fill coat to other side using same procedure. Let dry. Sand lightly where necessary.

c. For outer corner, apply finishing coat, feathering 8” from nose of bead. Draw knife along one side of bead with one edge resting on nose of bead and other on surface of wallboard. Repeat for other side. Let dry. Sand and prime. For inner corners, apply finishing coat to one side, feathering 1” past previous coat. Let dry. Apply finishing coat to other side. Let dry. Sand and prime.

G. Other Bead and Trim

Installation

a. Reinforce all vertical and horizontal exterior corners with corner bead fastened with nails or 9/16” galvanized staples 9” o.c. on both flanges along entire length of bead.

b. Where partition or ceiling terminates against masonry or other dissimilar material, apply metal trim over gypsum panel edge and fasten with nails or galvanized staples 9” o.c.

Finishing

a. Apply first coat to all bead and trim and properly feather out from ground to plane of surface. Compound must thoroughly dry prior to application of second coat (exception: SHEETROCK Brand Setting-Type [DURABOND] and Lightweight Setting-Type [EASY SAND] Joint Compounds need only have hardened prior to application of next coat.)

b. Apply second coat in same manner as first coat, extending compound slightly beyond face of panel. Compound must be thoroughly dry prior to application of finish coat (exception: Setting-Type joint compounds need only have hardened prior to application of next coat.)

c. Apply finish coat to all bead and trim, extending compound slightly beyond the second coat and properly feathering from ground to plane or surface (exception: Only two coats of SHEETROCK Brand Setting-Type [DURABOND] or Lightweight Setting-Type [EASY SAND] Joint Compound or SHEETROCK Brand Lightweight All Purpose Joint Compound Ready Mixed [PLUS 3] are needed.) When dry, sand finish as necessary to provide a flat smooth surface ready for decoration. When sanding, take care not to roughen face paper.

Note1: Gypsum board to be installed behind all tubs and shower units which results in double gypsum board on some bathroom walls. See bathroom drawing sheet.

Note 2: Fire rated gypsum board ceiling in concealed spaces. IE: Under acoustic tile ceiling in corridors tape to be set in compound and several coats of compound applied over tape, no exposed tape will be accepted.

H. Ceiling suspension system:

1. Space hangers not over 48 in. o.c. in direction of main runner channels, and within 6 in. of ends of main runner runs and of boundary walls, structural steel, partitions, and similar interruptions of ceiling continuity. Install additional hangers at ends of each suspension member and at ceiling equipment not separately suspended, 6 in. from vertical surfaces. Do not splay wires more than 5 in. in a 4 ft. vertical drop. Wrap wire a minimum of three times horizontally, turning ends upward.
2. Attach hangers directly to ceiling structure, or to supplementary framing members supplied and installed under this section. Hangers may not be suspended from mechanical or electrical equipment such as ductwork, conduit or piping.

3. Install 1-1/2 in. main runner channels spaced not over 48 in. o.c. within 6 in. of wall. Position channels for proper ceiling height, level and secure, with hanger wire saddle-tied along channel. Provide 1 in. clearance between runners and abutting walls and partitions. At channel splices, interlock flanges, overlap ends 12 in., and secure each end with double-strand 18 ga. tie wire.
4. Erect ¾ in. metal furring channels at right angles to main runner channels or main support members. Space furring not over 16 in. o.c., and within 6 in. of wall. Provide 1 in. clearance between furring ends and abutting walls and partitions. Secure furring to carrying channels with clips or saddle-tie to supports with double strand 18 ga. tie wire. At splices, next furring channels at least 8 double-strand 18 ga. tie wire.
5. At openings interrupting main or furring channels, install additional cross-reinforcing as required, to restore lateral stability of ceiling framing system.
6. Finished installations shall be level to within ¼ in. in 10 ft.

3.3 ON SURFACES TO BE PAINTED: tape and cement all joints and screw locations with three coats of compound, then sand to smooth finish, acceptable to paint.

3.4 DURING WORK PROGRESS, remove all excess materials and debris resulting from operations, which may disrupt the work of other trades and after completion leave the premises broom clean.

END OF SECTION

SECTION 09 51 23

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes:
   1. Acoustical ceiling panels.
   2. Exposed grid suspension system.
   3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.
B. Related Sections:
   1. Section 09 29 00 - Gypsum Board
   2. Division 21 00 00 – Fire Suppression
   3. Division 22 00 00 – Plumbing
   4. Division 23 00 00 – HVAC
   5. Division 26 00 00 - Electrical

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
   2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
   3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
   4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
   6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
   7. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

8. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
9. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
10. ASTM E 1264 Classification for Acoustical Ceiling Products.
11. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
12. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
13. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.

B. ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"
C. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components
D. International Code Council-Evaluation Services - Evaluation Report, ESR-1308, Fire- and Nonfire-Resistance-Rated Suspended Ceiling Framing Systems
E. ASCE 7 Standard - American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures
F. CISCA Seismic Zones 3 & 4 - Ceilings and Interior Systems Construction Association Guidelines for Seismic Restraint for Direct Hung Suspended Ceiling Assemblies

1.4 SYSTEM DESCRIPTION

- Seismic Loads: Design and size components to withstand seismic loads in accordance with the International Building Code, Section 1621 for Category D,E, and F.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
B. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.
C. Shop Drawings: Layout and details of acoustical ceilings. Show locations of items which are to be coordinated with, or supported by the ceilings.
D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.
E. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
    1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
        a. Flame Spread: 25 or less
        b. Smoke Developed: 50 or less
C. Seismic Performance: Provide acoustical ceiling system that has been evaluated by an independent party and found to be compliant with the 2009 International Building Code, Seismic Category D, E, and F.
    1. Tested per International Code Council - Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components as evidenced by International Code Council Evaluation Report, ESR-1308.
D. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.8 PROJECT CONDITIONS

A. Space Enclosure:

All ceiling products and suspension systems must be installed and maintained in accordance with Armstrong written installation instructions for that product in effect at the time of installation and best industry practice. Prior to installation, the ceiling product must be kept clean and dry, in an environment that is between 32oF (0o C) and 120oF (49o C) and not subject to Abnormal Conditions.
Abnormal conditions include exposure to chemical fumes, vibrations, moisture from conditions such as building leaks or condensation, excessive humidity, or excessive dirt or dust buildup.

<u>HumiGuard Plus Ceilings:</u> Installation of the products shall be carried out where the temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc.) must be complete and dry.
The ceilings must be maintained to avoid excessive dirt or dust buildup that would

provide a medium for microbial growth on ceiling panels. Microbial protection does not extend beyond the treated surface as received from the factory, and does not protect other materials that contact the treated surface such as supported insulation materials.

1.9 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
    1. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
    2. Grid System: Rusting and manufacturer's defects
    3. Acoustical Panels with BioBlock Plus or designated as inherently resistive to the growth of micro-organisms installed with Armstrong suspension systems: Visible sag and will resist the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
B. Warranty Period Humiguard:
    1. Acoustical panels: Ten (10) years from date of substantial completion.
    2. Grid: Ten (10) years from date of substantial completion.
    3. Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is thirty (30) years from date of substantial completion.
C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.10 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
    1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
    2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

Part 2-PRODUCTS

2.1 MANUFACTURERS

A. Ceiling Panels:

1. Armstrong World Industries, Inc.

- Location:

2.2.0 ACOUSTICAL CEILING UNITS

A. Armstrong Mesa 24” x 24” beveled tegular with 9/16” grid

2.3.0 SUSPENSION SYSTEMS

B. Components: Main beams and cross tees In accordance with the International Building Code, Section 1621 for Category D, E and F as described in ESR-1308.
    1. Structural Classification: ASTM C 635, Heavy Duty.
C. Attachment Devices: In accordance with the International Building Code, Section 1621 for Category D, E, and F.
D. Wire for Hangers and Ties: In accordance with the International Building Code, Section 1621.
E. Wall Moldings: In accordance with the International Building Code, Section 1621 for Category D, E. and F or method as described in ESR-1308.
F. Accessories:
    1. BERC2 - 2 inch Beam End Retaining Clip, 0.034 inch thick, hot-dipped galvanized cold-rolled steel per ASTM A568 - used to join main beam or cross tee to wall molding.
    2. SJCG - Seismic Joint Clip, 5 inches x 1-1/2 inch, hot-dipped galvanized cold-rolled steel per ASTM A568. The two piece unit is designed to accommodate a seismic separation joint. The clip is compatible with 15/16 inch and 9/16 inch grid systems including Prelude, Suprafine, and Silhouette The SJCG is not suitable for use with Vector panel installations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
    1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION (Category D,E,F)

A. Install suspension system and panels in accordance with the International Building Code, Section 1621, except as noted in Section 4.4.3.1 of ESR-1308, and with the authorities having jurisdiction.
B. ESR-1308, Section 4.4.3.1, Alternate Seismic Design Category D,E and F Installation:

   Under this installation, the runners must be rated heavy-duty and have a minimum simple span uniform load of 16.35 pounds per lineal foot (238 N/m); maximum ceiling weight permitted is 1.80 pounds per square foot (8.78 kg/m2).

   1. The BERC-2 clip is used to secure the main runners and cross runners on two adjacent walls to the structure and the two opposite walls to the perimeter trim, as detailed below. A nominal 7/8-inch (22 mm) wall molding is used in lieu of the 2-inch (51 mm) perimeter supporting closure angle required by Section 9.6.2.6.2.2 (b) of ASCE-7 for Seismic Design Categories D, E and F. Except for the use of the BERC-2 clip and the 7/8-inch (22 mm) wall molding and elimination of spreader bars, installation of the ceiling system must be as prescribed by the applicable code.
   2. The BERC-2 clip is attached to the wall molding by sliding the locking lances over the hem of the vertical leg of the wall molding. Clips installed on the walls where the runners are fixed are attached to the runner by a sheet metal screw through the horizontal slot in the clip into the web of the runner.

      <u>Alternate #2</u>: If acceptable to architect, fixed attachment may be accomplished by pop-riveting the runner to the wall molding.

   3. Clips installed on the walls where the runners are not fixed to the runner allow the terminal runner end to move 3/4 inch (19.1 mm) in both directions. BERC-2 clips installed in this manner are an acceptable means of preventing runners from spreading in lieu of spacer bars required in CISCA 3-4, which is referenced in ASCE 7, Section 9.6.2.6.2.2, which is referenced in IBC Section 1621.
C. The SJCG Seismic Separation Joint Clip is to be installed per the manufacturer's instructions, CS-3815.
D. The presence of a hanger wire within 3 inches of an expansion relief joint as called for in ASTM C636 shall be required in addition to the requirements of the International Building Code, Section 1621.2.5 and with the authorities having jurisdiction.
   1. Only applies when using Prelude XL Fire Guard 15/16"; Prelude Plus XL Fire Guard 15/16"; and Suprafine XL Fire Guard 9/16" Exposed Tee Systems.
E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3. FIELD QUALITY CONTROL

- Suspended ceiling shall be subject to the special inspection requirements in Section 01 45 00 Quality Control Services - Code-Required Special Inspections and Procedures.

3.5 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.
B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

CUT SHEETS FOLLOW

CEILING | SYSTEMS

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SINGLE TEE ADAPTER CLIP (STAC)

Installation Instructions

1. GENERAL

1.1 Description

The Single Tee Adapter Clip (STAC Clip) is used to create code compliant, off-module cross tee connections on Armstrong suspension systems where a cross tee intersects a main beam and is not locked into place with another cross tee.

STAC Clip (patent pending)

SUSPENSION SYSTEMS THAT CAN UTILIZE STAC INCLUDE:	
• Prelude® XL®/ML	• Silhouette 1/4" XL*
• Suprafine® XL/ML	• Interlude® XL
• Silhouette® 1/8" XL*	• Armstrong Drywall Grid

* Silhouette XL suspension intersection will result in a non-mitered visual at STAC location

The STAC Clip:

- Provides code compliant (non-seismic and Seismic Design Categories C and D, E, F) off-module main beam to cross tee connections
- Improves the squareness of the installed suspension system and prevents twisting of main beams
- Allows panel accessibility, no interference from screws, etc.
- Meets ASTM E580 compliant pullout strength
  - Seismic Design Category C requirement is 60 lbs
  - Seismic Design Categories D, E, F requirement is 180 lbs

Armstrong

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: FINISH MATERIALS FOR BACK-OF-HOUSE AREAS ONLY

1. Vinyl Composition Tile
2. Sheet Vinyl Flooring
3. Resilient Base
4. PVC Thresholds
5. Solid Vinyl Transition Edges
6. Stair Nosings

B. Related Sections:

1. Section 09 30 13 - Ceramic Tiling
2. Section 09 68 00 - Carpeting

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 03 30 and the following supporting data:

1. Submit manufacturer's product and maintenance data for each type of resilient flooring and accessory.

a. Certification by resilient flooring manufacturer that products supplied for flooring installation comply with local regulations controlling use of volatile organic compounds (VOCS).

2. Submit color selection in the form of actual sections of resilient flooring, including accessories, for each type of resilient flooring required showing full range of colors and patterns available.
3. Submit shop drawings, seaming plan, and coving details for flooring and accessories.

B. Installer Certificates: Signed by sheet vinyl flooring system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install sheet vinyl flooring system.

1.03 QUALITY ASSURANCE

A. Single-Source Responsibility for Flooring: Obtain each type, color and pattern of flooring from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the work.

B. Installer: A firm with not less than five years of successful experience in installation of sheet vinyl flooring systems with chemically welded seams similar to those required for this project and which is certified by manufacturer of the sheet vinyl materials.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver tiles and installation accessories to Project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 65 degrees F. and 90 degrees F. Store tile flooring materials on flat surfaces. Move resilient flooring and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

C. Store sheet vinyl rolls upright. Move sheet vinyl floor coverings and installation accessories into spaces where they will be installed at least 48 hours before installation, unless longer conditioning periods are recommended in writing by manufacturer.

1.05 PROJECT CONDITIONS

A. Maintain a minimum temperature of 70 degrees F. in spaces to receive tiles for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 degrees F.

B. Do not install resilient flooring until they are at the same temperature as the space where they are to be installed. Close spaces to traffic during resilient flooring installation.

C. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

1.06 SEQUENCING AND SCHEDULING

A. Do not install resilient flooring materials over concrete slabs until the slabs have cured and are sufficiently dry to bond with adhesive as determined by tile manufacturer's recommended bond and moisture test.

PART 2 PRODUCTS

2.01 VINYL COMPOSITION TILES:

A. Approved Manufacturers: SEE FINISH SCHEDULE

B. All vinyl tile shall be the maximum extent possible of a single batch number. Tile should have uniform disbursement of color and texture throughout the thickness of the tile. Comply with ASTM F1066, Composition 1 (nonasbestos formulated).

C. Size and Color: Refer to Interior Finish Index.

2.02 RESILIENT BASE

A. Approved Manufacturers: SEE FINISH SCHEDULE

B. Resilient bases shall be 1/8" thick, size as shown in Interior Finish Index. Provide cove type at sheet vinyl, resilient tile flooring, and other hard surfaces. Job mitering of corners will not be permitted.

2.03 PVC THRESHOLD:

A. Approved Manufacturers:

1. "Carpet Insert Threshold Mouldings"; Johnsonite (800-899-8916).

a. Guestroom Entry Door: "Model VT-XX-M6", 1-3/4" wide by 1/2" thick.

b. Guestroom Connecting Door: "Model VT-XX-M2", 5-1/2" wide by 1/2" thick.

B. Manufactured from a homogeneous composition of polyvinyl chloride (PVC), high quality additives, and colorants. All Threshold Mouldings shall comply with A.D.A. requirements of Section 4.5.2 Changes of Level. Standard formulation exceeds ASTM E648 Class 1 Flammability requirements.

1. Hardness - ASTM D2240 - Not less than 85 Shore A

2. Abrasion Resistance - ASTM D3389 - 0.22 mg/cycle

3. Slip Resistance - ASTM D2047 - Exceeds Federal Standards and ADA requirements of .6 for flat surfaces.

4. Fire Resistance:

a. ASTM E648/NFPA 253 (Critical Radiant Flux) - Class 1.

b. ASTM E662/NFPA 258 (Smoke Density) - 450 or less.

5. Adhesive: As recommended by Manufacturer for use intended.

6. Color: Refer to Interior Finish Index for color and other additional requirements.

2.04 TRANSITION EDGES:

A. Approved Manufacturers:

1. Marley Flexco Co. , A Soflex Company (800-633-3151)

2. Johnsonite (800-899-8916)

3. Burke Mercer Flooring Products, A Division of Burke Industries (800-669-7010).

4. Schluter Systems (800-574-8481)

B. Model, Size and Color: Refer to Interior Finish Index.

C. Furnish transition edges at the following locations:

1. Vinyl Composition Tile to Carpet

2. Sheet Vinyl Flooring to Concrete

2.05 RESILIENT STAIR ACCESSORIES

A. Stair Nosings:

1. Approved Manufacturers:

a. Johnsonite (800-899-8916).

b. Burke Mercer Flooring Products, A Division of Burke Industries (800-669-7010).

c. Roppe Corporation (800-537-9527)

B. Model, Size and Color: Refer to Interior Finish Index.

2.06 INSTALLATION ACCESSORIES

A. Concrete Slab Primer:

1. Vinyl Composition Tiles

a. Non-staining type as recommended by flooring manufacturer.

B. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by manufacturer for applications indicated.

1. Vinyl Composition Tiles

a. As recommended by flooring manufacturer.

C. Resilient Base Adhesives to be Non-Toxic, Low Odor, and Solvent Free with no alcohol, glycol, or ammonia. Adhesive shall be antimicrobial with no hazardous vapors and contain no carcinogenic materials, per OSHA Regulation 29 CFR 1910-1200. All containers shall contain material safety data sheets (MSDS) and be available at job site for inspection. Provide product as manufactured by W.F. Taylor Co., Inc. (800-397-4583) recommended for intended installation, as approved by resilient base manufacturer, or approved substitution.

D. Other materials, including edge strips not specifically described, but required for a complete and proper installation of resilient flooring, shall be only as recommended by the manufacturer of material to which it is applied.

PART 3 EXECUTION

3.01 INSPECTION:

A. Installer must examine the areas and conditions under which resilient flooring and accessories are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

1. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.

2. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.02 CONCRETE SUBFLOORS OR GYPSUM CEMENT FLOOR UNDERLAYMENT:

A. Verify that concrete slabs comply with ASTM F710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, residual adhesives, adhesive removers, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by manufacturer.
2. Finishes of subfloors comply with tolerances and other requirements specified in Division 03 Section, "Cast-In-Place Concrete" for slabs receiving resilient flooring.
3. Subfloor Moisture Conditions: Before installing flooring Contractor shall verify that Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 deg F, or as recommended by manufacturer.
4. Subfloor Alkalinity Conditions: Before installing flooring Contractor shall verify that a pH range of 5 to 9 when subfloor is wetted with potable water and pHydrion paper is applied

3.03 PREPARATION

A. General: Comply with manufacturer's installation specifications for preparing substrates to receive products indicated.

1. Comply with Armstrong Guaranteed Installation Manual F-5061, or equivalent by other listed manufacturers.

B. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

C. This Contractor to remove coatings, including curing compounds, adhesives, plastics, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush. Surface to receive new flooring shall be fully prepared, including removal of existing materials not acceptable for proper installation of new materials, as required by manufacturer. Do not use solvents.

D. Slab Primers:

1. Gypsum Cement Floor Underlayment: Apply Armstrong "S-185 Latex Primer and Additive", or approved substitution, to gypsum subfloor liberally with a short nap paint roller or a coarse fiber brush. Avoid puddling. Use at full strength, DO NOT DILUTE.
2. 2. Allow to dry thoroughly before skimming with floor patch

E. Underlayment or Leveling Compound: Use leveling compound as recommended by flooring manufacturer for filling small cracks and depressions in subfloors. All rough areas, projections, ridges, and bumps shall be removed.

1. Vinyl Composition Floor Tile: Apply underlayment or leveling compound in compliance with manufacturer's directions.
2. Sheet Vinyl Flooring: Skim coat the entire subfloor with Armstrong "S-184 Fast-Setting Cement-Based Patch and Skim Coat", or approved substitution, using a smooth-edge

finishing trowel filling in the recessed areas to provide a smooth finished substrate to receive the sheet vinyl.

3.04 INSTALLATION - GENERAL:

A. Install flooring after finishing operations, including painting, have been completed. Moisture content of concrete slabs, building air temperature, and relative humidity must be within limits recommended by flooring manufacturer's directions.

B. Patch and repair floors and walls to receive flooring for proper installation of flooring, stair accessories, and base.

C. Place flooring with adhesive cement in strict compliance with manufacturer's recommendations. Butt tightly to vertical surfaces and edgings. Scribe around obstructions and to produce neat joints, laid tight, even, and straight. Extend flooring into toe spaces.

D. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.

E. Install flooring on covers for telephone and electrical ducts and other such items as occur within finished floor areas.

F. Maintain overall continuity of color and pattern with pieces of flooring installed in these covers. Tightly cement edges to perimeter of floor around covers and to covers.

G. Tightly cement flooring to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections.

3.05 INSTALLATION - VINYL COMPOSITION TILE FLOORS:

A. Lay tile from center marks established from center of area so that tile at opposite edges of the area are of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at edge perimeters. Lay tile square to room axis unless otherwise indicated.

B. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged. Cut tile neatly in and around all fixtures. Broken, cracked, chipped, or deformed tiles are not acceptable. Lay tile with grain in tile running in same direction.

C. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

D. Extend tiles into toe spaces, door reveals, closets, and similar openings.

E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

F. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.06 INSTALLATION - SHEET VINYL FLOORING:

A. General: Comply with sheet vinyl floor covering manufacturer's written installation instructions.

1. Install flooring in strict accordance with the latest edition of "Armstrong Guaranteed Installation System", F-5061, or equivalent by other listed manufacturers.

B. Unroll sheet vinyl floor coverings and allow them to stabilize before cutting and fitting, if recommended in writing by manufacturer.

C. Lay out sheet vinyl floor coverings to comply with the following requirements:

1. Maintain uniformity of sheet vinyl floor covering direction.

2. Arrange for a minimum number of seams and place them in inconspicuous and low-traffic areas, and not less than 6 inches away from parallel joints in flooring substrates.

3. Match edges of sheet vinyl floor coverings for color shading and pattern at sump according to manufacturer's written recommendations.

4. Avoid cross seams.

D. Install flooring wall-to-wall before the installation of floor-set cabinets, casework, furniture, equipment, moveable partitions and similar moveable objects.

E. Scribe, cut, and fit or flash cove to permanent fixtures, built-in furniture and cabinets, pipes and outlets, and permanent columns, walls, and partitions as shown on Drawings.

F. Extend sheet vinyl floor coverings into toe spaces, door reveals, closets, and similar openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.

H. Install sheet vinyl floor coverings on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.

I. Adhere sheet vinyl floor coverings to flooring substrates to comply with floor covering manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.

1. Produce completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

J. Chemically-Welded Seams: Chemically weld seams with Armstrong "S-553 Seam Sealer" into a seamless floor covering. Prepare, weld, and finish seams according to manufacturers written instructions and ASTM F 1516 to produce surfaces flush with adjoining floor covering surfaces.

K. Hand roll sheet vinyl floor coverings directions with a 100 pound roller in both directions from center out to embed floor coverings in full spread of adhesive and eliminate trapped air. At walls, door casings, and other locations where access by roller is impractical, press floor coverings firmly in place with flat-bladed instrument.

B. Do not reverse pieces (TM edge to non-TM edge)., if a seam is needed, seams should be positioned so that the ends of the planks are offset 3” to 6”. Install with Full Spread of Armstrong "S-575" adhesive using a fine notched trowel 1/32” deep x 1/16” wide x 5/64” apart.

3.07 RESILIENT WALL BASE INSTALLATION

A. At areas where base is required, apply resilient base to walls, columns, pilasters, casework, and other permanent fixtures, as coordinated with type of flooring. Install base in as long lengths as practicable. Tightly bond base to backing throughout the length of each piece with continuous contact at horizontal and vertical surfaces. On irregular surfaces, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

B. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.

2. Inside Corners: Use straight pieces of maximum lengths possible. Form by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

3.08 ACCESSORIES:

A. Place resilient edge strips tightly butted to adjacent materials of type indicated and bond to substrates with adhesive. Install edging strips at all unprotected edges of flooring unless otherwise shown. Apply resilient accessories to stairs and risers as indicated and according to manufacturer's installation instructions.

B. Stair Nosings:

1. Use stair-tread-nose filler, according to resilient tread manufacturer's written instructions, to fill nosing substrates that do not conform to tread contours.

2. Apply resilient products to stairs as indicated and according to manufacturer's written installation instructions.

3.09 CLEANING AND PROTECTION:

A. Perform the following operations immediately after installing resilient floor coverings:

1. Remove adhesive and other surface blemishes using cleaner recommended by floor covering manufacturer.

2. Sweep or vacuum floor thoroughly.

3. Do not wash floor covering until after time period recommended by floor covering manufacturer.

4. Damp-mop floor to remove marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by manufacturer of resilient product involved.

C. Cover sheet vinyl floor coverings with undyed, untreated building paper or the application of two coats of a high quality acrylic floor finish such as Ecolabs "Gemini Gemstar" or Armstrong "S-480 Commercial Floor Polish "can be applied to protect the floor during construction until inspection for Substantial Completion.

D. Clean products specified in this Section not more than four days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products using method recommended by manufacturer. Strip protective floor polish that was applied after completing installation, prior to cleaning.

E. Do not move heavy and sharp objects directly over resilient floor coverings. Place plywood or hardboard panels over floor coverings and under objects while they are being moved. Slide or roll objects over panels without moving panels.

3.10 FINISHING:

A. After completion of project and just prior to final inspection of work, thoroughly clean floors and accessories.

1. Vinyl Composition Tile: Apply wax and buff with type of wax, number of coats, and buffing procedures in compliance with flooring manufacturer's instructions.

B. Sheet Vinyl Flooring: Apply two (2) coats of a high quality acrylic floor matte shine finish (high gloss is not permitted) such as "Taski's Ombra Matte Shine Floor Finish" by Lever Industrial (800-827-5487), or approved substitution by Ecolabs.

END OF SECTION

SECTION 09 68 13

TILE CARPETING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes modular, fusion-bonded carpet tile.

1.2 RELATED SECTIONS

1. Section 09 65 00 - Resilient Base and Accessories

1.3 SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include installation recommendations for each type of substrate.

B. Samples: Submit manufacturers complete set of color samples for Architect's initial selection.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the certification level.

B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.

1.8 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 - PRODUCTS

2.1 CARPET TILE

Products: REFER TO FINISH SCHEDULE

2.2 ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
2. Subfloor finishes comply with requirements specified in Section 033100 "Cast-in-Place Concrete" for slabs receiving carpet tile.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

H. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Vacuum carpet tile using commercial machine with face-beater element.

END OF SECTION 09 68 13

SECTION 09 90 00

PAINTING AND WALL COVERING

1. GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of work shall be as shown on Drawings and called for in these Specifications. Performance shall meet the requirements of these Specifications. The work covered by this section of Specifications consists of the following:

1. Painting or staining all interior as called for in the Finish Schedule on Drawings or in these Specifications.

2. Painting interior walls, door trim, window trim, etc. A minimum of five (5) different colors will be used.

NOTE: All colors to be selected by Architect/Interior Designer.

2. PRODUCTS

2.1 General

A. Acceptable manufacturers, unless specific manufacturer is noted: California Products Corporation, Benjamin Moors, Pratt & Lambert, Sherwin-Williams, Tnemec.

B. All products used shall be manufacturer's top quality product for each type of finish specified.

2.2 MATERIALS

A. Where primer is called for, use primer recommended by manufacturer for particular combination of substrate and finish coat. Where painting over shop-applied primers, verify that finish paint proposed for field application is compatible with shop primers actually used.

B. All Gypsum Walls and Ceilings to be painted: Primer - Benjamin Moore Vinyl Latex Primer Sealer.

C. Finish-Walls - Benjamin Moore Moorcraft Latex Eggshell

D. Interior Rails & Metal Frames: Touch up Shop Primer. Finish - Two coats Alkyd semi-gloss finish.

E. Note: All Field cut edges to be painted. Metal Door & Window frames latex satin finish.

3. EXECUTION

3.1 JOB CONDITIONS

A. Store materials in sealed containers. Provide a fire extinguisher in storage room. Remove flammable rags and waste from building at end of day.

B. Do not perform exterior work in rain or when precipitation is forecast imminently; or in hot, dry, or windy weather which would cause finish to cure too rapidly, or be marred by windstorm dust; or at temperatures below 40 degrees F.

C. Maintain temperature at interior locations between 50 and 75 degrees F, maximum 80 percent relative humidity, while paint is being applied. Provide adequate ventilation, by mechanical means if necessary, for drying of paint and prevention of condensation and mildew. Do not apply finish in areas in which dust is being generated.

D. Protect finished surfaces and equipment not being painted with masking tape, canvas dropcloths, polyethylene sheets, etc. Items such as lighting switch covers, fixture canopies, and door handles shall be temporarily removed, carefully stored, and replaced after painting, or carefully covered during painting operations.

3.2 PREPARATION

A. Preparation of newly-installed materials to receive finish painting is specified under those Sections installing materials. This includes, but is not necessarily limited to: touch-up of damaged shop coats; taping, sealing and sanding of drywall; patching masonry; sanding finish wood; and cleaning off grease, oil, dirt, mildew, factory-applied protective coatings, and other foreign materials.

B. At wood surfaces to be painted, scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.

C. Before beginning work under this Section, verify that preparation of substrates under other Sections has been done as specified. Thoroughly remove water, dirt, and dust with clean cloths, brooms, or brushes. Allow masonry mortar joints to cure as long as possible before beginning paint application, 7 days minimum, 28 days preferably.

3.3 APPLICATION

A. Apply all materials in accordance with the manufacturer's recommendations.

B. Apply materials with suitable brushes, rollers, and spraying equipment. Keep application equipment clean, dry, and free from contaminants. Thoroughly stir materials before applying, and periodically during application.

C. Rate and method of application and drying time between coats shall be strictly in accordance with manufacturer's recommendations.

D. Prepare field test panels in accordance with paragraph 1.4-B.3 of this Section for each type and color of finish specified. Request review of first completed room, color scheme, special items, etc., which shall serve as project standard after approval.

E. Touch-up shop applied primers before field painting.

F. Do not apply first coat until surface is dry to touch. Moisture content of surface shall be within limitations recommended by paint manufacturer.

G. Leave all parts of moldings and ornaments clean and true to detail, without excessive paint in corners and depressions. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping. Paint surfaces visible through grilles one coat flat black.

H. Finish coats shall be smooth, free of brush marks, streaks, laps or pile-up of paint, and skipped or missed areas. Refinish whole wall if unacceptable finish is extensive or of such a nature that it cannot be repaired by normal touch-up.

I. After completion of painting work, remove spilled or spattered paint. Touch-up and repair finishes damaged in any way by work under this Section. Protect finished surfaces.

3.4 Interior

A. Interior Painting: Paint shall be applied in the following number of coats, primer and finish. Tint all primers to match finish color.

1. One (1) fully applied finish coat of even coverage. NOTE: Contractor to adequately cover M.R. (Blueboard) or other colored drywall by primer or finish coat as necessary to eliminate any visible "bleed through".

2. Drywall: All interior gyp board walls and ceilings to receive paint: one (1) coat latex base primer-sealer, two (2) finish coat’s latex eggshell.

B. Interior Glass & Door Frames - one (1) coat primer and two (2) coats finish, semigloss.

C. All hardwood to receive three (3) coats urethane.

END OF SECTION

SECTION 10 52 00

FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fire Extinguishers and Brackets
2. Fire Extinguisher Cabinets
3. Hose Valve Cabinet
4. Accessories

1.02 REFERENCES

A. NFPA 10 - Portable Fire Extinguishers

1.03 SUBMITTALS

A. Submit product data which shall include physical dimensions, operational features, color and finish, anchorage details, rough-in measurements, location, and details.

B. Submit manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

A. National Fire Protection Association (NFPA) Publications:

1. NFPA 10 - Portable Fire Extinguishers

B. Underwriter's Laboratories, Inc. (UL) Standards:

1. UL 4A-60BC classification

1.05 OPERATION AND MAINTENANCE DATA

A. Do not install extinguishers when ambient temperatures may cause freezing.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Approved Manufacturers:

1. J. L. Industries, Inc. (800-554-6077).
2. Larsen's Manufacturing Company (800-527-7367).
3. Modern Metal Products, a Division of Technico, Inc. (800-435-5544)

2.02 EXTINGUISHERS:

A. Multi-Purpose, Dry-Chemical Type: Steel Tank, pressurized, including hose and nozzle; 10-pound, ABC classification, UL 4A/60BC.

2.03 BRACKET:

A. Furnish wall mount bracket where shown on Drawings complete with mounting hardware.

2.04 CABINETS:

A. Items specified below are by Larsen's Manufacturing Co. Equivalent products by listed manufacturer will be acceptable.

1. Wall mounted on Bracket (FE): "MP10" Extinguisher with "B2" bracket.

2. Semi-recessed Cabinet (FEC-1): "MP10" Extinguisher with "G-2409-6R"; semi-recessed cabinet, projecting 2-1/2", rough opening of 10-1/2" x 25" x 4".
3. Surface Mounted Cabinet (FEC-2): "MP10" Extinguisher with "G-2409-SM"; surface-mounted cabinet at exterior locations such as stairs.
4. Hose Valve Cabinet (FVC): "MP10" Extinguisher with "GTVCS 3616 RL" Hose Valve Cabinet.

B. Cabinet: 18 gauge steel with acrylic thermosetting enamel finish, flat trim type with continuous hinged 1/4" acrylic plastic "Gemini" series door with black vertical letters on white background stating equipment in cabinet.
1. Provide lock similar to “Larsen-Loc” on all cabinets.
2. Color: Door and frame to be White.
3. Provide text “FIRE EXTINGUISHER” on side of cabinet where required by code.

C. Mounting Hardware: Appropriate to Cabinet

D. Fabrication
1. Form body of cabinet with tight inside corners and seams.
2. Pre-drill holes for anchorage.
3. Form perimeter trim and door stiles by welding, filling, and grinding smooth.
4. Hinge doors for 180 degree opening with continuous piano hinge. Provide pull handle and roller type catch.

2.05 FINISHES

A. Extinguishers: Red Enamel

PART 3 EXECUTION

3.01 Verify Locations with Local Fire Department before any work.

3.02 INSPECTION

A. Verify rough openings for cabinet are correctly sized and located.

B. Beginning of installation means acceptance of existing conditions.

3.03 INSTALLATION

A. Install cabinets plumb and level in wall openings. Secure rigidly in place in accordance with manufacturer's instructions.

END OF SECTION

SECTION 14 24 00
HYDRAULIC ELEVATOR

1. GENERAL:

1.1 REFERENCES: Drawings and general provisions of Contract, including General Conditions and Division 1 specifications, apply to work in this section.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

A. 110 volt branch circuit to the terminals of the elevator controller for car light supply and 110 volt light and outlet in the elevator pit, complete with switch adjacent to the pit ladder as shown on Elevator Drawings.

B. Any cutting, patching or painting of walls and grouting under thresh-holds and hoistway frames.

C. Adequate supports for guide rail brackets.

D. Sill support angles.

E. Electrical current during erection and testing of equipment.

F. Necessary recesses to accommodate doors, sills, (min. 2-1/2" deep) and signal equipment such as indicators, push buttons, hall lanterns, etc.

G. Pit access ladder.

H. General Contractor to receive, handle and store in the building approximately ten (10) tons of elevator materials.

I. Smoke sensors in each elevator lobby and elevator machine room complete with necessary wiring to elevator controller. A shunt trip circuit breaker with heat detectors will also be provided as required.

1.3 REGULATORY AGENCIES: Perform all work in accordance with the National Electrical Code, American Standard Safety Code and such state and local codes as may be applicable.

1.4 SUBMITTALS: Shop Drawings-

A. Submit six (6) print copies of elevator layout drawings to the Architect for approval.

B. Upon completion submit to Owner, warrantee operating manual and maintenance information.

1.5 GUARANTEE:

A. Elevator Contractor shall guarantee that materials and workmanship of apparatus installed by him under these Specifications shall be first class in every respect; and that he will make good any defects not due to ordinary wear and tear or improper use which may develop within one (1) year from date of completion and installation.

B. In addition to the other requirements, inspection, tests and remedies herein provided upon completion of elevator installation and before final approval and final payment, Elevator Contractor shall make, in speed test with full maximum load on elevator to determine whether elevator equipment as installed meets the speed, capacity and all other requirements of the Specifications.

C. In event equipment does not meet all requirements of Specifications, Elevator Contractor shall promptly remove from the premises all work condemned by Architect as failing to conform to the contract and shall bear all expense of making good all work of other Contractors destroyed or damaged by such removal or replacement. If Elevator Contractor does not remedy such condemned work within a reasonable time, fixed by written notice from Architect, General Contractor may correct such condemned work at expense of Elevator Contractor and withhold such cost from final payment under contract price. In the event the remainder due under Contract price is insufficient to cover such a cost, Elevator Contractor shall, immediately upon request, reimburse General Contractor in full.

1.6 PERMITS, TAXES AND LICENSES: All permits, inspection fees and licenses necessary for the execution of the work shall be secured and paid for by the Elevator Contractor.

1.7 TEMPORARY USE: The General Contractor, Sub-contractors, Owner or others will not be permitted use of the elevators during construction except under a written agreement as stipulated by the Elevator Contractor.

2. PRODUCTS:

2.1 ACCEPTABLE MANUFACTURES:

A. Except as otherwise specified herein, or specifically approved by Architect, the Elevator Contractor shall be regularly engaged in installation of elevators of type specified herein, and shall be able to demonstrate at least three (3) installations of this type made by him within the State of New Hampshire which have provided satisfactory operation for a period of one (1) year prior to the date of receipt of General Bids, for this project.

B. Demonstrate that he has provided satisfactory maintenance service for elevators of type specified and that he has maintained a complete maintenance organization comprised of regularly employed inspectors and mechanics within the State of Maine for a period of at least one (1) year prior to the date of receipt of General Bids.

C. Provide 1 year maintenance warrantee for insuring problem free operation of elevator, and make available complete ongoing maintenance service package.

D. Elevator shall be equal to Canton Elevator Company, or approved equal. Elevator shall meet latest ANSI handicapped requirements and Maine State Elevator Code.

E. Delivery of elevator systems shall be guaranteed by Manufacturer to be on site sixteen (16) weeks after receipt of approved Shop Drawings. Shop Drawings shall be submitted to the General Contractor for review by the Architect within ten (10) days of Sub-Contractors award.

2.2 MATERIALS AND FABRICATIONS:

A. Description of equipment -

Capacity:	2500 lbs.
Speed:	100 fpm
Operation:	Selective Collective
Inside Cab Dim	6'-8" x 4'-3" inside dim.
Travel:	Approximately (36'- 0") as shown on Drawings
Power supply:	208 v 3 phase, 60 cycle.
Machine Location:	As shown on Drawings
Stops & Openings:	Four (4) stops: One (1) front, (3) Three back
Car Enclosure:	Plastic laminate faced wood core walls, suspended acrylic ceiling, fluorescent lights, stainless steel return, stainless steel faced car door, handrail on rear wall, finished floor by others One (1) set Protection pads and hooks. Include: ADA compliant telephone Fan Emergency Lighting Proximity detectors, door protection
Hoistway Door Frames:	Hollow metal U.L. "B: labeled door, square frame”
Door Size & Type:	Single slide side open 3'-6" W x 7'-0"H (clear opening). Hoistway door and frame finish to be Stainless Steel at main lobby; at upper floors finish to be baked enamel; color to be selected from standard selection charts
Door Operation:	D.C. Power Operation

Signals:	Illuminated halo buttons, (Braille) alarm bell, in car location. Hall position indicator at main floor level. In – Car Direction Lantern
Special Features:	Special handicap provisions Door Hold Key Service Independent Operation Key Switch Infrared Curtin door protection **Seismic Zone 2 compliant** **Flood Zone Requirements**
Motor HP:	3 Phase Power 25 HP
Oil:	**Vegetable-based biodegradable hydraulic oil**
Starter:	Solid state soft start

B. Jack unit:

1. The jack unit shall be designed and constructed in accordance with the applicable requirements of the American Standard Safety Code for Elevators A-17. It shall be of sufficient size to lift the gross load the height specified. It shall be factory tested to insure adequate strength and freedom for leakage. No brittle material, such as gray cast iron, shall be used in the jack construction.

2. The jack unit shall consist of the following parts: a plunger of heavy polished steel tubing accurately turned; a stop ring shall be electrically welded to the plunger to positively prevent plunger leaking its casing made of steel tubing and provided with a pipe connection and air bleeder; Brackets shall be welded to jack casing and supporting the elevator on pit channels.

3. A sealed PVC cylinder protection system shall be installed. The system shall provide a means to monitor the space between the PVC sleeve and cylinder wall and evacuate unwanted fluids, so as to prevent such fluids from remaining in contact with the cylinder.
4. A standard well hole with steel pipe casing to retain the hole shall be provided**.** All drilling spoils are to be removed by the general contractor. Water for drilling, if required, will be provided by others also. Should obstructions such as rock, boulders, debris, water, quicksand or any other condition other than normal soil or clay be encountered, additional time to drill the hole will be treated as a change order. Work cease until a change order is issued.

C. Car:

1. Platform and Sling: The platform and sling have a fabricated frame of formed and structural steel shapes, gusseted and rigidly welded. Flooring shall be wood top floor laid over wood sub-floor. Finished flooring shall be provided, by others, on top of the car platform.

2. The sling shall consist of heavy steel channel stiles properly affixed to a steel cross head and bolster, with adequate bracing members, to remove all strain from the car enclosure.

3. Steel bumper plates shall be affixed to bottom of bolster channels; and a platen plate with clamps and car screws shall be furnished for fastening sling to plunger.

D. Car doors: The car entrance shall be provided with horizontal sliding doors. Panel rigidity to be obtained by suitable steel reinforcements. Doors shall be hung on sheave hangers with polyurethane tires and sheaves not less than 2-1/2" diameter running on a polished steel track, and guided at the bottom by non-metallic shoes sliding in a smooth threshold groove.

E. Alarm bell: An emergency alarm bell shall be located in conformance with ANSI A-17 Code requirements, and connected to a plainly marked push button in the car. Alarm bell shall be connected to the emergency lighting power pack.

F. Guide and Guide Shoes: Guides for the elevator car shall be planed steel elevator guide rails, properly fastened to the building structure with steel brackets. The car stile shall be fitted at top and bottom with sliding guide shoes.

G. Power Unit:

1. (Oil pumping and control mechanism) shall be compactly and neatly designed with all of the components listed below combined in a self-contained unit; structural steel outer base with tank supports; floating inner base for mounting motor pump assembly; overhead oil reservoir with tank cover and controller compartment with cover; metal drip pan; oil-hydraulic pump; electric motor; and oil control unit with the following components built into a single housing: a high pressure relief valve, a check valve, an automatic unloading up start valve, a lowering and leveling valve, and a magnetic controller, or a self-contained submersible of manufactures standard type.

2. The pump shall be especially designed and manufactured for oil-hydraulic elevator service. It shall be of positive displacement screw type, inherently designed for steady discharge with minimum pulsations to give smooth and quiet operation. Output of pump shall not vary more than ten percent (10%) between no load and full load on elevator car.

3. Motor shall be especially designed for oil-hydraulic elevator service, of standard manufacturer and of duty rating to comply with herein specified speeds and loads.

4. Oil control unit shall consist of the following components, all built into a single housing. Welded manifolds with separate valves to accomplish each function will not be acceptable under this Specification. All adjustments shall be accessible and shall be made without removing the assembly from the oil lines:

   a. Relief valve shall be externally adjustable and shall be capable of bypassing the total oil flow without increasing back pressure more than ten percent (10%) above that required to barely open the valve.

b. Up start and stop valve shall be externally adjustable, and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, insuring smooth up starts and up stops.

c. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.

d. Lowering valve and leveling valve shall be externally adjustable for drop-away speed, lowering speed, leveling speed and stopping speed to insure smooth "Down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling when slowdown is initiated.

5. Electric controller shall be of the full magnetic type or solid-state integrated circuitry. Silver to silver contacts shall be utilized on all relays and contractors. Thermal overload relays to be provided to protect the motor. All component switches to be mounted in a steel panel designed for wall to floor mounting. Shall have built in diagnostics, no proprietary tools required to service unit.

H. Mainline Strainer: A mainline strainer of the self-cleaning type, equipped with a 40-mesh element shall be furnished and installed in the oil line.

I. Failure Protection: The electrical control circuit shall be designed so that if a malfunction should occur, due to motor starter failure, oil becoming low in the system, or the car failing to reach a landing in the up direction within a predetermined time, the elevator car will automatically descend to the lowest terminal landing. If power operated doors are used, the doors will automatically open when the car reaches the landing to allow passengers to depart. The doors will then automatically close and all control buttons, except the "door open" button in the car station, shall be made inoperative.

J. Sound Isolating Coupling: Install a minimum of two in the oil line in the machine room between pump and jack.

K. Oil-Hydraulic Silencer (muffler device): Install in oil line near power unit. It shall contain pulsation-absorbing material inserted in a blowout-proof housing arranged for inspecting interior parts without removing unit from oil line. Rubber hose without blowout-proof features will not be acceptable.

L. Vibration Pads: Mount neoprene or rubber pads under the power unit assembly to isolate the unit from the building structure. Attach all hydraulic piping using spring hanger vibration isolators to structure.

M. Automatic Terminal Limits: Place electric limit switches in the hatchway near the terminal landing; designed to cut off the electric current and stop the car should it run beyond either terminal landing.

N. Automatic Self-leveling: Provide elevator with a self-leveling feature that will automatically bring the car to the floor landings. This self-leveling shall, within its zone, be entirely automatic and independent of the operating device, and shall correct for over travel or under

travel. The car shall also be maintained approximately level with the landing regardless of the load.

O. Buffers: Furnish and install substantial buffers under the car in the elevator pit. They shall be mounted on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor and substantial extensions will be provided, if required. Buffers shall comply with ANSI A-17.1 Code requirements.

P. Car Top Inspection Station: A car top inspection station with an "emergency stop" switch and with constant pressure "up-down" direction buttons shall make the normal operating devices inoperative and give the inspector complete control of the elevator.

Q. Door Operation: Furnish and install a direct current motor driven heavy-duty operator designed to operate the car and hoistway doors simultaneously. Door movements shall be electrically cushioned at both limits of travel and door-operating mechanism shall be arranged for manual operation in event of power failure. The leading edge of the car door shall be provided with a retractable reversal edge arranged to automatically return car and hoistway doors to the open position in the event the doors are obstructed during closing cycle. Doors will then resume closing cycle.

Doors shall automatically open as the car arrives at the landing and shall automatically close after an adjustable time interval or when the car is dispatched to another landing. Direct drive geared operators, A.C. controlled units with oil checks, or other deviations for the above are not acceptable.

R. Interlock: Equip each hoistway entrance with an approved type interlock tested as required by Code. The interlock shall be designed to prevent operation of the car away from the landing until the doors are locked in the closed position as defined by Code and shall prevent opening the doors at any landing from the corridor side unless the car is at rest at the landing or is in the leveling zone and stopping at the landing. Interlocks shall bear Underwriter's Laboratories "B" label of approval.

S. Hoistway Door Unlocking Device: Provide hoistway door unlocking devices as specified by the ANSI A-17.1 Code to permit authorized persons to gain access to hoistway when elevator car is away from the landing.

T. Door Hangers and Tracks: For each hoistway sliding door, furnish and install sheave type two point suspension hangers and tracks complete. Sheaves shall be 2-1/2" in diameter and have polyurethane tires with ball bearings properly sealed to retain grease. Hangers shall be provided with an adjustable slide to take the up-thrust of the doors. Tracks are to be drawn steel shapes, smooth surface and shaped to conform to the hanger sleeves.

U. Hoistway Entrances: Hoistway entrances of the hollow metal, horizontal sliding type shall be furnished and installed complete at each of the hoistway openings. Note that entrances must be at least minimum legal width for wheelchair use, meeting ANSI A-17.1.

1. Entrances shall be manufacturer's standard design and shall bear Underwriter's Laboratories "B" labels. They shall consist of frames, sills, doors, hangers, hanger

supports, hanger covers, fascia plates, and all necessary hardware. Finish to be baked on prime enamel for finish painting in the field by others.

2. The entire front wall of the hoistway is to be left open or a rough opening provided which is 12" greater in width and 6" greater in height than the finished opening, until after entrances are installed. After guide rails are set and lined, the entrance frames shall be installed in perfect alignment with the guide rails. Finish walls will then be completed by others.

V. ADA telephone shall be furnished with wiring from elevator cab to the machine room and telephone box. Wiring to be coordinated with Electrical Contractor and tied into outside phone system.

W. Operation (Selective Collective Automatic Push-button): Control of the elevator car shall be automatic in operation by means of a push-button in the car marked for each of the landing levels served and an "up-down" button at each intermediate landing with a call button at each terminal landing, wherein all stops registered by the momentary pressure of landing or car buttons shall be maintained until the car answers the call. An emergency stop switch shall be provided in the car push-button station which, when in the off position, will render the elevator inoperative, and which will enable attendant or passenger to stop the car at any point during its travel. Opening of this switch shall not cancel registered calls, and when the switch is closed the car will continue to answer calls that have been registered. Each landing station shall contain an illuminated push-button which shall "light-up" when pressed to indicate that a call has been registered to bring the car to that particular landing. A time delay non-interference feature shall be incorporated in the control mechanism to allow simple time for opening and closing car and hoistway doors before it is again placed in motion.

X. Special Emergency Service:

1. Special Emergency Service Operation shall be provided in compliance with the latest revision of the ASME/ANSI A17.1 or CAN3-B44 Code.

2. Special Emergency Service Phase I to return the elevator non-stop to a designated floor shall be initiated by an elevator smoke detector system or a keyswitch provided in a lobby fixture.

3. The smoke detector system is to be furnished by others. The elevator contractor shall provide contacts on the elevator controller to receive signals from the smoke detector system.

4. A keyswitch in the car shall be provided for in-car control of each elevator when on Phase II of Special Emergency Service.

5. If an elevator is on independent service when the elevator is recalled on Phase I operation, a buzzer shall sound in the car and a message indicator will be activated.

END OF SECTION

SECTION 26 00 20

SITE ELECTRICAL & COMMUNICATIONS WORK

1. GENERAL

1.1 SECTION INCLUDES

A. All work of this section shall be completed by an electrical subcontractor to the site contractor except where the site contractor elects to perform the work. The site contractor is responsible for assuring that the bid price includes all work of this section.

B. Description: Provide all necessary site electrical work in connection with the following:

1. Provision of a new 3-phase primary underground electrical line from the new terminal utility pole to a new concrete pad for a service transformer.

    a. Wiring by Central Maine Power (CMP).
    b. Conduit, hand holes, and manholes by the Electrical Sub-Contractor of Site Work Contractor.

2. Provision of a new concrete transformer pad for an electrical service.

    a. Concrete transformer pad by the Site Contractor.
    b. Service transformer by Central Maine Power.

3. Provision of empty electrical conduit from the service transformer to the concrete splice box.

4. Provision of a post-mounted, utility service meter located adjacent to the service transformer.

    a. Meter by Central Maine Power.
    b. Meter post, conduit, and meter back box by the Electrical Sub-Contractor.

5. Provision of service grounding at the concrete transformer vault for the CMP service transformer.

6. Provision of relocated light poles.

    a. Secondary underground electric to connect light poles.

7. Provision of an empty telephone conduit from the terminal utility pole to a point one foot inside the proposed building.

    a. Conduit by the Electrical Sub-Contractor for Site Work Contractor.
    b. Telephone service cable by Fairpoint Communications (to be provided under separate contract for the proposed building), conduit by Site Work Contractor.

8. Provision of an empty telecommunications conduit from the terminal utility pole to a point one foot inside of the proposed building.

    a. Conduit by the Electrical Sub-Contractor of Site Work Contractor.
    b. Cable TV service cable by telecommunications provider (to be provided under separate contract for the proposed building), conduit by Site Work Contractor.

9. Provision of site lighting poles with luminaries, lamps, and anchor bolts.

    a. Concrete foundation bases by the Site Contractor using anchor bolts provided by the pole supplier.
    b. Poles, luminaries, lamps, anchor bolts to be reused.
    c. Underground conduit and wiring by electrical subcontractor.

10. Provision of empty underground conduit with pull string from site lighting junction box to be extended through the foundation wall of the proposed building perimeter.

    a. Conduit by the Electrical Sub-Contractor for Site Work Contractor.
    b. Wiring to be provided under separate contract for the proposed building.

C. The Contractor for this work is referred to in Bidding Requirements, General Conditions, Special Conditions, Temporary Services and other pertinent Sections of these Specifications. These sections describe work that is a part of this Contract as contained in Division 1. The following General Provisions amplify and supplement these sections of Specifications. In cases of conflicting requirements, the stipulations set forth in Division 1 supersede and must be satisfied by the Contractor.

1.2 REFERENCES

A NEMA TC-2 – Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

B. NEMA TC-3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing.

C. ANSI/NFPA 70 – National Electrical Code.

D. ANSI C80.1 – Rigid Galvanized Steel Conduit.

1.3 SUBMITTALS

A. Submit under provisions of Division 1.

B. Product Data: Provide for each product specified herein. Indicate overall equipment dimensions and electrical characteristics including voltage, frame and trip ratings and short circuit withstand ratings where applicable.

1.4 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1.

B. Record the installed location of all electrical equipment and underground services.

1.5 REGULATORY REQUIREMENTS

A. Complete installation shall conform with all applicable Federal, State and Local laws, Codes and Ordinances, included but not limited to latest approved editions of the following:

1. National Electrical Safety Code (ANSI C2).
2. National Electrical Code (NFPA 70).
3. Occupational Safety and Health Act (OSHA) of 1971 and all amendments thereto.
4. All applicable State and Local Codes.

B. Nothing contained in the drawings and specifications shall be construed to conflict with these laws, codes, and ordinances, and they are thereby included in these specifications.

C. Contractor shall visit the site to become familiar with all existing conditions affecting this work. No claim will be recognized for extra compensation due to failure of contractor to familiarize himself/herself with the conditions and extent of proposed work.

D. Furnish products listed and classified by Underwriters Laboratories, Inc.

E. Obtain permits and request inspections from all authorities having jurisdiction.

1.6 PROJECT CONDITIONS

A. Verify field measurements are as shown on Drawings.

B. It is recognized that minor adjustments to locations may be required to coordinate with existing site conditions and underground utilities. Where equipment and/or conduit cannot be installed at the location shown on the plans, notify the Engineer to receive direction. Prior to installation of any site light pole or foundation, verify the minimum clearance requirements will be met with other overhead utilities, as required by utility company or other regulatory codes.

2. PRODUCTS

2.1 CONDUIT AND FITTINGS

A. PVC Schedule 40 Plastic Conduit: NEMA TC 2.

B. Plastic Conduit Fittings: NEMA TC-3.

C. Rigid Galvanized Steel Conduit: ANSI C80.1.

2.2 UNDERGROUND WARNING TAPE

A. Underground Warning Tape: 6” wide plastic tape, colored red with suitable legend describing buried electrical lines: Model UT27737-6 as manufactured by Emedco, or equal.

2.3 SITE LIGHTING

A. Provide site lighting poles/luminaries as described on the site lighting plans contained in the contract documents.

B. Provide all necessary pole hardware including anchor bolts as required.

C. Foundations, poles and anchor bolts shall be rated for the given EPA to withstand 90 mph wind with a 1.3 gust factor.

D. Site lighting poles shall be provided with all necessary internal wiring conductors.

E. Provide all site lighting poles with internal ground lugs.

3. EXECUTION

3.1 EXISTING UNDERGROUND UTILITIES IDENTIFICATION

A. The Contractor shall utilize the services of Dig-Safe to identify locations of existing underground utilities within the vicinity of all new excavation work.

3.2 CONDUIT INSTALLATION

A. Cut conduit square using a saw or pipe cutter; de-burr cut ends.

B. Bring conduit to the shoulder of fittings and couplings and fasten securely.

C. Install no more than the equivalent of three 90-degree bends between poles.

D. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.

E. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.

F. Install electrical warning tape for all underground conduits 6 inches below the finished grade.

G. Cap empty conduits for future use by others. Mark locations where ends of conduits are buried.

3.3 CONDUIT INSTALLATION SCHEDULE

A. Underground Locations - PVC, Schedule 40.

B. Above ground Locations - Rigid galvanized steel conduit.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

1. GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing site utilities.
7. Temporary erosion and sedimentation control measures.

1.2 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.3 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner’s premises. Coordinate storage locations with Owner.

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing. Note that a private utility detection service will be required to identify utilities on the school property. The Contractor shall be responsible for the cost of private utility detection.

D. Do not commence site clearing operations until temporary erosion and sedimentation control and plant protection measures are in place.

E. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

F. See Soil Management Plan for specific requirements related to imported soils on the site.

2. PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 20 00 "Earth Moving".

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

3. EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion and sedimentation control Drawings and requirements for the project.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE PROTECTION

A. General: Protect trees and plants remaining on-site according to requirements in Section 01 56 39 “Temporary Tree and Plant Protection”.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Owner’s Rep and Engineer.

3.4 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

1. Arrange with utility companies to shut off indicated utilities.

B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner’s Rep and Engineer not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner’s Rep and Engineer’s written permission.

C. Removal of underground utilities is included in earthwork sections and with applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security and utilities sections and Section 02 41 19 “Selective Demolition”.

3.5 CLEARING AND GRUBBING

A. Clearing and grubbing shall include the removal of all trees, shrubs, vegetation, roots, and organic measures to permit installation of new construction. The Contractor may elect to remove some of the roots during loam stripping operations. Any area that will be regraded must be cleared and grubbed.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil. All removals/excavation shall be completed in accordance with the Soil Management Plan.

B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

3.7 SITE IMPROVEMENTS

A. Remove existing above and below grade improvements as indicated and necessary to facilitate new construction.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, stumps and cleared material, and legally dispose of them off Owner's property.

1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

2. All topsoil shall be screened. Excess topsoil, if any, shall remain the property of the Owner. The location for stockpile material shall be agreed upon with the Owner.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

1. GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for slabs-on-grade, walks, pavements, play surfaces, and all other subgrade surfaces required for this project.
2. Excavating and backfilling for site improvements and structures.
3. Moisture condition and/or chemically treat excavated soils as necessary to provide workable fill material that will meet the compaction specifications and maximize reuse of existing soils.
4. Subbase course for walks and pavements.
5. Subbase and base course for asphalt paving.
6. Excavating and backfilling for utility trenches.

B. Related Requirements

1. See Section 02 32 00 Geotechnical Investigation
2. See Section 31 10 00 Site Clearing
3. See Section 32 13 16.26 Rock Removal
4. See Soil Management Plan

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from on or off-site for use as fill or backfill.

E. Drainage Course: Course supporting the slab-on-grade in areas where underslab drainage is required that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions changes in the Work.

2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, curbs, electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or material placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

L. Zone of Influence (ZOI): The area below footings and below imaginary lines that extend 2 ft laterally beyond the footing outer bottom edges and down on a 1H:1V slope to suitable bearing material.

M. Pipe Zone: The pipe zone is considered to be the area from the invert of the pipe to 6 inches above the crown of the pipe.

N. Pipe Bedding: Pipe bedding is the material placed between the bottom of the trench and the invert of the pipe.

1.3 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated. A private utility detection service will be required to identify utilities within the school property.

1.4 SUBMITTALS

A. General

1. Unless otherwise noted, Contractor shall forward submittals to the Engineer a minimum of two weeks prior to any planned work related to the Contractor's submittals.

2. The time period(s) for submittals are the minimum required by the Engineer to review, comment and respond to the Contractor. The Engineer may require resubmission(s) for various reasons. The Contractor is responsible for scheduling specified submittals and resubmittals so as to prevent delays in the work.
3. The Contractor's submittals shall be reviewed and accepted by the Engineer prior to conducting any work.
4. Acceptance of the Contractor's submittals by the Engineer does not relieve the Contractor of responsibility for the adequacy, safety and performance of the work.

B. Excavation and Backfilling

1. A narrative describing the schedule and means and methods for placement/compaction of fill soils based on the material requirements provided in Part 2 of this Section.
2. Proposed type(s) and source(s) of chemicals to treat borrow soils to be reused beneath building or pavement areas if site work activities are to be performed outside of summer months.
3. A plan showing delineated site "haul roads" for heavy construction equipment such as articulated trucks and scrapers.

2. PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations. In general, the Owner's intent is to encourage the use of onsite excavated materials for subgrade fills subject to the material requirements provided herein.

B. Satisfactory Soils: The existing soils will not meet the gradation specifications for Structural Fill, Base Course or Subbase Material. The native soils are acceptable for common subgrade fill if moisture conditioned and placed to meet the density and other requirements of the Contract Documents. The native soil may require segregation by type, blending with offsite borrow, filling with choke stone, must be free of organics, and moisture conditioned during winter construction or wet weather or extreme dry conditions. In no case should frozen soils be used beneath the building footprint, parking areas, or driveways.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, OL, CH, MH, OH, and PT or a combination of these groups and satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Course: Maine DOT 703.06 Type D. (Maximum Particle Size of 4 inches)

E. Base Course: Maine DOT 703.06 Type A. (Maximum Particle size of 2 inches)

F. Granular Borrow: Maine DOT 703.19 with a maximum particle size of 6 inches. Note that existing subgrade soils may meet the definition of Granular Borrow and may be used in place of imported materials if the Contractor can provide third party testing confirming conformance with this specification.

G. Crushed Stone: Maine DOT 703.22 Backfill for Underdrain Type C.

H. Pipe Bedding: Maine DOT 703.22 Backfill for Underdrain Type C.

I. Foundation Backfill: Foundations shall be backfilled with foundation backfill. The portion of foundation backfill passing the 3" sieve size should meet the following gradation requirements:

FOUNDATION BACKFILL	
Sieve Size	**Percent Passing By Weight**
3-inch	100
¼-inch	25 to 100
No. 40	0 to 50
No. 200	0 to 7

*The maximum particle size should be limited to 3-inches.

J. Structural Fill: Structural fill shall be used as fill below ground floor slabs. Structural fill shall be a well graded sand and gravel mixture free of roots, topsoil, loam, organic material, and any other deleterious materials, as well as clods of silt or clay, and meet the following gradation requirements:

STRUCTURAL FILL	
Sieve Size	**Percent Passing By Weight**
3-inch	100
½-inch	38 to 80
¼-inch	25 to 65
No. 40	0 to 30
No. 200	0 to 7

*The maximum particle size should be limited to 3-inches.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility with a separate metallic "tracer". <u>This is required for all non-metallic utility lines except "straight runs" of sewer lines and storm drains between manholes.</u>

3. EXECUTION

3.1 PREPARATION

A. The earthwork shall be conducted in accordance with the more stringent of the Maine DOT Specifications, and these specifications. All cost for moisture conditioning and complying with the Contract Documents is part of the base bid.

B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

C. Designated haul roads shall be established by the Contractor at the beginning of earthwork operations to minimize damage to soil subgrades resulting from construction vehicle traffic. The use of geotextile fabric and/or geogrid to stabilize haul road subgrades shall be included by the Contractor as part of the base bid.

D. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site Clearing."

E. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing." during earthwork operations.

F. Due to the previously developed nature of the site, the Project Contractor and their Subcontractors should be sensitive to the potential of encountering obstructions such as remnants from prior structures and buildings, associated foundations, and underground utilities (note: both active and abandoned) during site and earthwork activities. It is anticipated that obstructions may include, but not limited to, conduits, electrical and communications lines, and irrigation piping. Where such items are encountered beneath the proposed construction limits, they should be excavated to their full extent, removed, and replaced with compacted structural fill. The ends of underground pipes and utility conduits that will be abandoned in-place should be filled with concrete and capped to prevent erosion of material into the conduit or pipe.

3.2 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

B. Remove all organic soils within the ZOI of footings or slabs to expose naturally deposited soils or bedrock.

C. Excavation of bearing surfaces in soil or fill should be performed by earthwork equipment fitted with smooth-edged buckets. Final subgrade preparation should include compaction of fill or naturally deposited soil subgrades with vibratory compaction equipment. Following compaction and prior to placement of imported materials, care should be taken to limit disturbance of the bearing surfaces. Any loose, softened, or disturbed material due to construction traffic should be removed prior to placement of imported materials, and backfilled with compacted structural fill.

D. The integrity of natural soils and fill must be maintained during cold weather conditions. Footing and slab subgrades should not be allowed to freeze. The naturally deposited soils are considered moderately. Freezing of subgrade soils beneath improvements might result in heaving and post-construction settlement. The Contractor should make every effort to prevent freezing of subgrade soils. In the event frost penetration occurs, all frozen and

previously frozen soils should be removed and replaced with compacted structural fill. At no time should frozen material be placed as fill.

E. Excavation measurement and pay dimensions shall extend 12” beyond the footing or slab.

3.3 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

B. Remove all man placed fill, topsoil, organic matter, and debris encountered within the footprint of site improvements and structures.

C. Proof-rolling should be performed using a fully loaded, tandem axle dump truck weighing not less than 25 tons or 2 passes in each of two perpendicular directions with a 5 ton min. vibratory roller. Proof-rolling should not be performed over culverts, pipes, conduits, or other underground construction that might be damaged by the proof-roller. Soft areas or areas that yield excessively during proof-rolling should be over excavated and replaced with ¾” crushed stone or structural fill. Soft areas or areas that yield excessively are characterized by weaving or rutting more than one inch deep.

3.4 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following trench width. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

C. A minimum and pay width of 2’-6” for conduits up to 6” diameter.

D. A minimum of 3’-0” or 4/3 the pipe inside diameter plus 1’-6” for conduits over 18”.

E. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

F. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.

3.5 SUBGRADE INSPECTION

A. Proof-roll subgrade consisting of granular soils (engineered fill or glacial till) below slabs and under pavement as outlined in paragraph 3.3.C above. Any soft pockets, areas of excess yielding, or areas disturbed during excavation and construction shall be over excavated and replaced with structural fill. Do not proof-roll wet or saturated subgrades or subgrades consisting of silt/clay soils (marine deposits).

B. The exposed subgrade will be examined in the field by the Engineer to observe the strength and bearing capacity of the soils. Disturbed or soft soils, as judged by the Engineer, shall be excavated and replaced with suitable material without additional compensation.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, or accumulated water, as directed by Engineer, without additional compensation.

D. Overexcavate subgrades disturbed/damaged by construction vehicle traffic to the depth and plan limits directed by the Engineer. Replace disturbed soil with suitable material without additional compensation.

3.6 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Engineer.

B. Fill unauthorized excavations under other construction or utility pipe as directed by Engineer.

3.7 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion.

B. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

C. Stockpiles must be contained within permissible work and staging areas in accordance with the detail shown on the Drawings.

3.8 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Backfill trenches with Engineered Fill, Gravel Borrow, or granular backfill, or crushed stone.

D. Provide 4-inch thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

E. Place and compact pipe zone backfill to a height of 6 inches over the utility pipe or conduit.

F. Carefully compact pipe zone backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

G. Place and compact trench granular backfill of satisfactory soil to final subgrade elevation.

H. Install warning tape directly above utilities as noted in Section 2.2, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.9 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

1. Place and compact fill material in layers to required elevations as follows:
2. Under grass and planted areas, use satisfactory soil material.
3. Under walks and pavements, use Granular Fill below base and subbase gravels.

B. In open areas, structural fill should be placed in level, uniform lifts not exceeding 12 inches in uncompacted thickness and be compacted with self-propelled compaction equipment. In confined areas and within 4 feet of foundation walls, structural fill should be placed in lifts not exceeding 6 inches in uncompacted thickness and be compacted with hand-operated compaction equipment. All fill placed for footing and slab support should be structural fill compacted to at least 95 percent of the maximum dry density as determined by *ASTM Standard D1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).*

3.10 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace, aerate or chemically treat otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.11 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Granular Borrow and Common Fill: Place in layers not more than 6 to 12 inches in loose depth for material compacted by heavy compaction equipment and not more than 6 inches for material compacted with hand-guided equipment.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

Location	Minimum Compaction Requirements	Testing Frequency 1 Lift per:
Structures and Walkways	95 Percent	5,000 square feet
Trenches	95 Percent Bedding and 92 Percent Trench Zone	100 linear feet
Pavement Base and Subbase Areas	95 Percent	5,000 square feet
Pavement Areas (Below Base & Subbase)	92 Percent	5,000 square feet
Landscaped Areas	90 Percent Nominal Compaction	5,000 square feet

3.12 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus ¼" with no "bird baths".
3. Pavements: Plus or minus ¼" with no "bird baths".

3.13 SUBBASE AND BASE COURSES

A. Place subbase and base course on stable, firm subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase and base course under pavements and walks as follows:

1. Shape subbase and base course to required crown elevations and cross-slope grades.

C. Compact subbase and base course in maximum 8 inch lifts in uncompacted thickness at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.14 DRAINAGE COURSE

A. Place drainage course on stable, firm subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade or filter fabric as shown on the Drawings, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.

C. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades consisting of engineered fill materials, tests will be performed to verify that the compaction requirements are achieved. Bearing capacities will be verified visually in natural soils (glacial till), weathered rock or bedrock.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable.

3.16 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions without additional compensation.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

D. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

E. The in-situ sandy soils and gradation makes them susceptible to “loosening” if allowed to dry out. The contractor shall keep the soils moist and cover with a 12” layer of sand/soil mix approved to the geotechnical engineer of record.

F. All areas where soil is placed shall not have standing water. The contractor shall keep water out of the work areas until backfill is complete or adequate provisions to protect the work have been taken by the Contractor.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil except loam and materials otherwise shown on the contract drawings, waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 31 23 19

DEWATERING

1. GENERAL

1.1 SUMMARY

A. This Section includes construction dewatering.

1.2 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control groundwater flow into excavations, to permit construction to proceed on stable subgrades and to restrict the flow of surface water into the excavation.

1.3 SUBMITTALS

A. Shop Drawings for Information: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of headers and discharge lines; and means of discharge and disposal of water, piles, slurry walls, or other formal dewatering systems.

1. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with water disposal requirements of authorities having jurisdiction.

B. Discharge all pumped water through a Dirtbag® or equal.

C. Comply with all OSHA and other safety regulations.

2. PRODUCTS (VACANT)

3. EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or groundwater from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.

2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, sumps, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

B. Before excavating below groundwater level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed, or until dewatering is no longer required.

C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

1. Maintain piezometric water level a minimum of 24 inches below surface of excavation.

E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, Dirtbag® and other flow-control devices as required by authorities having jurisdiction.

F. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

END OF SECTION

SECTION 31 25 13

EROSION CONTROLS

1. GENERAL

1.1 SECTION INCLUDES

A. Temporary and permanent erosion control systems.

B. Slope Protection Systems.

1.2 RELATED SECTIONS

A. Section 31 10 00 – Site Clearing

B. Section 31 20 00 – Earth Moving

C. Construction Requirements

D. Soil Management Plan

1.3 ENVIRONMENTAL REQUIREMENTS

A. The Site Contractor shall protect adjacent properties and water resources from erosion and sediment damage throughout the life of the construction contract in accordance with the Erosion and Sediment Control plan, details and notes prepared for this project and in accordance with the requirements of the City of Portland's Permit and conditions of approval. The Erosion and Sediment Control plan, notes and details and Site Permits have specific restrictions on work which must be completed prior to the start of other construction, seasonal work limits, the amount of area which can be exposed at a given time, the general sequence of construction, and Site Contractor monitoring responsibilities for documenting compliance with the erosion control plan for this project. These affect the scheduling of the work.

   Protected resources as referred to in this document include wetlands, streams or water bodies, and trees or vegetation outside of the work limit.

   Prior to grubbing, orange safety fence shall be installed between the limit of grading and any protected resource. When the protected resource is a tree, the safety fence shall be installed at the drip line of the tree. If disturbance of the root system occurs, the Site Contractor shall have an Arborist or Nurseryman inspect the root system and provide recommendations to preserve the tree. This information shall be included in the logs for the Erosion Control Plan maintained by the Site Contractor.

B. The Site Contractor will be required to designate, by name, a suitably qualified individual, responsible for implementation of all erosion control measures as required by current local, State and federal regulations and this specification.

Specific responsibilities will include:

1. Assuring and certifying the Site Contractor's construction sequence is in conformance with the specified schedule. In addition, a weekly certification stating compliance, any deviations, and corrective measures shall be filed with the owner by this person. A copy of the certification form is contained the Erosion and Sedimentation Control plan, details and notes.

2. Inspection of the project work site on a weekly basis, with the installation of added erosion control measures in areas which appear vulnerable to erosion. The erosion and sediment measures shown on the contract documents are minimum provisions. Any additional measures required to comply with the permit or intent of the Erosion and Sedimentation Control plan shall be incidental to the contract.

3. Inspection of all erosion control measures and drainage inlets after any significant rainfall. Accumulated silt/sediment should be removed when the depth of sediment reaches 50 percent of the barrier height. Accumulated silt/sediment should be removed from behind silt fencing when the depth of the sediment reaches 6 inches. A significant rainfall shall be defined as over ½ inch of precipitation in any consecutive 24-hour period.

4. Inspect areas for catch of grass. A minimum catch of 90 percent is required prior to removal of erosion control measures.

5. Maintaining precipitation records and monitoring forecast activity.

C. It shall be the responsibility of the Site Contractor to implement, maintain, monitor and document compliance with the erosion and sediment control plan for the project and to avoid turbid discharges from the site, to avoid fugitive dust emissions, to avoid sediment from leaving the site, or affecting areas outside of the project work limits.

The work includes the submission of logs and photographic evidence of compliance with the plan at the time each pay requisition is submitted. These records shall be certified as complying with the Erosion Control Plan and this specification. Deficiencies in the logs or photographic records identified by the Owner or Engineer shall be corrected before the pay requisition is processed.

The photographic documentation must include:

1. A minimum of 10 digital photos per week showing the appropriate erosion control measures in place.

2. Evidence of stabilization of areas that are not being actively worked.

3. Documentation of any observed releases of turbid runoff or failure of any erosion control measure.

D. The erosion control measures specified are required to be installed in accordance with the details provided with the construction plans and manufacturer’s recommendations. The method and details of the installation of these erosion control methods are of vital importance to insure the effectiveness of the erosion control measures. While precipitation

amounts cannot be predicted, the Erosion Control Plan is designed to minimize erosion by restricting the amount of the site that can be open at a given time, limiting the period that an area can be open without stabilization, and requiring weather forecasts to be monitored. It is a requirement of the contract documents that these methods be incorporated on the site.

2. PRODUCTS

2.1 MATERIALS

A. Quick growing grasses for temporary seeding (see seed mixes contained in Erosion and Sedimentation Notes).

B. Hay or straw bales.

C. Fencing for siltation control as specified on the plans. Mirafi prefabricated silt fence, straw wattles or approved equal.

D. Curlex blankets by American Excelsior Company or approved equal. Curlex single net except Curlex double net in winter months.

E. Bale stakes shall be a minimum of 4 feet in length and 1" in width.

F. Temporary mulches such as loose hay, straw, netting, wood cellulose or agricultural siltage.

G. Fence stakes shall be metal stakes a minimum of 8 feet in length.

H. Stone Sediment Barriers or SiltSacks™, or approved equal for inlet protection.

J. A stabilized construction entrance to be constructed of the materials identified on the contract drawings.

K. Calcium chloride and water for dust control.

L. DIRTBAG® as outlined on the contract drawings and specified in Section 31.

M. Catch basin inserts. SiltSacks™ or approved equal.

N. Sorbent booms. Ecotech “Hula” Bug or equal. (N.I.C.)

O. DirtGlue™ Polymar Emulsion Mixes. DirtGlue™ emulsion formulation must be approved by Owner prior to installation.

3. EXECUTION

3.1 PREPARATION

A. Review site erosion control plan attached to this section of the specifications.

B. Deficiencies or changes in the erosion control plan as it is applied to current conditions will be brought to the attention of the Engineer and Owner and a remedial action prepared and implemented by the Contractor.

3.2 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

A. Provide catalog cuts and information concerning the erosion control products which will be used for construction for review by the Owner.

B. Provide information concerning the installation of the erosion sedimentation control including anchorage trench provisions anchorage devices, and spacing for review by the Owner.

C. Place erosion control systems in accordance with the erosion control plan and in accordance with approved installation procedures.

D. This contract limits the surface area of erodible earth material exposed any time by clearing and grubbing, excavation, borrow and embankment operations. The Owner has the authority to direct the Site Contractor to provide immediate permanent or temporary pollution control measures. The Site Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practical time to minimize the need for temporary controls. Cut slopes shall be permanently seeded and mulched as the excavation proceeds to the extent considered desirable and necessary to comply with the erosion control plan.

E. The temporary erosion control systems installed by the Site Contractor shall be maintained to control siltation at all times during the life of the Contract. The Site Contractor must respond to any maintenance or additional work to comply with this specification within a 48-hour period.

F. DIRTBAGS® are required for the discharge of <u>any</u> construction dewatering or pumping, and the DIRTBAG® shall be operational before any trenching.

G. Certain erosion control measures require staged restoration. For example, reinforced cuts must be completed in 5-foot vertical increments.

H. Fugitive dust shall be controlled through construction.

I. Sorbent booms must be installed in the catch basin before paving. These shall be replaced prior to requesting substantial completion. (N.I.C.)

J. DirtGlue™ may be substituted to the Engineer for approval when DirtGlue™ is to be substituted for mulch, dust control, and other erosion controls of the emulsion mix, application rate, and weather condition that exist at the time of proposed installation must be approved by the Engineer.

3.3 CONSTRUCTION OF TEMPORARY EROSION CONTROL MEASURES

A. Perimeter Dike/Swale Construction

1. All perimeter dike/swale shall have uninterrupted positive grade to an outlet.

2. Diverted runoff from a disturbed area shall be conveyed to a sediment trapping device.

3. Diverted runoff from an undisturbed area shall outlet into an undisturbed stabilized area at non-erosion velocity.

4. The swale shall be excavated or shaped to line grade and cross section as required to meet the criteria specified in the standard.

5. Stabilization of the area disturbed by the dike and swale shall be done in accordance with the standard and specifications for temporary seeding and mulching, and shall be done within 10 days.

6. Periodic inspection and required maintenance must be provided after each rain event.

   Max. Drainage Area Limit: 2 Acres.

B. Silt Fence Construction

1. oven 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 fastened securely to woven wire fence with ties spaced every 24" at top and mid section. Fence shall be woven wire, 12 ½ 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.

C. Stabilized Construction Entrance

1. Stone Size – Use 2" stone, or reclaimed or recycled concrete equivalent.

2. Length – Not less than 50 feet (except on a single residence lot where a 30 foot minimum length would apply).

3. Thickness – Not less than six (6) inches.

4. Width – Twelve (12) foot minimum, but not less than the full width at points where ingress or egress occurs. Twenty-four (24) foot if single entrance to site.

5. Filter Cloth – Will be placed over the entire area prior to placing of stone.

6. Surface Water – All surface water flowing or diverted toward construction entrances shall be piped across the entrance. If piping is impractical, a mountable berm with 5:1 slopes will be permitted.

7. Maintenance – The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way, all sediment spilled, dropped, washed or tracted onto public rights-of-way must be removed immediately.

8. When washing is required, it shall be done on an area stabilized with stone and which drains into an approved sediment trapping device.

9. Periodic inspection and needed maintenance shall be provided after each rain.

D. Sump Pit Construction

1. Pit dimensions are optional.

2. The standpipe should be constructed by perforating a 12-24" diameter corrugated or PVC pipe.

3. A base of 2" aggregate should be placed in the pit to a depth of 12" after installing the standpipe, the pit surrounding the standpipe should be backfilled with 2" aggregate.

4. The standpipe should extend 12-18" above the lip of the pit.

5. If discharge will be pumped directly to a storm drainage system, the standpipe should be wrapped with filter cloth before installation. If desired, ¼" – ½" hardware cloth may be placed around the standpipe, prior to attaching the filter cloth.

3.4 MULCH ANCHORING REQUIREMENTS

Anchoring Method or Material	Kind of Mulch to be Anchored	How to Apply
Peg and Twine	Hay or straw	After mulching, divide areas into blocks approximately 1 sq. yd. in size. Drive 4-6 pegs per block to within 2" to 3" of soil surface. Secure mulch to surface by stretching twine between pegs in crisscross pattern on each block. Secure twine around each peg with 2 or more tight turns. Drive pegs flush with soil. Driving stakes into ground tightens the twine.
Mulch Netting	Hall or straw	Staple the light-weight paper, jute, wood fiber, or plastic nettings to soil surface according to manufacturer's recommendations. Should be biodegradable. Most products are not suitable for foot traffic.
Wood Cellulose Fiber	Hay or Straw	Apply with hydro seeder immediately after mulching. Use 500 lbs. Wood fiber per acre. Some products contain an adhesive material, possible advantageous.
Mulch Anchoring Tool	Hay or Straw	Apply mulch and pull a mulch anchoring tool (blunt, straight discs) over mulch as near to the contour as possible. Mulch material should be "tucked" into soil surface about 3".
Chemical	Hay or Straw	Apply Terra Tack AR 120 lbs./ac. in 480 gal. of water (#156/ac.) or Aerospray 70 (60 gal/ac.) according to manufacturer's instructions. Avoid application during rain. A 24-hour curing period and a soil temperature higher than 45º Fahrenheit are required.

END OF SECTION

SECTION 31 25 73

DIRTBAG® SPECIFICATIONS FOR CONTROL OF SEDIMENT

1. GENERAL

1.1 DESCRIPTION

A. This work shall consist of furnishing, placing and removing the DIRTBAG® pumped sediment control device for erosion-sediment control. The DIRTBAG® pumped-silt control system is marketed by:

ACF Environmental, Inc.
2831 Cardwell Drive
Richmond, Virginia 23234
Phone: 800-448-3636
Fax: 804-743-7779

B. Four (4) DIRTBAGS® shall be included as part of the base bid.

2. MATERIALS

2.1 DIRTBAG®

A. The DIRTBAG® shall be a non-woven bag which is sewn with a double needle matching using a high strength thread.

B. The DIRTBAG® seams shall have an average wide width strength per ASTM D-4884 as follows.

DIRTBAG® Style	Test Method	Test Result
DIRTBAG® 53	ASTM D-4884	60 LB/IN
DIRTBAG® 55	ASTM D-4884	100 LB/IN

C. Each standard DIRTBAG® shall be supplied with fill spout large enough to accommodate a 4” discharge hose and straps to secure the hose and prevent pumped water from escaping without being filtered.

D. The geotextile fabric shall be non-woven fabric with the following properties:

Properties	Test Method	Units	Non-Woven	
			53	55
Weight	ASTM D-3776	Oz/yd	8	10
Grab Tensile	ASTM D-4632	Lbs.	203	250
Puncture	ASTM D-4833	Lbs.	130	165
Flow Rate	ASTM D-4491	Gal/Min/Ft2	80	70
Permittivity	ASTM D-4491	Sec.[1]	1.5	1.3

Properties	Test Method	Units	Non-Woven	
			53	55
Mullen Burst	ASTM D-3786	Lbs.^{in2}	400	550
UV Resistant	ASTM D-4355	%	70	70
AOS % Retained	ASTM D-4751	%	100	100

All properties are minimum average roll value except the weight of the fabric which is given for information only.

3. CONSTRUCTION SEQUENCE

3.1 Install DIRTBAG® on a prepared crushed stone pad overlying Mirafi 600X as shown on the contract drawings. Strap the neck of the DIRTBAG® tightly to the discharge hose. The preparation of a DIRTBAG® area is required before any trenching. Any water pumped from the construction site must be discharged through a DIRTBAG®.

3.2 It may be necessary to use hay/poly or other measures to keep the DIRTBAG® from freezing during winter months.

3.3 The DIRTBAG® is full when it no longer can efficiently filter sediment or pass water at a reasonable rate. Flow rates will vary depending on the size of the DIRTBAG®, the type and amount of sediment discharged into the DIRTBAG®, the type of ground, rock or other substance under the bag and the degree of the slope on which the bag lies. Under most circumstances, the vendor claims DIRTBAGS® will accommodate flow rates of 1,500 gallons per minute. Use of excessive flow rates or overfilling DIRTBAG® with sediment will cause ruptures of the bags or failure of the hose attachment straps.

3.4 Dispose of DIRTBAG® in accordance with Local, State, and Federal regulations. If allowed, the DIRTBAG® may be cut open and the contents seeded after removing visible fabric. DIRTBAG® is strong enough to be lifted with added straps if it must be hauled away (extra option). Off-site disposal may be facilitated by placing the DIRTBAG® in the back of the dump truck or flatbed prior to use and allowing the water to drain from the bag in place, thereby dismissing the need to lift the DIRTBAG®.

END OF SECTION

SECTION 32 11 00

BASE COURSES

1. GENERAL

1.1 SECTION INCLUDES

A. Granular Base and Subbase (also referred to as base and subbase aggregates or base and subbase gravels).

1.2 RELATED REQUIREMENTS

A. Section 31 10 00 – Site Clearing

B. Section 31 20 00 – Earth Moving

C. Section 32 12 16 – Asphaltic Paving

D. Section 32 16 15 – Curbs and Sidewalks

1.3 REFERENCES

A. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

B. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lbs (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

C. ASTM D2167 - Test for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

D. ASTM D1556 - Test Method for Density of Soil in-place by the Sand-Cone Method.

E. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth) Method B (Direct Transmission).

F. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

2. PRODUCTS

2.1 FILL MATERIALS

A. Submit materials certificate to on-site independent testing laboratory which is signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein. Materials shall comply with the gradations specified in Section 31 20 00, Earth Moving.

3. EXECUTION

3.1 EXAMINATION

A. Verify substrate has been inspected; gradients and elevations are correct, and dry.

3.2 CONSTRUCTION

A. Perform base and subbase course construction in a manner that will drain surface properly at all times and at same time prevent runoff from adjacent areas from draining onto base course or subbase construction.

B. Compact base material to not less than 95% of maximum density as determined by ASTM D-1557 unless otherwise indicated on the Drawings.

C. Granular Subbase: Construct to thickness indicated on Drawings; apply in lifts or layers not exceeding 8", measured loose.

D. Granular Base: Construct to thickness indicated on Drawings. Apply in lifts or layers not exceeding 4" measured loose.

E. All work of this section shall conform to the requirements of Sections 304 of the Maine Department of Transportation Specification for furnishing, placing, and surface tolerance of aggregate base and subbase courses.

3.3 FIELD QUALITY CONTROL

A. An Independent Testing Laboratory, retained by the Owner, shall perform construction testing of in-place base courses for compliance with requirements for gradation and density. The Contractor shall retain an independent surveyor to verify paving base course tolerances (by rod and level readings on no more than fifty-foot centers) to +0.05’ of design elevation that allow for paving thickness as shown in the Drawings. Contractor shall provide instruments and a suitable benchmark and perform all survey. The Contractor may, at his option, retain his own test laboratory for quality control, production schedules, or for any other reason at no cost to the Owner.

B. The following tests shall be performed on each type of material used as base and subbase course material:

1. Moisture and Density Relationship: ASTM D 698 or ASTM D 1557.
2. Mechanical Analysis: AASHTO T-88
3. Plasticity Index: ASTM D-4318-84
4. Base and subbase material thickness: Perform one test for each 5,000 square feet in-place base material area.
5. Base and subbase material compaction: Perform one test in each lift for each 5,000 square feet in-place base material area.
6. Test each source of base material for compliance with applicable state highway specifications.

C. Field density tests for in-place materials shall be performed according to one of the following standards as part of construction testing requirements:

1. Sand-Cone Method: ASTM D1556
2. Balloon Method: ASTM D2167
3. Nuclear Method: ASTM D2922, Method B (Direct Transmission).

D. Independent Testing Laboratory shall prepare test reports that indicate test location, elevation data, and test results. The Engineer, Owner, and Contractor shall be provided with copies of reports within 96 hours of time test was performed. In event that any test performed fails to meet these Specifications, the Owner and Contractor shall be notified immediately by Independent Testing Laboratory. The Owner reserves right to employ a separate testing laboratory and to direct any testing that is deemed by them to be necessary. Contractor shall provide free access to site for testing activities.

E. Any base or subbase courses which become contaminated due to weather, erosion, or other activities, whether or not such contamination is under the control of the Contractor shall be removed and replaced. Said removal and replacement shall be incidental to the work and no additional payment will be made to the Contractor.

END OF SECTION

SECTION 32 12 16

ASPHALTIC PAVING

1. GENERAL

1.1 SECTION INCLUDES

A. Provide all material and labor for the placement of surface course and binder course on roads, access drives, parking lots, sidewalks, and walkways. All pavement shall be produced, supplied, placed and conform to the requirements of Section 401 of the MaineDOT Standard Specifications.

1.2 REFERENCES

A. November 2014 State of MaineDOT Standard Specifications, including relevant updates, except as modified herein.

B. November 2014 State of MaineDOT Standard Details.

C. MS-2 - Mix design methods for asphalt concrete and other hot mix types - The Asphalt Institute (AI).

D. MS-3 - Asphalt Plant Manual - The Asphalt Institute (AI).

E. Hot Mix Asphalt Paving Handbook - US Army Corp of Engineers, UN-13 (CE MP-ET).

F. MS-19 - Basic Asphalt Emulsion Manual - The Asphaltic Institute (AI).

G. ASTM D946 - Penetration - Graded Asphalt Cement for use in Pavement Construction.

H. AASHTO M-226/ASTM D3381 Asphalt Cement

I. AASHTO M-140/ASTM D997 or AASHTO M-208/ASTM D-2397 Tack Coat

J. AASHTO M-117/ASTM D242 Mineral Filler

K. AASHTO T-245/ASTM D1559 Marshall Mix Design

L. Approved and released for construction plans (for State Highway work, there may be a difference between “Released for Bid” and “Approved and Released for Construction” drawings. Any substantive changes shall be addressed by approved change order before commencing the work).

1.3 RELATED SECTIONS

A. Section 31 20 00 – Earth Moving

B. Section 32 11 00 – Base Courses

C. Section 32 16 15 – Curbs and Sidewalks

1.4 SUBMITTALS

A. Design Mix: Before any asphaltic concrete paving is constructed, the Contractor shall submit the proposed actual design mix to the Owner for review and/or approval. Design mix submittal shall follow the format as indicated in the Asphalt Institute Manual MS-2, Marshall Stability Method; and shall include the type/name of the mix, gradation analysis, asphalt cement grade used, Marshall Stability (lbs), flow, effective asphalt content (percent), and direct references to the applicable highway department specifications sections for each material. Design shall be for a mixture listed in the most recent edition of roadway specifications of the state in which the project is to be constructed. In no case shall a mix design over three years old be submitted.

B. Material Certificates: Submit materials certificate to an independent testing laboratory retained by the Owner. The certificates shall be signed by the material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein.

C. Field density test results, minimum 1 per 100 tons of bituminous pavement placed including station/offset of test.

D. Plant inspection reports to verify pavement batch plant and paving equipment meets or exceeds MDOT Specification 401. The inspections shall be conducted by an independent testing firm retained by the Owner.

1.5 JOB CONDITIONS

A. Weather Limitations:

1. Apply tack coats when ambient temperature is above 40 degrees F, and when temperature has been above 35 degrees F for 12 hours immediately prior to application.

2. Construct asphaltic concrete paving when atmospheric temperature is above 40 degrees F base, 50 degrees F surface.

2. PRODUCTS

2.1 MATERIALS

A. Provide asphaltic concrete mixture as recommended by local or state paving authorities to suit project conditions. Use locally available materials and gradations which meet State Department of Transportation specifications and exhibit satisfactory record on previous installations.

B. Asphalt Cement: Comply with AASHTO M-226/ASTM D 3381; Table 2 AC-10, AC-20, or AC-30, AR-80, viscosity grade, depending on local mean annual air temperature. (See following chart):

Temperature Condition	Asphalt Grades
Cold, mean annual air temperature < 7° C (45° F)	AC-10 85/100 pen.
Warm, mean annual air temperature between 7° C (45° F) and 24° C (75° F)	AC-20 60/70 pen.
Hot, mean annual air temperature > 24° C (57° F)	AC-30

Final acceptance of the proper grade of A.C. shall be made by the Owner's Engineer.

C. Tack Coat: Emulsified asphalt; AASHTO M-140/ASTM D 997 or M 208/ASTM D 2397, SS-1h, CSS-1, or CSS-1h, diluted with one part water to one part emulsified asphalt.

D. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with AASHTO M-17/ASTM D242, if recommended by applicable state highway standards.

E. Asphalt-Aggregate Mixture: See drawings and details – all materials must meet current Maine DOT Standards and Specifications.

2.2 EQUIPMENT

A. Maintain all batch plant and paving equipment in satisfactory operating condition and correct breakdowns in a manner that will not delay or be detrimental to progress of paving operations.

3. EXECUTION

3.1 PREPARATION

A. Remove loose material from compacted base material surface immediately before applying prime coat.

B. Proof roll prepared base material surface to check for areas requiring additional compaction and areas requiring removal and recompaction.

C. Do not begin paving work until deficient base material areas have been corrected and are ready to receive paving.

3.2 APPLICATIONS

A. Tack Coat:

1. Apply to contact surfaces of previously constructed asphaltic concrete base courses or Portland cement concrete and surfaces abutting or projecting into asphalt concrete and surfaces abutting or projecting into asphalt concrete pavement.

2. Apply tack coat to asphaltic concrete base course or sand asphalt base course. Apply emulsified asphalt tack coat on the surface of all such bases where asphaltic concrete paving will be constructed.

3. Apply emulsified asphalt tack coat in accordance with APWA Section 2204 and applicable state highway specifications.

4. Apply at minimum rate of 0.05 gallon per square yard of surface.

5. Allow to dry until at proper condition to receive paving.

3.3 ASPHALTIC CONCRETE PLACEMENT

A. Place asphalt concrete mixture on completed compacted subgrade surface, spread, and strike off. Spread mixture at following minimum temperatures:

1. When ambient temperature is between 40 degrees F and 50 degrees F: 285 degrees F.

2. When ambient temperature is between 50 degrees F and 60 degrees F: 280 degrees F.

3. When ambient temperature is higher than 60 degrees F: 275 degrees F.

B. Whenever possible, all pavement shall be spread by a finishing machine. Inaccessible or irregular areas, pavement may be placed by hand methods. The hot mixture shall be spread uniformly to the required depth with hot shovels and rakes. After spreading, the hot mixture shall be carefully smoothed to remove all segregated coarse aggregate and rake marks. Rakes and lutes used for hand spreading shall be of the type designed for use on asphalt mixtures. Loads shall not be dumped faster than they can be properly spread. Workers shall not stand on the loose mixture while spreading.

C. Paving Machine Placement: Apply successive lifts of asphaltic concrete in transverse directions with the surface course placed in the direction of surface-water flow. Place in typical strips not less than 10'-0" wide.

D. Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of asphalt concrete course. Clean contact surfaces and apply tack coat.

3.4 WEATHER AND SEASONAL LIMITATIONS

For weather limitations, the State of Maine will be considered to be divided into two paving zones:

(a) Zone 1: All area north of US Route 2 from Gilead to Brewer and north of Route 9 from Brewer to Calais.

(b) Zone 2: All area south of Zone 1 including the US Route 2 and Route 9 boundaries.

Bituminous plant mix for use other than traveled way wearing course may be placed in either zone between the dates of April 15th and November 15th, provided that the air temperature as determined by an approved thermometer placed in the shade at the paving location is 35 degrees F or higher and the area to be paved is not frozen. Plant mix to be placed as traveled way wearing course may be placed in Zone 1 between the dates of May 1st and the Saturday following October 1st and in Zone 2 between the dates of April 15th and the Saturday following October 15th provided the air temperature determined above is 50 degrees F or higher.

Any hot bituminous base or binder course that is to be subject to traffic during the winter months shall have its gradation densified or asphalt content (percent of mix) adjusted through a change in the job mix formula as submitted by the Contractor and approved by the Owner.

3.5 ROLLING AND COMPACTION

A. The mixture, after being spread, shall be thoroughly compacted by rolling as soon as it will bear the weight of the rollers without undue displacement. Mixture shall be compacted to a minimum, of 92% theoretical maximum density. The number, weight, and types of rollers and sequences of rolling operations shall be such that the required density and surface are consistently attained while the mixture is in a workable condition.

B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.

F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 FIELD QUALITY CONTROL

A. An Independent Testing Laboratory, shall be retained to perform construction testing of in-place asphaltic concrete courses for compliance with requirements for thickness, density, composition and surface smoothness. Asphaltic surface and asphaltic base/binder courses shall be randomly cored at a minimum rate of one core for every 20,000 square feet of

paving. In no event shall less than three cores in light duty areas and three cores in heavy-duty areas shall be obtained. Coring holes shall be immediately filled with full-depth asphalt or with concrete. Asphaltic Concrete pavement samples shall be tested for conformance with the mix design. Refer to the general contract conditions for clarification on the cost for the independent laboratory.

B. Grade Control: Establish and maintain required lines and elevations.

C. Thickness: In-place compacted thickness shall not be less than thickness specified on the drawings. Areas of deficient paving thickness shall receive a tack coat and a minimum 1" overlay; or shall be removed and replaced to the proper thickness, at the discretion of the Owner's; until specified thickness of the course is met or exceeded at no additional expense to the Owner.

D. Surface Smoothness: Testing shall be performed on the finished surface of each asphalt concrete course for smoothness, using 10'-0" straightedge applied parallel with, and at right angles to centerline of paved area. The results of these tests shall be made available to the owner upon request. Surfaces will not be acceptable if exceeding following tolerances for smoothness:

Base Course Surface:	1/4"
Wearing Course Surface:	3/16"

E. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable paving as directed by Owner.

F. Compaction: Field density tests for in-place materials shall be performed by examination of field cores in accordance with one of the following standards:

1. Bulk specific gravity of paraffin-coated specimens: ASTM D-1188.

2. Bulk specific gravity using saturated surface-dry specimens: ASTM D-2726.

Rate of testing shall be one core per 20,000 square feet of pavement, with a minimum of 3 cores from heavy-duty areas and 3 cores from standard-duty areas. Cores shall be cut from areas representative of the project.

Areas of insufficient compaction shall be delineated, removed, and replaced in compliance with the specifications at no expense to the Owner.

G. Pavement Plant Inspection: The paving plant shall be inspected a minimum of one week prior to pavement placement to verify the plant meets the requirements outlined in Section 401. Random inspection and sampling during pavement placement shall be conducted and documented by a testing firm hired and paid for by the Owner.

H. After the binder pavement is placed, the Contractor shall retain an independent surveyor to profile the centerline of the access drive at a minimum of 25-foot stations plus survey the elevations at the locations of any pavement spot grades shown on the drawing and all catch basin inlets. This survey information shall be plotted on the drawing access drive profile and a grading plan. The Contractor shall supply this information in triplicate to the Engineer with copies to the Owner, Architect and Construction Manager. A narrative identifying any areas which do not meet the specification tolerances of subsection E of this specification with an outline of corrective measures shall accompany the submission. The Owner shall have four working days upon certified receipt of these data to issue a letter authorizing surface pavement to be placed.

END OF SECTION

SECTION 32 16 15

CURBS AND SIDEWALKS

1. GENERAL

1.1 SECTION INCLUDES

A. Concrete, Brick or Bituminous Sidewalks

B. Stonedust Walks

C. Granite Curb

D. Bituminous Curb

E. Slipform Cast in Place Concrete Curb (precast concrete curb is not permitted on this project)

F. Unit Pavers

G. Tactile Warning Strips

H. This specification contains the requirements for multiple types of curbing and sidewalks. Some of these will not be required for this project.

1.2 RELATED SECTIONS

A. Section 31 10 00 – Site Clearing

B. Section 31 20 00 – Earth Moving

C. Section 32 11 00 – Base Courses

D. Section 32 12 16 – Asphaltic Paving

E. State Highway Department Standard Specifications

F. Construction Documents.

1.3 SECTION EXCLUDES STRUCTURAL SLABS AT ENTRANCES

A. Structural slabs are entryway areas consisting of a slab supported by a foundation contiguous with the building foundation.

1.4 REFERENCES

A. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

B. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural construction.

C. ANSI/ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

D. ASTM C33 - Concrete Aggregates.

E. ASTM C94 - Ready Mix Concrete.

F. ASTM C150 - Portland Cement.

G. ASTM C260 - Air-Entraining Admixtures for Concrete.

H. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

I. ASTM C494 - Chemical Admixtures for Concrete.

J. FA TT-C-800 - Curing Compound, Concrete, for New and Existing Surfaces.

K. MDOT specifications for Highway and Bridge construction, current edition.

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

1. C33 – Concrete Aggregates
2. C67 – Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
3. C144 – Aggregate for Masonry Mortar
4. C936 – Standard Specification for Solid Interlocking Concrete Pavers.
5. C979 – Specification for Pigments for Integrally Colored Concrete.

M. Interlocking Concrete Pavement Institute (ICPI).

1. Interlocking Concrete Pavement Manual

1.5 PERFORMANCE REQUIREMENTS

A. Contractor shall maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

2. PRODUCTS

2.1 MATERIALS

A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated

boards to form radius bends as required. Coat forms with non-staining type coating that will not discolor or deface surface of concrete.

B. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM 185. Furnish in flat sheets, not rolls, unless otherwise acceptable to Owner.

C. Concrete Materials: Comply with requirements of MDOT Specifications Section 502 for concrete materials, admixtures, bonding materials, curing materials, and others as required. Any concrete outside of the building and not a structural slab shall be part of the site work for the project.

D. Joint Fillers: Resilient pre-molded bituminous impregnated fiberboard units complying with ASTM D 1751 FS HH-F-341, Type II, Class A; or AASHTO M 153, Type I.

E. Joint Sealers: Non-priming, pourable, self-leveling polyurethane. Acceptable sealants are Sonneborn "Sonolastic Paving Joint Sealant", Sonneborn "Sonomeric CT 1 Sealant", Sonneborn "Sonomeric CT 2 Sealant", Mameco "Vulken 45", or Woodmont Products "Chem-Caulk".

F. Granite Curb shall be used where required on the Contract Drawings and shall be installed in accordance with the requirements of MDOT Specification 609. All curb shall be of granite mined and cut in the United States of America. Type 1 granite headstones shall be used at all catch basin inlets along the access drive gutter lines. Granite at all ADA ramps shall be Type 1 with a flush reveal. Type V curb is not permitted for tip downs or to directly abut Type 1 curb in any area.

G. Bituminous Curb shall be used where required on the Contract Drawings and shall be installed in accordance with Section 609 of the MDOT specifications. Fiberglass resin shall be used in all curb. Coatings pursuant to MDOT specifications (seal coat) shall be provided for all bituminous curb.

H. Slipform Concrete Curb shall be used where required on the Contract Drawings. Concrete materials for Slipform curb will meet the same requirements for concrete curb under 502.05 of the MaineDOT Standard Specifications including 703.0201 associated with ASR Aggregates. This includes a minimum compressive strength of 4000 psi.

I. Aggregates subbase gravels and base gravels (if appropriate) for sidewalks shall meet the requirements of Section 32 11 00 of these specifications.

J. Asphaltic concrete pavement for sidewalks shall meet the requirements of Section 32 12 16 of these specifications.

K. STONEDUST

1. 3/8” sieve material as supplied by R. J. Grondin and Sons, Route 25, Gorham, ME 839.5544 or approved equal conforming to the following gradations:

Sieve Designation	% by Weight Passing Square Mesh Sieves
#6	100
#16	40-63
#40	20-29
#200	0-8

2. Construct stone dust on prepared base to lines, grades and sections shown on the drawings and details.

3. Compact to 95% density.

4. During the final grading of lawn areas, bring loam to stone dust walk edges and grades. Create a smooth line where loam meets stone dust. Keep stone dust and loam from becoming mixed.

L. Aggregate Base: Material for aggregate base course shall be a graded, granular, non-frost susceptible, free-draining material, consisting of either durable stone and coarse sand or of blast furnace slag, practically free from loam and clay, and which can be readily compacted to form a stable foundation.

1. Material shall conform to MDOT Specifications Section 703.06, "Aggregate for Base" Type A gravel.

M. Unit Pavers:

1. Pedestrian/light traffic clay Pathway paving bricks as manufactured by Pinehall Brick (www.pinehallbrick.com), or approved equal, and as distributed by Morin Brick (Tel. 207-784-9375 – Jason LaChance).

2. Unit specifications:

a. Unit clay paver shall conform to the requirements of ASTM C902, Class SX, Type 1, Application PX.

b. Square, wire-cut edges, no lugs.

c. Minimum average compressive strength of 8,500 psi.

d. Water absorption less than 6%, without sealer.

e. Dimensional tolerance: ± 1/8" in any dimension.

f. Passes CSA-A231.2 freeze thaw test in saline solution without use of sealers or other products applied to the power.

g. Refer to details in the drawings and to the following schedule:

Type/Finish	Size	Uses	Color	Pattern
Pinehall Pathway	4x8x2¼	Sidewalks	Full Range	Runningbond

i. Color selections correspond to manufacturers' designations and City of Portland Technical Standards.
ii. Refer to Enlarged Site Layout Plans for coursing and pattern direction.

3. Detectable Warning Pavers as manufactured by Pavestone, (www.pavestone.com), Whitacre-Greer (www.wgpaver.com or 1-800-947-2837), or approved equal. (N.I.C.)

   a. Dry-press solid (uncored) hard-burned, frost-free pavers with chamfered edge.
   b. Complies with ADA requirements, 5,000 psi min. compressive strength, 8% maximum absorption.
   c. Size: 2 ¼" x 4" x 8".
   d. Color: Light Gray.

4. The pavers shall be free of cracks or other imperfections when viewed from a distance of 20 feet (6 meters). The exposed parts of the brick shall be free of chips exceeding 5/16" from the edge and ½" from a corner. All pavers that do not meet these criteria shall be replaced with acceptable units.

N. Cobblestone (N.I.C.):

1. Provide gray granite cobblestones roughly 9"x5"x5" in size.

O. Edge Restraint:

1. Provide injection molded polyethylene edge restraint as manufactured by Snap Edge Corporation or approved equal. Use approved edge restraints where a structure, pavement, or curbing does not abut pavers.

2. Edge restraint spikes shall be 12" x 3/8" diameter galvanized steel.

P. Setting Bed and Joint Filler:

1. Concrete sand conforming to ASTM C33 for bedding sand; ASTM C144 for unit paver joint sand. Bedding sand may be used for unit paver joints, but may require extra sweeping compound and compaction.

   a. Sand to be sharp, washed and free of foreign material.

2. Stone dust may be used instead of sand to fill cobblestone joints.

Q. Bituminous Setting Bed:

1. Refer to Section 02525 – Curbs and Sidewalks

R. Water: Water shall be potable and shall be free of injurious contaminants.

S. Catalog cuts and information on the curb supplier shall be submitted to the Engineer for approval prior to ordering the material.

T. Tactile Warning Strips: Materials shall be selected by the Contractor from the materials shown on the drawings or from materials approved by the City of Portland Technical Standards and shall meet all current ADA standards at the time the materials are ordered.

2.2 MIX DESIGN AND TESTING

A. Design mix to produce normal weight concrete consisting of Portland cement, aggregate, water-reducing admixture, air-entraining admixture, and water to produce the following properties:

1. Compressive Strength: 4,500 psi, minimum at 28 days, unless otherwise indicated on the Drawings.
2. Slump Range: 3"-5" for normal concrete at time of placement
3. Air Entrainment: 4% to 6%

3. EXECUTION

3.1 PREPARATION FOR SIDEWALKS

A. Prepare subgrade to receive sidewalk subbase gravel in accordance with Section 32 11 00.

B. Place and compact subbase and base gravel in accordance with Section 31 20 00 and 32 11 00 of these specifications.

C. Proof-roll prepared base material surface to check for unstable areas. The paving work shall begin after the unsuitable areas have been corrected and are ready to receive paving. Compaction testing for the base material shall be completed prior to the placement of the paving.

D. Surface Preparation: Remove loose material from compacted base material surface immediately before placing concrete.

3.2 INSTALLATION OF CONCRETE SIDEWALKS

A. Form Construction:

1. Set forms to required grades and lines, rigidly braced and secured.
2. Install sufficient quantity of forms to allow continuance of work and so that forms remain in place a minimum of 24 hours after concrete placement.

3. Check completed formwork for grade and alignment to following tolerances:

   Top of forms not more than 1/8" in 10'-0".

   Vertical face on longitudinal axis, not more than 1/4" in 10'-0".

4. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

B. Reinforcement: Locate, place and support reinforcement per Division 3 specifications.

C. Concrete Placement:

1. Comply with requirements of Division 033000 – Concrete.

2. Do not place concrete until base material and forms have been checked for line and grade. Moisten base material if required to provide uniform dampened condition at time concrete is placed. Concrete shall not be placed around manholes or other structure until they are at the required finish elevation and alignment.

3. Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Consolidate with care to prevent dislocation of reinforcing, dowels and joint devices.

4. Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hours, place construction joint.

D. Joint Construction:

1. Contraction Joints: If joints are specified, the curb or gutter shall be constructed in uniform sections of the length specified on the plans. The joints between sections shall be formed either by steel templates 1/8 inch in thickness, or a length equal to the width of the gutter or curb, and with a depth which will penetrate at least 2 inches below the surface of the curb and gutter; or with 3/4 inch thick preformed expansion joint filler cut to the exact cross section of the curb or gutter; or by sawing to a depth of at least 2 inches while the concrete is between 4 to 24 hours old. If steel templates are used, they shall be left in place until the concrete has set sufficiently to hold its shape, but shall be removed while the forms are still in place.

2. Longitudinal Construction Joints: Concrete curb, concrete gutter, combination concrete curb and gutter, where specified on the plans, shall be tied to concrete pavement with 1/2 inch round, reinforcement bars of the length and spacing shown on the plans.

3. Transverse Expansion Joints: Transverse expansion joint in curb, curb and gutter, gutter or sidewalk shall have the filler cut to the exact cross section of the curb, curb and gutter, gutter or sidewalk. The joints shall be similar to the type of expansion joint used in the adjacent pavement.

E. Joint Fillers: Extend joint fillers full-width and depth of joint, and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. If not joint sealer, place top of joint filler flush with finished concrete surface. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler section together.

F. Joint Sealants: Exterior pavement joint sealants shall be installed per manufacturer's recommendations.

G. Cold Weather Placing:

1. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions or low temperatures, in compliance with ACI 306 and as specified herein. All expenses associated with the protective measures, temporary heating, etc. shall be at the expense of the Contractor.

   When air temperature has fallen to or is expected to fall below 40° F (4° C) uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50° F (10° C) and not more than 80° F (27° C) at point of placement.

   Do not use frozen materials or materials containing ice or snow. Do not place concrete or frozen subgrade or subgrade containing frozen materials.

   Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical agents, unless otherwise accepted in mix design.

H. Concrete Finishing:

1. After striking off and consolidating concrete, smooth surface by screening and floating. Adjust floating to compact surface and produce uniform texture. After floating, test surface for trueness with 10'-0" straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide continuous smooth finish.

2. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2" radius. Eliminate tool marks on concrete surface. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:

   a. Inclined Slab Surfaces: Provide coarse, nonslip finish by scoring surface with stiff-bristled broom perpendicular to line of traffic.

   b. Paving: Provide coarse, nonslip finish by scoring surface with stiff-bristled broom perpendicular to line of traffic.

3. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed.

4. Protect and cure finished concrete paving using acceptable moist-curing methods, more particularly described in the "water-curing" section of ACI 308-81. Apply Saltguard© or approved equal to finished concrete surface.

I. Cleaning and Adjusting:

1. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.

2. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials.

3.4 GRANITE CURB

A. Granite curbing will be installed and backfilled in accordance with provisions of Paragraph 3.06. If Type 5 sloped curb configuration is used, the curb shall be set on a slope as shown on the plans. All granite curb used to form a radius and any granite curb of any type with stone length of less than 36” shall be backfilled with lean concrete to a level equal to the binder pavement surface in front of the curb and a level equal to 3” below finish grade behind the curb.

B. Protect the granite curb from damage throughout construction and until substantial completion.

3.5 BITUMINOUS CURB

A. Bituminous curb shall be installed on the bituminous pavement base course prior to placement of final bituminous pavement wearing course. The curb shall be backfilled with approved materials. That shall be placed in layers not exceeding 8 inches in depth, loose measure and thoroughly tamped.

B. Bituminous curb shall be seal coated after placement in accordance with MDOT Standard Highway specifications.

3.6 SLIPFORM CONCRETE CURB

A. Installation: Concrete may be placed with an approved Slipform machine that will produce a finished product according to the design specified in the plans and will meet the same standards set for cast-in-place curbing. For cold weather slipforming, the outside temperature must be at least 36 °F (2.2 °C) and rising. The curb shall be placed on a firm, uniform bearing surface, shall conform to the section profile specified in the plans and shall match the appropriate grade. Proper curing shall be insured through the use of a curing compound spray that meets ASTM specifications. Expansion joints will be provided at ends of curve radii or wherever the curb meets rigid structures such as building foundations or fire hydrants. Contraction joints will be placed at 10 foot (3 m) intervals using sawing methods, which cut 1-3" into the concrete. Joints shall be constructed perpendicular to the subgrade and match other joints in roadways, sidewalks or other structures when applicable. If the

concrete is placed on bituminous pavement, an approved epoxy or adhesive shall be used to bond the curb to the pavement. The contractor shall form tip downs and transitions to conform to the requirements of the construction documents and details.

B. Backfilling: Same as Section 609.05 (B) of the Maine Department of Transportation Standard Specifications.

C. Protection: Slipform curbing must be adequately protected after placement. The concrete shall be allowed to cure for at least 72 hours. During cold weather conditions, when temperatures drop below the required temperature of 36 °F (2.2 °C) after placement, curbing shall be protected by concrete blankets or a combination of plastic sheeting and straw. After any placement of Slipform curbing, regardless of weather conditions, the placed curbing shall be adequately protected by traffic control devices and flagging as necessary

3.6 HOT BITUMINOUS CONCRETE SIDEWALKS

A. Bituminous concrete pavement for sidewalks shall be placed in two lifts to provide the total thickness specified on the drawings.

B. Compaction shall be by a paver roller having a minimum total weight of 2,000 lb. with a minimum of 65 lbs. per inch of drive roll or by satisfactory vibratory equipment.

C. Placement and quality control shall comply with Section 32 12 16 of these specifications.

3.7 BRICK SIDEWALKS

A. Preparation: Provide and compact base gravel where required as surface to place stone dust or bituminous concrete as shown on the detail.

B. Stone Dust: A layer of sand cement base material one (1”) inch thick shall be spread upon the properly prepared bituminous concrete base. This course of stone dust shall be firm but not compacted.

C. Brick Placement: Perform all masonry work with skilled workmen under adequate supervision. A journeyman brick mason shall supervise all brick placement. Lay all masonry true to lines and grade with all surfaces true, and corners straight and plumb. Lay exposed-to-view bricks smooth side up, with an individual unit-to-unit level tolerance not to exceed 1/8-inch and an overall tolerance from the grade not to exceed ¼-inch in 10 feet in any direction. Lay no unit having chipped edges of face, in exposed-to-view locations. Remove any such unit, if installed and replace with a new undamaged unit.

1. Brick Laying: The brick shall be laid in patterns shown on the drawings. The joints shall be hand tight, leaving only as much space between bricks as occurs naturally from rough surface or slight irregularities. When necessary, the brick shall be cut with a masonry saw. The Owner will require replacement of improperly broken bricks. No struck brick shall be less than two (2’) inches in length.

D. Compaction: After the bricks are carefully laid upon the properly prepared sand cement base, a 2” x 4” board shall be placed upon the bricks and shall be tapped with a hammer until the

bricks reach a firm, unyielding bed and present a surface of the proper grade and slope. Any divergence from line and grade is to be corrected by taking up and relaying the bricks. After setting the bricks, a sufficient amount of sand cement shall be spread over the surface and thoroughly swept or raked so as to fill the joints. All surplus sand cement remaining on the brick paved areas after the joints have been properly filled shall be removed by sweeping. Avoid raking out the joints during the removal of excess sand cement.

E. Moisture: Sufficient moisture shall be applied by sprinkling to permit the sand cement to achieve and set.

F. After 3 days, the surface of the walk shall be cleaned with a solution of muriatic acid to remove any cement film.

3.8 INSTALLATION OF UNIT PAVERS (N.I.C.)

A. Base:

1. Contractor shall inspect and verify that aggregate base and bituminous binder course or concrete frost slab for all work covered in this Section have been placed and compacted in the amounts specified in the Drawings and Specifications (See Section 02200 - Earthwork and Section 02511 – Asphaltic Concrete Paving).
2. Commencement of work by the Contractor signifies acceptance of base conditions. Any deviations or abnormalities in base preparation are to be reported to the owner's representative immediately.

B. Edge Restraint:

1. Place edge restraint to exact lines as shown on drawings.
2. Straight runs to be true to the line, and curves to be smooth and true to form.
3. Install edge as per manufacturer's specifications. Top edge should not be visible from surface.
4. Notify Owner's representative after edge installation and before setting of pavers.

C. Sand Setting Bed:

1. Place and screed sand to grades and lines as required. Thickness after paver installation to be no less than 1" and no greater than 1 1/2".
2. Do not use water-saturated or frozen sand.
3. Do not use sand to compensate for improperly installed or compacted base or for making up any unevenness or irregularity in the base course surface as this will show through to the finished surface of the pavers over time.
4. Do not walk on or otherwise disturb screeded setting bed surface prior to paver installation.

D. Pavers:

1. Set pavers hand tight using specified colors, shapes and textures in patterns and configurations shown.
2. Trim and cut pavers as required using a motor driven masonry saw with a blade designed specifically for the cutting of paving units. Keep cuts to a minimum. Small pieces less than 2” in any dimension, or pieced together to create a larger “whole” will not be accepted.
3. A typical spacing of 1/16" is to be maintained between pavers; maximum joint width 1/8”.
4. Gaps between pavers and adjoining objects of greater than 3/8" shall be filled with sand.
5. After pavers are set, vibrate into place with a plate vibrator capable of 3,000 to 5,000 pounds centrifugal compaction force and operating at a frequency of 80 to 90 hertz. Two passes in opposing directions (at right angles) minimum to be made with vibrator.
6. Sweep joints with dry sand, and vibrate (lightly water when sand/cement used). Repeat process to fill joints. Damp sand may be spread over paver surface and allowed to dry before filling joints.
7. Do not compact closer than 3' to an unrestrained paver edge.
8. All work must be compacted up to 3' from stopping point by the end of each workday. Cover and protect setting bed and uncompacted pavers until resumption of work.

E. Expansion and Control Joints:

1. Provide for sealant-filled joints at building foundation and against concrete slabs or foundations.
2. Provide compressible form filler as backing for sealant-filled joints as necessary.
3. Install joint filler before setting pavers.
4. Make top of joint filler flush with top of pavers.

F. Tolerances:

1. Do not exceed 1/16-inch (1.6 mm) unit–to-unit offset from flush (lippage) nor 1/8 inch in 24 inches (3 mm in 600 mm) and ¼ inch in 10 feet (6 mm in 3 m) from level, or indicated slope, for finished surface paving.
2. Surface elevation of pavers are to be 1/8" to 1/4" above adjoining curbs, inlets, walks, etc. (and may be 1/8" to 1/4" above final grades in general) to allow for characteristic minor settling.

G. Repair, Protection, Cleanup:

1. Replace units that are chipped, broken, stained, or in any other way do not conform to or may adversely affect the adjoining work.
2. Work area to be left in a neat and orderly manner upon completion of work, free from debris and swept clean.

3. Finished work is not to be used for storage of materials, unapproved vehicle movement or other operations which may damage, stain or otherwise mar the paver surface.

H. Inspection and Acceptance:

1. When paver installation is complete, the owner's representative will, upon request, inspect work to determine acceptability.
2. Work that does not comply with requirements will be removed and replaced as specified and as shown on drawings, at no additional cost to Owner.
3. The owner's representative will, upon completion and request, inspect replaced areas to determine acceptability.

END OF SECTION

SECTION 32 17 23.13

PAINTED PAVEMENT MARKINGS

1. GENERAL

1.1 SECTION INCLUDES:

A. The work shall consist of furnishing and placing permanent reflectorized pavement markings as shown on the plans or as designated by the Engineer.

B. When it is necessary to remove existing pavement lines or markings, it shall be done by grinding, sand blasting, or other acceptable method. The method chosen must be capable of completely eradicating the existing lines or markings without damage to the existing pavement.

1.2 RELATED REQUIREMENTS:

A. Section 31 20 00 – Earth Moving

B. Section 32 11 00 – Base Courses

C. Section 32 12 16 – Asphaltic Paving

D. Construction Drawings

1.3 PROJECT CONDITIONS

A. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize flagmen, barricades, warning signs and warning lights as required.

2. PRODUCTS

2.1 MATERIALS

A. The paint shall be a non-bleeding, quick-drying, alkyd petroleum base paint suitable for traffic-bearing surfaces and shall meet FS TTP-85E and mixed in accordance with manufacturer's instructions before application.

3. EXECUTION

3.1 SITE MEETING

A. A site meeting including the Engineer, Contractor, Pavement Marking Subcontractor, and the Owner shall be conducted prior to conducting the work. Marking locations, colors for the markup, and dates of application shall be confirmed at this meeting. The Owner reserves the right to alter or modify said locations at this meeting.

3.2 PREPARATION

A. Sweep and clean surface to eliminate loose material and dust.

B. Where existing pavement markings are indicated on the drawings to be removed or would interfere with the adhesion of new paint, a motorized device shall be used to remove the markings. The equipment employed shall not damage the existing paving or create a surface hazardous to vehicle or pedestrian traffic. In all areas within public rights-of-way, the method of marking removal shall be approved by governing authority.

3.3 APPLICATION

A. Apply two (2) applications of paint at manufacturer's recommended rate without the addition of thinner, with a maximum of 125 square feet per gallon. Install during calm (low wind) conditions in order that spray or unintended paint does not affect adjacent areas. Where necessary, apply during periods of the day when traffic can be controlled and barricaded from area where markings are being installed. Use proper barricades, traffic and safety officers. Apply with mechanical equipment to produce uniform straight edges. At sidewalk curbs and crosswalks, use a straightedge to ensure a uniform, clean, and straight stripe. A minimum of 48 hours shall elapse between the applications.

B. The following items are to be painted with the colors noted below:

1. Pedestrian Crosswalks: White
2. Lane Striping where separating traffic in opposite directions: Yellow
3. Lane Striping where separating traffic in same direction: White
4. Handicap Symbols: Conforming to the modified symbol for International Barrier Free as shown on drawings
5. Parking Stall Striping: White
6. Parking space numbering (if required by plans): White
7. Stop Bars: Provide painted stop bars where shown on the plan
8. Directional Arrows: White
9. Fire Lane: Per Fire Department and Portland Public Works selection
10. Chevrons: Yellow

END OF SECTION

SECTION 32 30 00

SITE IMPROVEMENTS

1. GENERAL

1.1 GENERAL PROVISIONS

A. The CONDITIONS OF THE CONTRACT and all Sections of Division 1 are hereby made a part of this Section.

1.2 SECTION INCLUDES

A. Divisions 01 through 33 Sections for requirements specific to the work of each of these Sections. Requirements may or may not include reference to LEED.

B. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, and without limiting the generality thereof furnish and install the following:

1. Bicycle Rack
2. Benches (N.I.C)

1.3. RELATED SECTIONS

A. Section 03 30 00 – Cast-In-Place Concrete.

B.Section 31 20 00 – Earth Moving.

C.Section 32 93 00 – Trees, Plants and Ground Covers.

1.4 QUALITY ASSURANCE; SUBMITTALS

A. Quality Assurance: Conform to requirements of Section 01 33 00 – Submittal Procedures.

B. Submittals: Provide as follows:

1. Product Data:
   a. All manufactured equipment.
   b. Metal fasteners, anchors, other accessories.

C. Shop Drawings: All items where installation methods are not fully described in product data. Where appropriate, and when approved by the Engineer, manufacturer's catalogue cuts may be substituted for shop drawings.

1.5 REFERENCE STANDARDS

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

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

A 153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware

B. MDOT: Where specified, comply with applicable provision of State of Maine Department of Transportation Standard Specifications for Highways and Bridges, hereinafter referred to as MDOT.

C. Earthwork: Conform to requirements of Section 31 20 00 – Earth Moving.

2. PRODUCTS

2.1 PRODUCTS

A. Products: Supply and install the following:

1. Bicycle Racks: Galvanized steel, in-ground mounted Bike Hitch, as manufactured by Dero (www.dero.com, 800-298-4915), or approved equal. Quantity: 11 Hitches.

2. Benches (N.I.C.):

a. Products as manufactured by Victor Stanley, Inc. (www.victorstanley.com, 301-855-8300); Urbanscape (www.urbanscapefurniture.com 1-866-903-3714), or approved equivalent. Black powder coat finish, with wheat or maple recycled plastic slats. Quantities as indicated in the Drawings.

b. 7 foot bench without back or arms; faux-wood (wheat); in-ground mount; Urbanscape Kentland Collection #24 KE14221.

c. 4-foot bench with back and arms and recycled plastic slat seat; Victor Stanley, GreenSites Series Model CM-50. Maple slats.

d. Benches shall be bolted to concrete pads, in accordance with the details.

3. Bench Alternate (for 7-foot bench) (N.I.C.):

a. 6-foot bench without back or arms: Victor Stanley GreenSites Series Model CM-53, recycled plastic slat; color: Maple; tubular steel frames with black powder coat finish. In-ground mounted in 12” diameter x 2-foot deep foundations.

4. PVC Solid Waste Enclosure and Fence (N.I.C.):

a. Provide as indicated, conforming to manufacturer’s specifications. This work shall include the supply and installation of all PVC fence including posts, gates, fasteners, finishes and ancillary equipment as depicted on the contract drawings or as required to render the installation complete.

b. Acceptable manufacturers include BuffTech by CertainTeed Corporation as distributed by Gorham Fence Co. or equal.

c. All corner and end posts of trash enclosures shall have Schedule 40 galvanized steel inserts. All gate hardware (hinges, latches, handles & pins) shall be galvanized steel.

d. Set all posts in 12” dia. Sonotube filled with concrete.

5. Steel Fencing and Gates (N.I.C.):

a. Fusion-welded steel ornamental fence, Montage II, heavy industrial weight, as manufactured by Ameristar Fence Products (www.ameristarfence.com or 1-800-321-8724).

1. Posts: 2 ½” square, up to and including 6’ height, 3” square minimum over 6’ height.

2. Pickets: 1” square.

3. Color: Black

b. Security fencing and gates shall be Invincible, Style I3 (3-rail). (Type A).

1. Refer to drawings and details for gates and panel dimensions and locations.

c. Ornamental fencing, railing and gates (Type B), shall be Majestic Series Style M3, (3-rail).

1. Refer to drawings and details for gates and panel dimensions and locations.

3. WARRANTIES

3.1 GENERAL

A. The supplier shall provide warranties on all materials and workmanship for one year excluding vandalism.

B. Site Contractor shall guarantee concrete for one year excluding vandalism.

END OF SECTION

SECTION 32 40 00

SIGNAGE

1. GENERAL

1.1 SUMMARY

A. Provide traffic control signs complying with U.S. Department of Transportation, Federal Highway Administration's “Manual on Uniform on Traffic Control Devices", local codes, and as specified. See Drawings for type, location, and quantity of signs required.

B. Related Sections:

1. Construction Drawings.
2. Manufacturer's Mounting Instructions.

2. PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Signs to meet FHWA requirements NCHRP 350 certification, engineer grade reflective.

B. Provide information for all signs, proposed mounting heights, mounting hardware, and posts to be submitted to the Owner for review and approval prior to installation.

C. Posts to be 2" diameter galvanized steel tube.

2.2 MATERIALS

A. To be backed with Alucobond panels, to be tan or light grey or selected by the Owner. To be painted with reflective baked-enamel finish with following colors:

B. "STOP" Signs: (R1-1) 24"x24", Octagon, reflectorized copy and border.

C. "MODIFIED HANDICAPPED SYMBOL" Signs per size shown on the contract drawing, white legend on blue background. Handicapped van accessible sign shall be the dimensions shown on the contract drawings.

D. "DO NOT ENTER" Signs: (R5-1) Highway Dept. standard red and white sign except 24"x24" size.

E. Miscellaneous Signs: Per Manual on Uniform Traffic Control Device recommendations or lettered with dimensions shown on the contract drawings.

2.3 POSTS

A. Posts shall be 2" diameter galvanized steel tube with galvanized steel weather tight closure cap.

3. EXECUTION

A. Conduct an on-site meeting with the Engineer and Owner prior to start of the work to review/confirm sign location and types.

B. Red signs shall be on top where multiple signs are on a single post, larger signs shall be installed above smaller signs.

C. Install weed control collar when signs are installed in turf areas.

D. All signs in pedestrian areas shall be mounted with the bottom of the sign at 7’ above finish grade. Signs in non-pedestrian areas shall be mounted with the bottom of the sign at 5’ above finish grade except ADA signs which shall be 7’. Set posts vertical and plumb as shown in the plans. Mount signs in accordance with manufacturer's instructions. Check mounting height, replace any posts which are not installed plumb.

END OF SECTION

SECTION 32 93 00

TREES, PLANTS AND GROUND COVERS

1. GENERAL

1.1 WORK INCLUDED

A. Provide all materials and equipment, and do all work required to complete the planting, as indicated on the Drawings and as specified.

1.2 SECTION INCLUDES

A. Divisions 01 through 33 Sections for requirements specific to the work of each of these Sections.

1.3 RELATED WORK

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 31 10 00 – Site Clearing. Clearing and grubbing, and stripping of topsoil.
2. Section 31 20 00 – Earth Moving. Establishment of subgrade elevations and excavation and backfill.
3. Section 32 92 00 – Turf and Grasses. Seeding and sodding.

1.4 REFERENCES

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. American National Standards Institute, Inc. (ANSI):

Z60.1	American Standard for Nursery Stock (Sponsor: American Association of Nurserymen, Inc.)

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

C 136	Sieve Analysis of Fine and Coarse Aggregates
E 11	Wire-Cloth Sieves for Testing Purposes

3. American Wood Preservers' Association (AWPA):

C2	Lumber, Timbers, Bridge Ties and Mine Ties – Preservative Treatment By Pressure Processes

4. "Hortus Third", A Concise Dictionary of Plants Cultivated in the United States and Canada, Cornell University, L.H. Bailey Hortorium, MacMillian Publishing Co., New York, NY.

1.5 SUBMITTALS

A. Submit under provisions of Division 1.

B. Samples: The following samples shall be submitted:

Material	Sample Size or Quantity (lb)
Mulch	1
Planting soil	1
Topsoil from on-site sources	1
Topsoil from off-site sources	1
Each plant species	Actual representative sample, or picture with scale; include information on sources

C. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following materials:

Aluminum sulfate
Antidessicant
Fertilizer
Fungicide
Insecticide
Compost

D. Certificates: Labels from the manufacturer's container certifying that the product meets the specified requirements shall be submitted for the following materials:

Compost
Commercial fertilizer
Limestone

E. Test Reports: Test reports from an approved testing agency indicating compliance with the specifications shall be submitted for topsoil, planting soil mixture, and any other materials designated by the Engineer/Landscape Architect.

1.6 OWNER'S INSPECTION AND TESTING

A. Work will be subject to inspection at all times by the Engineer/Landscape Architect. The Owner reserves the right to engage an independent testing laboratory in accordance with requirements of Section 01 45 00, QUALITY CONTROL to analyze and test materials used in the construction of the work. Where directed by the Engineer/Landscape Architect, the testing laboratory will make material analyses and will report to the Engineer/Landscape Architect whether materials conform to the requirements of this specification.

1. Cost of tests and material analyses made by the testing laboratory will be borne by the Owner when they indicate compliance with the specification, and by the Contractor when they indicate non-compliance.

2. Testing equipment will be provided by and tests performed by the testing laboratory. Upon request by the Engineer/Landscape Architect, shall provide such auxiliary personnel and services needed to accomplish the testing work.

3. Gradation of granular materials shall be determined in accordance with ASTM C 136. Sieves for determining material gradation shall be as described in ASTM E 11.

1.7 CONTRACTOR'S INSPECTION AND TESTING

A. Testing, analyses, and inspection required by the Contractor for his own information or guidance shall be at his own expense.

B. The Contractor shall engage an independent testing agency, experienced in the testing of agricultural soils and acceptable to the Engineer/Landscape Architect, to perform the following tests and analyses:

Material	Tests and Analysis Required
Topsoil	Mechanical analysis of soil indicating the percent passing by weight of the following sieve sizes: 1 in., 1/2 in., No. 4, No. 10, No. 100, and No. 200. Determination of pH, organic content, and nutrient content. Recommendations shall be made by the testing agency as to the type and quantity of soil additives required to bring nutrient content and pH to satisfactory levels for planting.
Compost	Determination of moisture absorption capacity, organic matter content, and pH.

1. Materials shall not be used in construction until test results have been reviewed by the Engineer/Landscape Architect.

2. All costs associated with testing shall be at Contractor's expense.

1.8 SOURCE QUALITY CONTROL

A. Identification of plant names shall be as listed in "Hortus Third".

B. Selection of Plant Materials: Submit to the Engineer/Landscape Architect the names and locations of nurseries proposed as sources of acceptable plant material. Inspect all nursery materials to determine that the materials meet the requirements of this section. Proposed materials shall be flagged at the nurseries by the Contractor prior to viewing by the Engineer/Landscape Architect.

1. Schedule with the Engineer/Landscape Architect a time for viewing plant material at the nursery. Trips to nurseries shall be efficiently arranged to allow Engineer/Landscape Architect to maximize his viewing time. A minimum of six weeks shall be allowed for this viewing prior to time that plants are to be dug.

2. Engineer/Landscape Architect may choose to attach his seal to each plant, or representative samples.

3. Where requested by the Engineer/Landscape Architect, photographs of plant material or representative samples of plants shall be submitted.

4. Viewing and/or sealing of plant materials by the Engineer/Landscape Architect at the nursery does not preclude the Engineer/Landscape Architect's right to reject material at the site of planting.

1.9 UNAVAILABILITY OF PLANT MATERIALS

A. No changes or substitutions may be made without prior approval by the Engineer/Landscape Architect, and municipal authority, if applicable. If unavailability of plant material becomes a concern, then submit satisfactory evidence of advertisement for a one month period in a field-related trade journal or online, without success, or submit written substantiation that specific material is unavailable from at least six reliable and approved sources. Provide alternative availability data or substitution recommendations for approval prior to purchase and installation.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Digging Plant Material: Plants shall not be dug at the nursery or approved source until the Contractor is ready to transport them from their original locations to the site of the work or acceptable storage location.

B. Transportation of Plant Material: Plants transported to the project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle to prevent injury to the plants. Closed vehicles shall be adequately ventilated to prevent overheating of the plants.

1. Plants shall be kept moist, fresh, and protected at all times. Such protection shall encompass the entire period during which the plants are in transit, being handled, or are in temporary storage.

2. The roots of bareroot stock shall be protected from drying out with wet straw or other suitable material while in transit.

3. Unless otherwise authorized by the Engineer/Landscape Architect, notify the Engineer/Landscape Architect at least two working days in advance of the anticipated delivery date of any plant material. A legible copy of the bill of lading, showing the

quantities, kinds, and sizes of materials included for each shipment shall be furnished to the Engineer/Landscape Architect.

C. Storage: Unless specific authorization is obtained from the Engineer/Landscape Architect, plants shall not remain on the site of work longer than three days prior to being planted.

1. Plants that are not planted immediately shall be protected as follows:

a. Earth balls shall be kept moist and their solidity carefully preserved.

b. Plants shall not be allowed to dry out or freeze.

2. Bareroot plants may remain on the site of the work only 24 hours before being planted or placed in storage. During this 24-hour period, injury and desiccation of plants on-site shall be prevented.

a. Roots of plants in storage shall first be puddled in a paste solution of prepared planting soil and then watered.

b. Plants shall then be protected and kept moist by "heeling-in" the roots or by placing the plant in a cool moist storage building. The "heeling-in" procedure shall require the plants to be separated and the roots heeled in a suitable moist soil. If plants are stored in a building, the roots shall be covered with suitable moist mulch.

3. Both the duration and method of storage of plant materials shall be subject to the approval of the Engineer/Landscape Architect.

D. Handling of Plant Materials: Exercise care in handling plant materials to avoid damage or stress.

1.11 REJECTION OF MATERIALS

A. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage, shall be cause for rejection.

B. Upon arrival at the temporary storage location or the site of the work, plants shall be inspected for proper shipping procedures. Should the roots be dried out, large branches be broken, balls of earth broken or loosened, or areas of bark be torn, the Engineer/Landscape Architect will reject the injured plant.

C. When a plant has been rejected, remove it from the area of the work and replace it with one of the required size and quality.

1.12 PLANTING SEASON

A. Spring Planting: Spring planting may commence as soon as the ground has thawed at the nursery and at the site of planting, and weather conditions make it practicable to work both at the nursery and at the site. The planting period shall be April 1 to October 15.

B. Regardless of the dates specified above, planting shall only be performed when weather and soil conditions are suitable for planting the material specified in accordance with locally accepted practice.

C. Planting season may be extended only with the written permission of the Engineer/Landscape Architect.

1.13 ACCEPTANCE

A. The Engineer/Landscape Architect will inspect all work for Substantial Completion upon written notice of completion. The request shall be received at least ten calendar days before the anticipated date of inspection.

B. Acceptance of installed plant material will be given by the Engineer/Landscape Architect for general conformance to specified installation procedures, size, character, and quality, and shall not diminish responsibility for full conformance to the Contract Documents.

C. Upon completion and reinspection of all repairs or renewals necessary in the judgment of the Engineer/Landscape Architect, the Engineer/Landscape Architect will recommend to the Owner that Acceptance of the work of this Section be given.

D. Acceptance in Part:

1. The work may be accepted in parts when it is deemed to be in the Owner's best interest to do so, and when permission is given to the Contractor in writing to complete the work in parts.

2. Acceptance and use of such areas by the Owner shall not waive any other provisions of this Contract.

1.14 MAINTENANCE

A. Plant material shall be maintained as described in Part 3 of this Section until the Acceptance of work.

B. Following Acceptance, maintenance of plant material shall become the Owner's responsibility. Provide instructions and service as follows:

1. Provide Owner with typewritten recommended maintenance program at time of Substantial Completion.

2. Make as many periodic inspections as necessary during the guarantee period, at no additional cost to the Owner, to inspect the condition of all plant materials. Submit written report of each inspection to the Engineer/Landscape Architect outlining corrective measures required to keep the guarantee valid.

1.15 GUARANTEE

A. Plants shall be guaranteed for a period of one year after the date of Acceptance by the Owner and Engineer/Landscape Architect.

1. When the work is accepted in parts, the guarantee periods shall extend from each of the partial acceptances to the terminal date of the last guarantee period. Thus, all guarantee periods terminate at one time.

B. Plants shall be healthy, free of pests and disease, and in flourishing condition at the end of the guarantee period. Plants shall be free of dead and dying branches and branch tips, and shall bear foliage of normal density, size, and color.

C. Replace dead plants and all plants not in a vigorous, thriving condition, as determined by the Engineer/Landscape Architect during and at the end of the guarantee period, without cost to the Owner, as soon as weather conditions permit and within the specified planting period.

1. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this Specification.

2. Make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Owner.

3. The guarantee of all replacement plants shall extend for an additional one-year period from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of the said extended guarantee period, the Owner may elect one more replacement or credit for each item.

D. At the end of the guarantee period, and no less than five days prior to final inspection, staking and guying materials shall be removed from the site.

1.16 FINAL INSPECTION AND FINAL ACCEPTANCE

A. At the end of the guarantee period, the Engineer/Landscape Architect will, upon written notice of end of guarantee period inspect the work for Final Acceptance. Request shall be received at least ten calendar days before the anticipated date for Final Inspection.

B. Upon completion and reinspection of full repairs or replacements necessary in the judgment of the Engineer/Landscape Architect at that time, the Engineer/Landscape Architect will recommend to the Owner that Final Acceptance of the Work of this Section be given.

2. PRODUCTS

2.1 PLANTS

A. Except as otherwise specified, size and grade of plant materials shall conform to ANSI Z60.1. In no case shall ball size be less than 11 in. in diameter for each inch of caliper.

B. Plants shall have outstanding form; symmetrical, heavily branched with an even branch distribution, densely foliated and/or budded, and a strong, straight, distinct leader where this is characteristic of species. Plants shall possess a normal balance between height and spread. The Engineer/Landscape Architect will be the final arbiter of acceptability of plant form.

C. Plants shall be healthy and vigorous, free of disease, insect pests and their eggs, and larvae.

D. Plants shall have a well-developed fibrous root system.

E. Plants shall be free of physical damage such as scrapes, broken or split branches, scars, bark abrasions, sunscalds, fresh limb cuts, disfiguring knots, or other defects. These defects shall not interrupt more than 25% of the circumference of the plant cambium.

F. Plants shall meet the sizes indicated on the Plant List. Plants larger or smaller than specified may be used only if accepted by the Engineer/Landscape Architect.

G. Where a size or caliper range is stated, at least 50% of the material shall be closer in size to the top of the range stated.

H. Plants shall not be pruned before delivery.

I. Plants indicated as "B&B" shall be balled and burlapped.

1. Unless otherwise permitted by the Engineer/Landscape Architect, plants shall be nursery grown.

2 Plants shall be grown for at least two years under climatic conditions similar to those in the locality of the Project.

3. Nursery grown plants shall be freshly dug. No heeled in plants or plants from cold storage will be accepted, unless otherwise permitted by the Engineer/Landscape Architect.

J. Container grown plants shall be well rooted and established in the container in which they are growing. They shall have grown in the container for a sufficient length of time for the root system to hold the planting medium when taken from the container, but not long enough to become root bound. Container grown plants exceeding the sizes indicated in ANSI Z60.1 shall have containers which are not less than 75% of the ball sizes for comparable B&B plant material. Each container plant shall be inspected and root pruned as needed.

1. Canes or Trunk(s) and Branches:

a. Very well formed and sturdy.
b. Branching plentiful and uniformly distributed to form a well-balanced plant.
c. Scars shall be free of rot and not exceed 1/4 the diameter of the wood beneath in greatest dimension unless completely healed (except pruning scars).
d. Pruning scars clean cut leaving little or no protrusion from the trunk or branch.
e. Graft union completely healed.

f. No mechanical or pest damage.
g. No extreme succulence.

2. Foliage:

a. Densely supplied with healthy, vigorous leaves of normal size, shape, color, and texture (except shrubs moved bare-root or deciduous shrubs when dormant).
b. No holes, cavities, or depressed areas caused by broken or dead branches or insufficient foliage.
c. No chlorosis.
d. Pest or mechanical damage barely perceptible with no more than 5% of total foliage affected.
e. No frost or cold damage discernible.

3. Root System:

a. Sturdily established in container.
b. Shall not be excessively rootbound except plants deliberately grown rootbound to produce a dwarf plant.
c. No large roots growing out of container.
d. No noxious weeds in container.

K. Bareroot stock, where specified or approved by Engineer/Landscape Architect, shall meet the standards of ANSI Z60.1 and shall conform to the following:

1. Root System. The root system of bareroot stock shall be sufficient to insure plant growth.

2. Bareroot Trees. Bareroot trees shall have a heavy fibrous root system that has been developed by proper cultural treatment, transplanting, and root pruning. The spread of the root system shall be 12 times greater than the trunk diameter plus an additional 6 in.

3. Bareroot Shrubs. Bareroot shrubs shall have a well-developed fibrous root system, with a minimum spread conforming to the following:

Plant Height, ft.	Minimum Spread of Roots, in.
1.5 to 2	10
2 to 3	11
3 to 4	14
4 to 5	16
5 to 6	18
6 to 8	20

2.2 TOPSOIL

A. Topsoil shall be obtained from a previously established stockpile on the site, to the extent that suitable material is available. Additional topsoil required shall be obtained from off-site sources.

B. Topsoil, whether stripped from site or supplied from off-site, shall be a sandy loam as defined by the USDA Soil Conservation Service, Soil Classification System, and shall have the following mechanical analysis:

Textural Class	% of Total Weight	Average %
Sand (0.05-2.0 mm dia. range)	45 to 75	60
Silt (0.002-0.05 mm dia. range)	15 to 35	25
Clay (less than 0.002 mm dia. range)	5 to 25	15

1. 95% of topsoil shall pass a 2.0 mm sieve.

2. Topsoil shall be free of stones 1 in. in longest dimension, earth clods, plant parts, and debris.

3. Organic matter content shall be 4 to 12% of total dry weight.

2.3 COMPOST

A. Compost shall be highly organic dark brown to black containing 6-10% organic matter tested on a dry weight basis with pH between 6.0 – 8.0, free of plants, their roots, debris; other extraneous matter >1 in. diameter and shall be uncontaminated by foreign matter, or substances harmful to plant growth. Do not use soil for planting while in a frozen or muddy condition.

2.4 PLANTING SOIL

A. Planting soil for all plant material except trees shall be a mixture of 2 parts existing soil and 1 part compost or topsoil or 1 part sandy fill if heavy soils.

B. Planting soil shall have pH value range of 5.5 to 7.0.

1. If planting soil mixture does not fall within the required pH range, limestone or aluminum sulfate shall be added to bring the pH within the specified limit.

2.5 LIMESTONE

A. Ground limestone shall be an agricultural limestone containing a minimum of 85% total carbonates, by weight. Ground limestone shall be graded within the following limits:

Sieve Size	% Passing by Weight
No. 10	100
No. 20	90
No. 100	60

2.6 WATER

A. Water shall be suitable for irrigation and shall be free from ingredients harmful to plant life.

2.7 ALUMINUM SULFATE

A. Aluminum sulfate shall be unadulterated and shall be delivered in containers with the name of the material and manufacturer and net weight of contents.

2.8 COMMERCIAL FERTILIZER

A. Fertilizer content shall conform to the following:

Constituent	% Present by Weight
Nitrogen (N)	10
Phosphorus (P)	0
Potassium (K)	10

1. 50% of nitrogen shall be derived from natural organic source of ureaform.
2. Fertilizer shall be phosphorus-free.
3. Potassium shall be derived from muriate of potash containing 60% potash.

B. Fertilizer shall be delivered in manufacturer's standard container printed with manufacturer's name, material weight, and guaranteed analysis.

C. Fertilizers with N-P-K analysis other than that stated above may be used provided that the application rate per square foot of nitrogen, phosphorus, and potassium is equal to that specified.

D. Controlled-release fertilizer shall be equal to the following:

Product	Manufacturer
Agriform 20-10-5	Sierra Chemical Co.
Planting Tablets	Milpitas, CA 95035
EZY-Grow Fertilizer Packet	EZY-Grow - Landscape Specialties

Phosphorus-free controlled-release fertilizer is preferred, if available.

E. Slow release fertilizer for seasonal plantings shall be Osmocote slow release 14-14-14 analysis (or preferred phosphorus-free).

2.9 EROSION CONTROL MATERIAL – JUTE MESH

A. Jute Mesh: Jute mat 4 feet in width, made of unbleached, undyed and loosely twisted yarn woven in a grid with approximately ½ inch openings.

B. Anchoring Staples: Cold-drawn 14-gauge or wider in diameter formed in a U-shape from a wire 12 inches or longer.

2.10 SOIL SEPARATION FABRIC

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric 3 oz./sq. yd. minimum.

2.11 MULCH

A. Mulch shall be a 100% fine-shredded pine bark, of uniform size and free from rot, leaves, twigs, debris, stones, or any material harmful to plant growth. Bark shall have been shredded and stockpiled no less than two months and no more than two years before use.

2.12 GUYING AND STAKING MATERIALS

A. Wood Stakes: For trees under 10 ft. in height, straight, sound, rough sawn lumber not less than 2 x 2 in., if square, or 2-1/2 in. diameter, if round. Wire for staking shall be 12-gauge steel or polyethylene ties per the detail.

B. Wire for Guying: Galvanized steel 1 x 19 preformed 3/16 in. diameter.

C. Turnbuckles: Galvanized steel fitted with eyebolts.

D. Deadman: Sound, rough sawn lumber 2 x 4 in., or other material approved by the Engineer/Landscape Architect.

E. Hose: High quality braided rubber hose, 3/4 in. diameter and suitable length, black in color.

2.13 ANTIDESICCANT

A. Antidesiccant shall be an emulsion specifically manufactured for plant protection which provides a protective film over plant surfaces which is permeable enough to permit transpiration. Antidesiccant shall be delivered in manufacturer's sealed containers and shall contain manufacturer's printed instructions for use.

B. Antidesiccant shall be equal to the following:

Product	Manufacturer
Wilt-Pruf	Wilt-Pruf Products, Inc. P.O. Box 469 Essex, CT 06426

2.14 FUNGICIDE

A. General: Chemicals registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and

as required for Project conditions and application. Do not use restricted chemicals unless authorized in writing by authorities having jurisdiction.

1. Fungicide shall be zinc ethylene bisdithiocarbonate (Zineb), or equal.

3. EXECUTION

3.1 EXAMINATION OF SUBGRADE

A. Examine subgrade and rough grading before planting. Alert Engineer/Landscape Architect to unacceptable rough grading or subgrade.

3.2 DRAINAGE OF SOILS

A. Test drainage of five plant beds and pits chosen by the Engineer/Landscape Architect shall be done by filling with water twice in succession. The time at which water is put into the pit or bed for a second filling shall be noted. Engineer/Landscape Architect shall then be notified of the time it takes for pit or bed to drain completely. Planting operations shall not proceed until Engineer/Landscape Architect has reviewed test drainage results.

B. Notify the Engineer/Landscape Architect in writing of all soil or drainage conditions that he considers detrimental to growth of plant material. Submit proposal and cost estimate for correction of the conditions for Engineer/Landscape Architect's approval before starting work.

3.3 LAYOUT OF PLANTING AREAS

A. Individual plant locations and outlines of shrub and ground cover areas to be planted shall be staked by the Contractor in ample time to allow inspection by the Engineer/Landscape Architect.

B. Digging shall not begin until locations are approved by the Engineer/Landscape Architect.

C. Location of trees shall be staked using color-coded stakes. A different stake color shall be used for each tree species.

3.4 PREPARATION OF SUBGRADE

A. Subgrade of planting areas shall be loosened or scarified to a minimum depth of 3 in. prior to spreading planting soil. Subgrade shall be brought to true and uniform grade and shall be cleared of stones greater than 2 in., sticks, and other extraneous material.

3.5 PLANT PIT EXCAVATION

A. Planting pits for trees and shrubs shall be excavated to the depth and dimension indicated on the Drawings.

B. Excavation shall not begin until locations are approved by the Engineer/Landscape Architect.

3.6 EROSION CONTROL MATERIAL – JUTE MESH

A. After grassing, jute mesh shall be installed in areas indicated on the Plans on slopes between 2H:1V and 3H:1V, or as directed by the Engineer/Landscape Architect. It may also be installed across areas to be planted on slopes between 3H:1V and 4H:1V.

1. Roll out in the direction of flow.

   a. Anchor the top edge of the mesh in a 6 inch deep trench.
   b. For all overlaps, place the upstream or uphill section on top.

2. Overlap adjacent strips and adjoining ends by at least 6 inches.
3. Apply jute mesh without stretching. Lay it evenly but loosely on the soil surface.
4. To keep the area smooth, do not walk directly on the seedbed before or after applying mesh.
5. Crosses may be cut to install plants, with yarn flattened in place after backfilling.

B. Hold matting strips firmly in place with one row of staples as follows:

1. Staple along each edge, spacing staples no more than 3 ft. apart in each row.
2. At the ends of the covered area and at overlapping joints, space staples no more than 18 inches apart.
3. Ensure that staples remain flush with the ground.

3.7 SOIL SEPARATION FABRIC

A. Filter fabric shall be installed where indicated on the Drawings. Unless otherwise indicated on the Drawings, filter fabric shall be overlapped 6 in. along all edges

B. Soil separation fabric shall be installed in raised planters to separate soil backfill from lower drainage layer or larger aggregates.

3.8 SPREADING OF PLANTING SOIL

A. Planting soil shall be spread and placed to required depths.

B. Surfaces shall be graded and smoothed, eliminating all sharp breaks by rounding, scraping off bumps and ridges, and filling in holes and cuts.

3.9 PLANTING

A. Walls of plant pits shall be dug so that they are vertical and scarified.

B. Plants shall be set as indicated on Drawings. Plants shall have same relationship to finished grade as in the nursery.

C. Plants shall be turned to the desired orientation when required by Engineer/Landscape Architect.

D. Containerized plants shall be removed from container taking care not to damage roots. The side of the root ball shall be scarified to prevent root-bound condition and plant positioned in planting pit.

E. Planting shall be positioned in center of planting pit, set plumb, and rigidly braced in position until all planting soil has been tamped solidly around the ball.

F. Pits for shrubs shall be backfilled with planting soil. Tree pits shall be backfilled with existing soil, no planting soil. Soil shall be worked carefully into voids and pockets, tamping lightly every 6 in.

1. When pit is two-thirds full, plants shall be watered thoroughly, and water left to soak in before proceeding.

2. At this time, ropes or strings on top of ball shall be cut and removed. Burlap or cloth wrapping shall be completely removed once plant is set in pit. Ball wrapping and support wire shall be totally removed from ball and planting pit.

3. Remove nursery plant identification tags.

G. Backfilling and tamping shall then be finished and a saucer formed around plant pits as indicated on the Drawings.

H. Saucer shall be filled with water and water left to soak in. Saucer shall then be filled with water again.

I. Following planting of aquatic plant material, 3 in. layer of gravel shall be spread to stabilize soil beneath.

3.10 BULBS AND HERBACEOUS PERENNIALS

A. Prepare perennial planting beds by application of fertilizers and pH-altering amendments and thoroughly rototilling into the top 12 in. prior to planting bulbs and flowering plants.

3.11 APPLICATION OF FERTILIZER

A. Fertilizer shall be applied when planting pits are backfilled two-thirds full. Fertilizer application shall be of the type, rate, and timing recommended by the testing agency for each plant type.

B. Slow-release fertilizer:

1. Fertilization schedule for trees and shrubs using slow release 4 oz. packet system shall be per manufacturer's recommendations.

2. Fertilizer packets shall be placed 6 to 8 in. deep below top of planting soil around root balls of plants. Packets shall be spaced evenly depending on the number of packets required.

3.12 FUNGICIDE SPRAYING

A. Immediately after planting, all trunks of deciduous trees shall be sprayed with fungicide, applied as directed by chemical manufacturer.

3.13 STAKING AND GUYING

A. Each tree shall be staked or guyed immediately following planting. Plants shall stand plumb after staking or guying.

B. Duckbill Tree Support Systems shall be installed in strict conformance with manufacturer's published installation instructions.

C. Duckbill Root Ball Fixing Systems shall be installed in strict conformance with manufacturer's published installation instructions.

3.14 MULCHING

A. Mulch shall be applied as follows (entire area listed shall be mulched):

Plant Type	Mulch Area	Mulch Depth, in.
Tree	Saucer	3
Shrub	Saucer or Bed	3
Groundcover	Bed	3

3.15 PRUNING

A. Each tree and shrub shall be pruned to preserve the natural character of the plant. Pruning shall be done after delivery of plants and after plants have been inspected and approved by the Engineer/Landscape Architect. Pruning procedures shall be reviewed with Engineer/Landscape Architect before proceeding.

B. Pruning shall be done with clean, sharp tools. Cuts shall be made flush, leaving no stubs. No tree paint shall be used.

C. Dead wood, suckers, and broken and badly bruised branches shall be removed.

3.16 MAINTENANCE OF PLANTING

A. Maintenance shall begin immediately after each plant is planted and shall continue until Final Acceptance. The Contractor shall provide water for irrigation if none is available on site.

B. Maintenance shall consist of pruning, watering, cultivating, weeding, mulching, removal of dead material, repairing and replacing of tree stakes, tightening and repairing of guys, resetting plants to proper grades and upright position, and furnishing and applying such sprays as are necessary to keep plantings free of insects and disease, and in a healthy growing condition.

C. Planting areas shall be kept free of weeds, grass, and other undesired vegetative growth.

D. Note: Extend maintenance beyond Substantial or Final Acceptance of Project if necessary to meet above requirements. Engineer/Landscape Architect may withhold funds from Substantial and Final Completion payments as necessary to assure proper performance of maintenance operations.

END OF SECTION

SECTION 33 05 00

COMMON WORK RESULTS FOR UTILITIES

1. GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping joining materials.
2. Sleeves.
3. Identification devices.
4. Grout.
5. Piping system common requirements.
6. Equipment installation common requirements.
7. Concrete bases.
8. Supports and anchorages.
9. Utility testing.

1.2 DEFINITIONS

A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.

B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Storm drain, underdrain, water, sewer, pipe and fittings.
2. Appurtenances including manholes, catch basins, grease traps, cleanouts, pipe manifolds, pipe insulation, flared inlets, rain guards, and manhole bases.
3. Submittals for appurtenances shall show the angle for any pipe entrances as well as the height or elevation of the penetration.

1.4 QUALITY ASSURANCE

A. Testing of Sanitary Sewer System (Gravity Main):

1. Sanitary Sewer Testing: Testing of a section of sewer between manholes shall be performed using the below stated equipment according to stated procedures and under the observation of the Owner's representative. The Contractor shall notify the City of Portland Public Works Department, Division of Stormwater and Sewer (PPW) at least 72 hours in advance of the date and time of the testing in order for PPW to have an opportunity to have a representative on site during the tests.

a. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.

b. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.

c. All air used shall pass through a single control panel.

d. Three (3) individual hoses shall be used for the following connections:

1) From control panel to pneumatic plugs for inflation.
2) From control panel to sealed line for introducing the low pressure air.
3) From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

2. Procedures: All pneumatic plugs shall be seal tested before being used in the actual test installation. One (1) length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to 25 psig. The sealed pipe shall be pressurized to 5 psig. The plugs shall hold against the pressure without bracing and without movement of the plugs out of the pipe.

a. After a manhole to manhole reach of pipe has been backfilled and cleaned, and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure reaches 4 psig greater than the average back pressure of any ground water that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize.

After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed "acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameters in the following table:

Diameter (inches)	Minimum Allowable Pipe Minutes to Decrease from 3.5 - 2.5 psig Pressure In
4	2.0
6	3.0
8	4.0
10	5.0
12	6.0
15	7.5
18	9.0
21	10.5

3. In areas where ground water is known to exist, the Contractor shall install a one-half (1/2) inch diameter capped pipe nipple, approximately ten (10) inches long, through the manhole wall on top of one of the sewer lines entering the manhole. This shall be done at

the time the sewer line is installed. Immediately prior to the performance of the Line Acceptance Test, the ground water shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the nipple.

The hose shall be held vertically, and a measurement of the height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. (For example, if the height of water is 11-1/2 feet, then the added pressure will be 5 psig, and the 2.5 psig to 7.5 psig. The allowable drop of one pound and the timing remain the same.)

4. If installation fails to meet the above requirements for the air test, the Contractor shall locate and repair the pipeline until an acceptable test is achieved.

5. The Contractor shall provide as required the proper plugs, weirs, and other equipment required to perform all tests. Testing of each section of sewer installed shall include the portions of service connections that are to be installed under the Contract.

6. Where ground water is confirmed to be high, the Engineer at his option may elect to accept infiltration measurements in lieu of air testing.

7. These tests shall be conducted at all times in the presence of the Owner's representatives. Should a line which has previously been tested indicate any water infiltration, or otherwise appear suspect to the representatives, the Contractor shall conduct confirmation air tests on the line at no additional costs.

1.5 DEFLECTION TESTING

A. Deflection tests shall be performed on all flexible pipe. The test shall be conducted after the final backfill has been in place at least 30 days.

B. No pipe shall exceed a deflection of 5 percent.

C. If the deflection test is to be run using a right ball or mandrel, it shall have a diameter equal to 95 percent of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.

1.6 Manhole and Appurtenance Testing

A. All sanitary manholes, wet wells, septic tanks, holding tanks, and other appurtenant structures shall be tested as to water tightness. If the initial test fails, a retest shall be required. The Contractor has the option of either of the following methods:

1. Water Test: The inlet and outlet of the structure shall be plugged by watertight plugs furnished by the Contractor, and the manhole shall be filled with water. The water shall remain for sufficient time for the absorption into the concrete pipe to have been substantially completed. The amount of water loss from the manhole shall then be determined. The rate shall not exceed five (5) gallons per hour. Obvious leaks shall be repaired by the Contractor by excavating outside the structure, if required, at no cost to the Owner.

2. Vacuum: The manholes shall be vacuum tested by a method and apparatus subject to the prior approval of the Engineer. Vacuum testing shall be performed in the following manner:

   The manhole shall be fully assembled, including all pipe connections into the structure. The manhole shall be in its final location and shall not have been backfilled prior to the performance of the test.

   All lift holes shall be plugged with a non-shrinking mortar, as approved by the Engineer.

   The seal between the manhole sections shall be in accordance with ASTM C923.

   The Contractor shall plug the pipe openings, taking care to securely brace the plugs and the pipe.

   With the vacuum tester set in place:

   - Inflate the compression band to effect a seal between the vacuum base and the structure.

   - Connect the vacuum pump to the outlet port with the valve open.

   - Draw a vacuum to 10" of Hg. and close the valve.

   - The test shall pass if the vacuum remains at 10" Hg. or drops to 9" Hg. in a time greater than one minute. If the manhole fails the initial test, the Contractor shall locate the leak and make proper repairs. Leaks may be filled with a wet slurry of accepted quick setting material.

   Any appurtenant structure which shows obvious infiltration, whether tested or not, shall be sealed to eliminate said infiltration.

1.7 WATER MAIN TESTING:

A. Test water distribution system installed below grade and into the building to the base of the riser in accordance with following procedures:

   1. The Contractor shall notify Portland Water District (PWD) at least 72 hours in advance of any testing on new water mains, in order for PWD to have an opportunity to have a representative on site during the tests.

   2. Before pressure testing the water main, air shall be completely expelled from the pipe. If permanent air valves are not located at all high points, corporation stops shall be installed at all high points so that the air can be expelled as the pipe is being filled. After completion of the test, the corporation stops shall either be removed or left in place at the discretion of the Owner.

   3. 2.If fire hydrants are installed on the new water main, the test shall be conducted against a closed hydrant valve.

4. The test pressure shall be 1.5 times the static pressure at the lowest point of elevation of the line and shall not be less than 150 p.s.i.

5. The test shall not exceed the pipe or thrust restraint design pressures, nor exceed twice the rated pressure of the valves or hydrants and shall not exceed the rated pressure of the valves, if resilient – sealed butterfly valves are used.

6. Water, only, shall be used to bring the main to the required test pressure. The type of pump shall be approved by the Mechanical Engineer.

7. The test shall be of at least two hours in duration. A leakage test shall be conducted immediately after the pressure test.

8. After the pressure test period, water shall be pumped into the main to bring the pressure back up to the initial test pressure. No pipe installation shall be accepted if the leakage is greater than that listed in Table 1 attached to this Section.

   If any pipe installation shows a leakage greater than that specified in Table 1, the contractor at his own expense shall locate and repair the leak until it is within the specified allowance.

9. The pressure and leakage tests shall be witnessed by the Owner's representative.

10. New hydrants shall be flowed with the static and residual pressures measured in accordance with NFPA 291.

B. Utility Grade/Alignment Check of the Design Alignment. Survey checks, mirrors, or lasers may be employed to verify conformance with these standards.

2. PRODUCTS

2.1 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3.2-mm) maximum thickness, unless otherwise indicated.

   a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.

2. CPVC Piping: ASTM F 493.

3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

4. PVC to ABS Piping Transition: ASTM D 3138.

E. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.2 SLEEVES

A. Galvanized-Steel Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.

E. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.

F. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.3 IDENTIFICATION DEVICES

A. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.

1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.

2. Location: Accessible and visible.

B. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils (0.08 mm) thick.

1. Width: 1-1/2 inches (40 mm) on pipes with OD, including insulation, less than 6 inches (150 mm); 2-1/2 inches (65 mm) for larger pipes.

2. Color: Comply with ASME A13.1, unless otherwise indicated.

C. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) sequenced numbers. Include 5/32-inch (4-mm) hole for fastener.

1. Material: Valve manufacturer's standard solid plastic.

2. Size: 1-1/2 inches (40 mm) in diameter, unless otherwise indicated.

3. Shape: As indicated for each piping system.

D. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.

E. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.

2. Thickness: 1/8 inch (3 mm), unless otherwise indicated.

3. Thickness: 1/16 inch (1.6 mm), for units up to 20 sq. in. (130 sq. cm) or 8 inches (200 mm) in length, and 1/8 inch (3 mm) for larger units.

4. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.

F. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:

1. Green: Cooling equipment and components.

2. Yellow: Heating equipment and components.

3. Brown: Energy reclamation equipment and components.

4. Blue: Equipment and components that do not meet criteria above.

5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.

6. Terminology: Match schedules as closely as possible. Include the following:

a. Name and plan number.

b. Equipment service.

c. Design capacity.

d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.

7. Size: 2-1/2 by 4 inches (65 by 100 mm) for control devices, dampers, and valves; 4-1/2 by 6 inches (115 by 150 mm) for equipment.

2.4 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

3. EXECUTION

3.1 PIPING INSTALLATION

A. Install piping according to the following requirements and Division 33 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping to permit valve servicing.

E. Install piping at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Select system components with pressure rating equal to or greater than system operating pressure.

I. Sleeves are not required for core-drilled holes.

J. Permanent sleeves are not required for holes formed by removable PE sleeves.

K. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas 2 inches (50 mm) above finished floor level.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

a. PVC Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).

b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating gypsum-board partitions.

L. Verify final equipment locations for roughing-in.

M. Refer to equipment specifications in other Sections for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 33 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

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

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

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

G. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer's written instructions.

H. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.

3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.

5. PVC Nonpressure Piping: Join according to ASTM D 2855.

6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

I. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

J. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

K. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End PE Pipe and Fittings: Use butt fusion.

2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.

L. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.

2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3. Install dielectric fittings at connections of dissimilar metal pipes.

3.4 EQUIPMENT INSTALLATION

A. Install equipment level and plumb, unless otherwise indicated.

B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.

C. Install equipment to allow right of way to piping systems installed at required slope.

3.5 IDENTIFICATION

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.

2. Locate pipe markers on exposed piping according to the following:

   a. Near each valve and control device.
   b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
   c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
   d. At manholes and similar access points that permit view of concealed piping.
   e. Near major equipment items and other points of origination and termination.

B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.

   1. Lettering Size: Minimum 1/4 inch (6.4 mm) high for name of unit if viewing distance is less than 24 inches (610 mm), 1/2 inch (13 mm) high for distances up to 72 inches (1800 mm), and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.

   2. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

3.6 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

   1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.

   2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of base.

   3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.

   4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

   5. Install anchor bolts to elevations required for proper attachment to supported equipment.

   6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

7. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in "Cast-in-Place Concrete" Section of the specifications.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor piped utility materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M.

3.8 GROUTING

A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION

Table 1

Allowable Leakage for Mechanical-Joint or Push-On Joint Pipe in 18-ft. Nominal Lengths*

Avg. Test Pressure (psi)	Pipe Size - inches															
	2	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48
Allowable Leakage per 1,000 ft-gph																
250	0.48	0.71	0.95	1.42	1.90	2.38	2.85	3.33	3.80	4.28	4.75	5.70	7.13	8.55	9.98	11.40
225	0.45	0.68	0.90	1.35	1.80	2.25	2.70	3.15	3.60	4.05	4.50	5.40	6.76	8.11	9.46	10.81
200	0.42	0.64	0.85	1.27	1.70	2.12	2.55	2.97	3.40	3.82	4.25	5.10	6.37	7.61	8.92	10.19
175	0.40	0.60	0.79	1.19	1.59	1.99	2.38	2.78	3.18	3.58	3.97	4.77	5.96	7.15	8.34	9.54
150	0.37	0.55	0.74	1.10	1.47	1.84	2.20	2.58	2.94	3.31	3.68	4.41	5.52	6.62	7.72	8.83
140	0.36	0.53	0.71	1.07	1.42	1.78	2.13	2.49	2.84	3.20	3.55	4.26	5.33	6.40	7.46	8.53
130	0.35	0.51	0.69	1.03	1.37	1.71	2.06	2.40	2.74	3.08	3.42	4.11	5.14	6.16	7.19	8.22
120	0.33	0.49	0.66	0.99	1.32	1.64	1.98	2.30	2.63	2.96	3.29	3.95	4.93	5.92	6.91	7.89
110	0.31	0.47	0.63	0.94	1.26	1.58	1.89	2.21	2.52	2.83	3.15	3.78	4.72	5.67	6.61	7.56
100	0.30	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.40	6.31	7.21
90	0.28	0.43	0.57	0.86	1.14	1.42	1.71	1.99	2.28	2.56	2.85	3.42	4.27	5.13	5.98	6.84
80	0.27	0.40	0.54	0.80	1.08	1.34	1.61	1.88	2.15	2.42	2.69	3.22	4.03	4.84	5.64	6.45
70	0.25	0.38	0.50	0.75	1.00	1.26	1.51	1.76	2.01	2.26	2.51	3.01	3.77	4.52	5.28	6.03
60	0.23	0.35	0.46	0.70	0.93	1.16	1.39	1.63	1.86	2.09	2.32	2.79	3.49	4.19	4.89	5.58
50	0.21	0.32	0.42	0.64	0.85	1.06	1.28	1.49	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.10
40	0.19	0.28	0.38	0.57	0.76	0.95	1.14	1.33	1.52	1.71	1.90	2.28	2.85	3.42	3.99	4.56

*The allowable leakage for a pipeline is calculated by multiplying the leakage per hour per 1,000 feet at the average test pressure and for the diameter of pipe tested as obtained from the above table by the duration of the test in hours and the total length of the line being tested divided by 1,000. If the line under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

SECTION 33 11 00

WATER UTILITY DISTRIBUTION PIPING

1. GENERAL

1.1 SUMMARY

A. Furnish labor, materials, services, equipment, and other necessary items required for accompanying the construction of the water systems. This shall include, but not be limited to the following: pipe and fittings for onsite and offsite water line including domestic water line and fire water line, valves, set lines, elevations, and grades for water distribution systems. **Also, supply all tapping sleeves, tees and valves for connection to the existing water main.** Provide rigid insulation where cover is designated to be less than 4 ’-0”.

B. Related Sections:

1. Section 32 11 00 – Base Courses.
2. Section 31 20 00 – Earth Moving.
3. Local Governing Authority and Code Requirements.
4. All Necessary Construction Permits.

C. The public water supply is owned and operated by the Portland Water District. All materials, installation, and workmanship shall comply with the requirements of the local water department, the Public Utilities Commission, the Maine State Plumbing Code and these specifications. Where a more stringent standard exists, the more stringent standard shall apply.

1.2 SUBMITTALS

A. Product Data: Provide data on pipe materials, pipe fittings, hydrants, valves and accessories including ASTM designations, AWWA certifications and UL labels as required.

B. Manufacturer's Certificate: Certify that products meet or exceed state or local requirements.

1.3 QUALITY ASSURANCE

A. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.

B. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54 Kg) Rammer and 18-in. (457 mm) Drop.

C. ANSI/AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe Fittings for Water.

D. ANSI/AWWA C105 - Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquid.

E. ANSI/AWWA C111 - Rubber-Gasket Joints for Ductile Iron and Grey-Iron Pressure Pipe and Fittings.

F. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.

G. ANSI/AWWA C502 - Dry Barrel Fire Hydrants.

H. ANSI/AWWA C508 - Swing-Check Valves for Waterworks Service, 2 in through 24 in NPS.

I. ANSI/AWWA C509 - Resilient Seated Gate Valves 3 in through 12 in NPS, for Water and Sewage Systems.

J. ANSI/AWWA C600 - Installation of Ductile-Iron Water Mains and Appurtenances.

K. ANSI/AWWA C606 - Grooved and Shouldered Type Joints.

L. ANSI/AWWA C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for Water.

M. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

N. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

O. ASTM D3035 - Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter.

P. AWWA C901 - Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, ½ inch through 3 inch, for water.

Q. UL 246 - Hydrants for Fire - Protection Service.

1.4 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of piping mains, valves, connections, and invert elevations. Record a minimum of two (2) lateral measurement “swing ties”, as close to 90 degrees opposed as practical, prior to backfilling pipeline from permanent fixtures such as building corners, telephone poles, fire hydrants, catch basins, manholes etc. to all valves, fittings, couplings, tees etc. for purposes of future location. Permanent fixtures shall be identified such as house numbers or description, pole numbers etc. These ties must be legibly recorded in sketch form and submitted to the Owner prior to final project acceptance. Record the same information with coordinates on the Maine State coordinate grid system for the record drawings.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with utility company and/or municipality requirements.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

2. PRODUCTS

2.1 PIPE

A. Pipe: Sizes less than 3” that are installed below grade and outside building shall comply with the following:

1. Seamless Copper Tubing: Type “K” roll form to comply with ASTM B88-62. Fittings shall be brass compression manufactured by Ford, Mueller, or McDonald.

B. Pipe: Sizes 4” and larger shall comply with the following:

1. Ductile Iron Water Pipe: In accordance with ANSI A21.51. (AWWA C151) ductile iron pipe shall be cement mortar lined in accordance with AWWA C104. Joints shall meet requirements of AWWA C111. Push-on joint pipe to be supplied with gaskets and gasket lubricants. Pipe shall be 62-42-10 strength; 60,000 psi minimum tensile strength; 42,000 psi minimum yield strength; 12 but not including 16 inch shall have a Class 52 wall thickness. Size 16" and over shall have Class 51 wall thickness. The bituminous coating used for the sealing of the cement mortar lining shall be of a quality that will not have a deleterious effect on the quality, color, taste or odor of potable water.

C. Ductile Iron Fittings: Fittings shall be North American manufactured by and material shall be ASTM A536-72 mini grade 70-50-05, in accordance with AWWA C110. Fittings shall be cement lined (AWWA C104-74). Interior seal coated (AWWA C104-74) and exterior bituminous coated. Mechanical joint with accessories furnished; D.I. glands, gaskets, Cor-Ten T-bolts and nuts; Class 350 pressure rating in accordance with AWWA C110. Thickness shall be equal to ductile iron pipe Class 53 in accordance with AWWA C151. All plain end fittings shall be beveled-edged (60o) to fit slip-joint fitting and shall be long body design.

D. Retainer Glands: Glands shall be heavy duty ductile iron body as manufactured be Romac or Ebba Iron and shall have a minimum working pressure rating as follows:

1. 4” – 350 psi (pounds per square inch)
   6” – 350 psi
   8” – 350 psi
   12” – 350 psi

Set screws shall be:

1. cupped syle ends;
2. composed of Cor-Ten Steel or Ductile Iron

The number of set screws shall be equal to or greater than the number of inches of nomial diameter of the gland (i.e. 4” – 4 set screws; 6” – 6 set screws, etc).

Gland shall meet AWWA specifications.

E. Bolts and Nuts: General description of properties required.

1. Stainless Steel: Type 316 - contains the addition of molybdenum to the nickel-chromium steels.

   Specific Chemical Composition:

   a) Carbon - 0.08% max.
   b) Manganese - 2.00% max.
   c) Silicone - 1.00% max.
   d) Phosphorus - 0.04% max.
   e) Sulphur - 0.03% max.
   f) Chromium - 16-18.00%
   g) Nickel - 10-14.00%
   h) Molybdenum - 2-3.00%
   i) SAE No. - 30316
   j) ASM No. - 5361A, 5524A, 5573, 5648B, 5690D

2. Cor-Ten Steel: Trade name for cold formed T-head bolts containing alloying elements such as copper, nickel, and chrome.

   Specific Chemical Composition:

   a) Carbon - 0.2% max.
   b) Manganese - 1.25% max.
   c) Sulphur - 0.05% max.
   d) Nickel - 0.25% min.
   e) Copper - 0.20% min.
   f) Combined - 1.25% min.
   (Ni,Cu,Cr)

F. Resilient Sealed Gate Valve: Valve shall meet all provisions of ANSI/AWWA C509-87 specification as latest revised; shall have a smooth unobstructed water way which shall be a minimum of the nominal diameter of the valve. Valve ends to be specified and shall be furnished with Cor-Ten (or equal) bolts and nuts. Valves shall be manufactured by Mueller, American Flow Control or U.S. Pipe and shall open right.

G. Valve Boxes: The valve box bottom section shall be slide-type with bell-type base. The valve box top section shall be slide-type. It shall have a top flange, but shall not have a "bead" or bottom flange. The valve box cover shall be a 2" drop-type cover to fit the 7-1/4" opening of the top section. The valve box extension shall be slide-type with a minimum 3" belled bottom. Material shall be cast iron or ductile free from defects. Interior and exterior of all components shall be bituminous coated with a minimum of 4 mils dry film thickness.

H. Service Box and Rod:

1. Service Box Specification:

   Shall be North American and 1.0" (in.) I.D. steel size (SCHEDULE 40) black iron with top having N.P.I. threads for 1.0" screw-on cover.

   Shall be Erie style with 4-6’ / 5-6' (ft.) slide-type riser.

2. Service Box Cover Specifications:

   Shall be North American, Quincy type (heavy-duty) cover that screws on (1.1 above).

   Shall be tapped with a 1" rope thread with a solid brass plug with pentagon operating head.

3. Service Box Foot Piece Specifications

   The standard foot piece shall be North American, heavy-duty (Ford style or equal) cast iron design.

   The large, heavy-duty foot piece shall have an arch that will fit over 2" ball-valve curb-stops.

4. Service Rod Specifications

   Shall be 24"-30" in length and have a self-aligning design.

   Shall be of circular dimension and constructed of:

   a) 1/2" diameter minimum #304 stainless steel.

   Shall have a yoke design that is an integral part of the rod.

   The curb-stop attachment point shall be a brass cotter pin.

   The rod "wrench-flat" shall have a minimum thickness of 1/4" tapered to 1/16" and width of 5/8" or 1/2".

I. Tapping sleeves shall be as approved by Portland Water District. Options include the following:

   The tapping sleeve shall be; 304 Stainless Steel Tapping Sleeves with ductile iron flange. Flange bolts shall be stainless steel or silicon bronze. The sleeve shall be rated for a maximum, working pressure of 200 psi. The interior and exterior shall be bituminous coated with a minimum of 4 millimeters dry film thickness. The sleeve shall be provided with a 3/4" F.I.P.T. test port and plug.

J. Corporation Stop:

1. 1" shall be a ball valve design with a brass ball that is Teflon (or equal) coated. 1-1/2" - 2" shall be ball corporation design with an on-off identification mark on the operating nut.

2. The valve shall be supported by 2 seats for water, tight shut-off in either direction.

3. The valve shall have a full port opening.

4. The body of the corporation-stop shall be of heavy-duty design.

K. Specifications for Services:

1. Material:

   Copper Tubing: ASTM B88, Type K, Seamless, Annealed, 2 Inch Diameter Maximum.

2. Fittings:

   Brass compression manufactured by Ford, Mueller or McDonald.

L. Curb Stops:

1. For sizes 1”-2”, the valve shall be a brass ball that is Teflon (or equal) coated.

2. The bass shall be supported by seats, which are water tight in either direction.

3. The valve shall have a full-port opening.

4. The valve shall open with ¼ turn (90°) with a check or stop.

5. The valve shall NOT have a drain.

6. The valve stem shall have 2 “o” rings and a bronze ring lock, which holds the stem solidly in the valve body.

7. The valve body shall be a heavy-duty design.

M. Hydrant: Hydrants shall be either American Flow Control’s B-62-B, Mueller Centurion or U.S. Pipe’s Metropolitan 250 all with stainless steel nuts and bolts below grade. The hydrant shall have an epoxy-coated base, and open right. The nozzles shall have National Standard Threads. Operating nut shall be 1-15/16".

   All material used in the production of fire hydrants for ordinary service shall conform to the specifications designated for each material listed in AWWA Standard C502.

N. Joint Restraint: Place thrust blocking consisting of 2,500 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 lbs./sq. ft. when water main pressure is 100 psi.

MINIMUM THRUST BLOCKING BEARING AREAS

Pipe Diameter	Tees Sq. Ft.	90 Deg.Bend Sq. Ft.	45 Deg.Bend Sq. Ft.	22 Deg.Bend Sq. Ft.
4"	1.0	1.0	1.0	1.0
6"	1.5	2.0	1.0	1.0
8"	2.5	3.5	1.8	1.0
10"	4.0	5.5	2.8	1.5
12"	6.0	8.0	4.0	2.0
14"	8.0	11.0	5.5	3.0
16"	10.0	14.2	7.0	4.0

O. Rigid Insulation: Installation, when required by the Drawings, shall be 2” Styrofoam SM or TG as manufactured by the Dow Chemical Company or equal.

Materials submitted shall have a K factor of .20 @ 75 degrees by ASTM C518-70, 2-lb. density by ASTM C303-56, compressive strength of 30-lb. by ASTM D1621-64 and a water absorption of less than .05 meet Federal Specifications HH1524B Type II, Class B.

P. Temporary Water Service: Provide temporary water service as necessary during the site work and building construction. Utilize materials as approved by Portland Water District.

3. EXECUTION

3.1 WATER DISTRIBUTION SYSTEM

A. Building Service Lines: Install water service lines to point of connection within approximately five feet outside of buildings to which such service is to be connected and make connections thereto. If building services have not been installed provide temporary caps. Connections of service lines to distribution mains shall be constructed in accordance with the following requirements.

1. 2 Inch and Larger: Connect by rigid connections and provide gate valve below frost line.

B. Regrading: Raise or lower existing valve and curb stop boxes and fire hydrants to finish grade in areas being graded.

C. Pipe Laying, General

1. Install to same tolerances as specified for storm drain (Section 33 41 00).

2. Do not lay pipe on unstable material, in wet trench, or, when trench or weather conditions are unsuitable.

3. Support pipe laid in fill area at each joint, by brick or concrete piers carried down to solid undisturbed earth.

4. Do not lay pipe in same trench with other pipes or utilities.

5. Hold pipe securely in place while joint is being made.

6. At least one foot shall separate water lines vertically from other pipes or underground structures.

7. Where water pipes cross sanitary sewers or are laid parallel and adjacent to them, bottom of water pipe shall be separated by not less than one foot above top of sewer and ten feet horizontally.

8. Do not work over, walk on, pipes in trenches until covered by layers of earth well tamped in place to a depth of 12 inches over pipe.

9. Full length of each section of pipe shall rest solidly upon pipe bed with recesses excavated to accommodate bells or joints. Do not lay pipes on wood blocking.

10. Install water lines to avoid storm and sanitary sewer lines.

11. Clean interior or pipe thoroughly of all foreign matter before installation. Keep pipes clean during laying operations by means of plugs or other methods. When work is not in progress, securely close open ends of pipe and fittings to prevent water, earth, or other substances from entering.

12. Tees, plugs, caps, bends and hydrants on pipe installed underground shall be anchored. Pipe clamps and tie rods, or concrete thrust blocks may be used. Type of pipe and soil conditions determine methods. Anchor water mains as specified in NFPA No. 24.

13. Close pipe openings with caps or plugs during installation. Tightly cover and protect equipment against dirt, water and chemical, or mechanical injury. At completion of all work thoroughly clean exposed materials and equipment.

D. Laying Ductile Iron Pipe

1. Installing Pipe: Lay pipe in accordance with AWWA C600.

2. Joints:

   a. Mechanical: AWWA C111. Provide sufficient quantities of bolts, nuts, glands and gaskets for each socket opening on pipe and fittings.

   b. Push-On: Apply thin film of lubricant to gasket and place in proper position in contour of bell. Insert beveled end of joining pipe and make contact with gasket. Force

beveled end of pipe to bottom of bell without displacing gasket. Do not caulk. Only lubricant furnished by manufacturer of pipe shall be used.

c. Flanges: AWWA C115. Install only in concrete pits. Must be watertight and set not less than six inches from walls to floor.

E. Setting of Valves:

1. Install gate valves as indicated on the Drawings and support on concrete pads with valve stem vertical and plumb. Install valve boxes in a manner that will not transmit loads, stress, or shock to valve body.

2. Center valve box over operating nut of valve vertical and plumb. Securely fit valve box together leaving cover flush with finished surface.

3. Clean valves and curb stops interior before installation.

F. Setting of Fire Hydrants

1. Install fire hydrant assemblies as indicated on Drawings in vertical and plumb position with steamer nozzle pointed toward building unless otherwise directed by local authorities. Support hydrant assembly on concrete pad and firmly braced on side opposite inlet pipe against undisturbed soil or concrete blocking. Place minimum of 6 cu. ft. of crushed stone or gravel around hydrant base and barrel after thrust blocking has cured at least 24 hours. Exercise care when backfilling and compacting so proper vertical position will not be altered.

2. Clean interior of hydrants of all foreign matter before installation.

3. Set center of each hydrant not less than two (2) feet nor more than six (6) feet back of edge of road or face of curb. Set barrel flange not more than two (2) inches above finished grade and eighteen (18) inches between center of steamer nozzle and finished grade.

G. Pipe Sleeves: Install where water lines pass through retaining and foundation walls. Properly secure in place, with approximately 1/4-inch space between pipe and enclosing sleeve, before concrete is poured. Caulk annular opening between pipe and sleeves, and seal with asphaltic compound consisting of bituminous materials mixed with mineral matter. Install piping so that no joint occurs within a sleeve. Split sleeves may be installed where existing lines pass through new construction.

H. Meter: The Contractor will obtain the meter from the Portland Water District and install the domestic water meter for the installation and will pay all usage charges connected with water supply until the installation is accepted by the Owner.

3.2 DISINFECTION

A. Disinfect distribution system with chlorine before acceptance for domestic operation in accordance with the following procedures:

1. The only acceptable method of disinfection shall be the continuous Feed Method of chlorine.

2. The rates of introduction of the chlorine and water shall be so proportioned so that the chlorine concentration in the water is maintained at a minimum of 50 mg/l available chlorine.

3. During the application of the chlorine, valves shall be operated in such a manner that the treatment dosage shall not flow back into the line supplying the water. The operation of the valves shall be done under Water Department supervision.

4. The chlorinated water shall be retained in the main for at least 24 hours. At the end of the 24 hour period, the treated water shall contain no less than 25 mg/l available chlorine.

5. At the end of the retention period, the chlorinated water shall be flushed from the main until the chlorine in the water leaving the main is no higher than the normal residual in the system, or less than 1 mg/1.

6. All bacteriological tests shall be collected in sample bottles and shall be tested at a State certified laboratory. All costs for disinfection of the main as well as bacteriological costs shall be borne by the Contractor.

3.3 TESTING OF WATER DISTRIBUTION SYSTEM

A. Test water distribution system pipe sizes installed below grade and outside building in accordance with following procedures:

1. Before pressure testing the water main, air shall be completely expelled from the pipe. If permanent air valves are not located at all high points, corporation stops shall be installed at all high points so that the air can be expelled as the pipe is being filled. After completion of the test, the corporation stops shall either be removed or left in place at the discretion of the Water District.

2. If fire hydrants are installed on the new water main, the test shall be conducted against a closed hydrant valve.

3. The test pressure shall be 1.5 times the static pressure at the lowest point of elevation of the line and shall not be less than 150 p.s.i.

4. The test shall not exceed the pipe or thrust restraint design pressures, nor exceed twice the rated pressure of the valves or hydrants and shall not exceed the rated pressure of the valves, if resilient - sealed butterfly valves are used.

5. Water, only, shall be used to bring the main to the required test pressure. The type of pump shall be approved by the Portland Water District.

6. The test shall be of at least two hours in duration. A leakage test shall be conducted immediately after the pressure test.

7. After the pressure test period, water shall be pumped into the main to bring the pressure back up to the initial test pressure. No pipe installation shall be accepted if the leakage is greater than that listed in Table 1 attached to this Section.

   If any pipe installation shows a leakage greater than that specified in Table 1, the contractor at his own expense shall locate and repair the leak until it is within the specified allowance.

   The pressure and leakage tests shall be conducted under Portland Water District's supervision.

END OF SECTION

SECTION 33 39 00

APPURTENANCES FOR UTILITIES

1. GENERAL

1.1 SUMMARY

A. Section Includes:

1. Monolithic concrete manholes with masonry transition to lid frame, covers, anchorage and accessories.
2. Modular precast concrete manhole sections with tongue-and-groove joints with masonry transition to lid frame, covers, anchorage and accessories.
3. Masonry manholes sections with masonry transition to lid frame, covers, anchorage and accessories.
4. Precast septic tank, holding tank, grease traps, and SEWER SYSTEM accessories when required on the contract drawings.

B. Related Sections:

1. Section 33 05 00 – Common Work Results for Utilities
2. Section 33 31 00 – Sanitary Utility Sewerage Piping
3. Local Governing Authority and Code Requirements
4. Construction Drawings

1.2 REFERENCES

A. ANSI/ASTM C55 - Concrete Building Brick.

B. ASTM A48 - Gray Iron Castings

C. ASTM C478 - Precast Reinforced Concrete Manhole Sections.

D. ASTM C923 - Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.

E. ASTM C1227-13 – Standard Specification for Precast Concrete Septic Tanks

F. ASTM D1248 - Precast Polyethylene Manholes.

G. International Masonry Industry All-Weather Council (IMIAC): Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.3 SUBMITTALS

A. Shop Drawings: For all precast structures indicate manhole locations, rim elevation, piping, sizes and elevations of proposed penetrations. For all other precast appurtenances, provide dimensional data, ASTM compliance certificates, and load capacity where applicable.

B. Product Data: Provide manhole covers, component construction, features, configuration and dimensions. Each precast structure shall have a diagram showing the dimensions and location of all openings or penetrations.

2. PRODUCTS

2.1 PRECAST CONCRETE ITEMS

A. Precast Manhole and Sections: Manhole and super-structures shall be precast reinforced concrete of the dimensions indicated on the Plans conforming to ASTM Specification C478. Sections shall be installed with a flexible plastic gasket equal to or better than "Ram-Nek" as manufactured by K. T. Snyder Co., Houston, Texas, or sections may be fabricated to accept Tylox "0" rubber gaskets as manufactured by Hamilton Kent Manufacturing Co., Kent, Ohio. The casting and the outside of the brick work required to bring the rim to grade shall be plastered with at least 3/8" mortar, thoroughly troweled to leave a smooth waterproof vertical exterior surface.

Manhole steps shall be forged aluminum safety type, alloy 6061, temper T6, or reinforced polypropylene plastic. Steps shall be cast or anchored into walls of precast sections to form a ladder with a distance of 12 inches between steps.

The Contractor shall furnish the name of the manufacturer to the Engineer prior to commencing work.

B. Precast Manhole Bases: Manhole bases shall be precast reinforced concrete of the dimensions indicated on the Plans conforming to ASTM Specification C478. Bases shall be placed on a well compacted layer of crushed stone.

Jointing system for pipe entering or leaving manholes shall be a flexible manhole sleeve cast in the base. A stainless steel pipe clamp shall be used to fix the pipe into the sleeve. All materials shall meet or exceed rubber quality standards of ASTM C-443 and C-361.

For manhole bases, a minimum of 4 inches shall be allowed between pipe invert and inside bottom of base for construction of brick inverts.

Where precast bases are used for drop manholes, a 6 inch concrete slab is to be placed under the base section large enough to receive the concrete encased drop pipes. Provide suitable ties between manhole sections and drop pipe encasements.

Prior to ordering precast manhole bases, all angles between incoming pipes are to be field checked to incorporate possible line changes required in the field layout.

C. Precast Tanks, Vaults and Appurtenances: Precast tanks, vaults, and appurtenances shall be constructed of precast reinforced concrete with inside dimensions conforming to those indicated on the contract drawings and conforming to ASTM C478. The tank may be a monolithic section or constructed with tongue and grooves with approved watertight sealants such as "o" rings. All penetrations through the tank shall use either cast in place wall sleeves with Link Seals or a flexible boot secured in the casting such as Kor N Seal. Any clamps or metallic connections shall be stainless steel.

The tanks, vaults, and appurtenances shall include shop drawings and submittals with supporting computations which demonstrate the tank can support an H20 loading, an equivalent external fluid pressure of 105 lb./cubic ft. (with the tank empty), and an internal fluid pressure of 65 lb./cubic ft. The pressures shall be assumed to apply from the base of the structure to the finish grade surface.

Tanks which require attachment to an anti-flotation slab shall use stainless steel angles and anchors sized to resist the uplift force.

The tanks shall be coated with a waterproof seal on the interior and exterior. Sections shall be fabricated to receive a watertight seal.

2.2 CASTINGS

A. The Contractor shall furnish all cast iron frames, grates, and covers conforming to the details shown on the Drawings, or as hereinbefore specified.

B. Castings shall be at least Class 25 conforming to the ASTM Standard Specifications for Gray Iron Castings, Designation A-48-64 except for the 12” NDS risers and 12” inlets.

C. Sanitary sewer covers shall have the name "Sewer" cast therein.

D. The manhole castings shall be a non-perforated manhole frame and cover, 24” clear opening as manufactured by the East Jordan Works Foundry or approved equal.

2.3 MORTAR

A. Mortar used to adjust rims and covers for manholes shall consist of the following materials and proportions by volume: 1 part of Portland cement; 1/4 part lime hydrate; and 3 parts sand.

B. For precast reinforced concrete manholes, mortar for invert construction shall consist of the following materials and proportions by volume: 1 part Portland cement and 2 parts sand. Quantity of water in mixture shall be sufficient to produce a stiff, workable mortar, but in no case shall exceed 5-1/2 gallons of water per sack of cement.

2.4 BRICK

A. Brick for manholes and catch basins shall meet Standard Specifications for Sewer Brick, AASHTO Designation M-91-42, Grade SA, Size No. 1 wire cut. Any brick rejected by the Engineer as unsuitable shall be immediately removed from the work.

2.5 SITE CONCRETE

A. Site concrete shall meet the requirements set forth below:

1. Aggregate: The aggregate shall conform to the Standard Specifications for Concrete Aggregates, ASTM Designation C-33, as revised.

   (a) Sand shall be a medium sand with a fineness modules of 2.60 - 2.90.
   (b) Coarse aggregate shall not exceed 1-1/2 inches for mass concrete.

2. Cement: All cement shall be a Portland Cement conforming to the requirements of Standard Specifications of the American Society for Testing Materials, Designation C-150, as revised, Type II. An air entraining agent, approved by the Engineer, shall be used.

3. Proportioning Concrete:

Maximum Size Coarse Aggregate (Inches)	Air Content Percent by Volume
1-1/2, 2, or 2-1/2	5 +/- 1
3/4 or 1	6 +/- 1

The strength of the concrete shall be fixed in terms of water-cement ratio in accordance with trial batches of the materials to be used. All concrete placed under this Specification shall be mixed in the ratio not to exceed six (6) U.S. gallons of water per sack of cement, including surface water carried by the aggregate in each case. The Contractor shall determine the approximate amount of surface water contained in the aggregate, and make proper allowance. Concrete shall have a minimum 28 day strength of 4000 psi. The Contractor shall submit the proposed mix proportions to the Engineer for approval ten (10) days prior to placing concrete. Copies of recent test results for the proposed mix design shall also be submitted.

2.6 REINFORCEMENT

A. The Contractor shall submit detailed shop drawings for concrete reinforcement in accordance with ACI 318 and ACI 315. The steel shall be deformed Grade 60 bars which conform to ASTM 615, ASTM 616, or ASTM 617. Supports, spaces, and chairs shall permit the steel to be supported in accordance with ACI 318.

2.7 TREATMENT OF INTERIOR SURFACES

A. All interior surface of cast in place concrete structures shall have a liquid hardener applied. The application shall consist of two coats of VANDEX or approved equal installed in accordance with manufacturer's instructions including requirements for surface preparation. Catalog cuts of the hardener shall be submitted to the Engineer for approval. All interiors of concrete items shall be treated with a waterproof coating (18 mil. Film thickness).

2.8 TREATMENT OF EXPOSED SURFACES

A. All exposed exterior concrete surfaces shall have a "rub finish". Structures and appurtenances shall have an applied coating of Tnemec Series 104 H5 Epoxy applied in 2 coats or approved equal to achieve a minimum dry film thickness of 18 mils. All light pole bases shall have an epoxy finish colored to match the pole color. One coat shall be applied in the factory, a second coat shall be applied in the field.

2.9 TREATMENT OF ALL OTHER EXTERIOR SURFACES

A. All buried surfaces shall be double coated with a concrete hardener to achieve a minimum dry film thickness of 18 mils.

2.10 RAIN GUARD MANHOLE INSET

A. A self sealing removable insert shall be provided and installed in the frame of each manhole casting. The purpose of this device is to collect and store illicit water that may enter the manhole casting. The units shall be “RAINGUARD™” or approved equal.

3. EXECUTION

3.1 MANHOLES

A. General: All appurtenant structures shall be set level on compacted material as shown on the Plans.

B. Manhole Channels: Channels shall be constructed in all sanitary sewer manholes in accordance with the details shown on the Plans by a mason whose qualifications meet the approval of the Engineer or a channel of reinforced concrete cast with the manhole base. The sides shall be raised by brick masonry construction from the spring line perpendicular to the height of the crown of the pipe. Where changes in directions are made at manholes, the invert shall be shaped with as great a radius as possible, and to the complete satisfaction of the Engineer. Brick shall be carefully laid to present a smooth surface as indicated on the Plans and to the satisfaction of the Engineer.

C. Pipe Connections:

1. Stubs in Manholes: Stubs placed as specified and indicated on the Drawings shall be short pieces cut from the bell ends of appropriate pipe and shall have compatible watertight

stoppers. Stubs shall be set accurately to the required line and elevation and encased in the structure masonry as indicated on the Drawings:

2. Wall Sleeves and Castings: Wall sleeves and castings as specified and indicated on the Drawings shall be accurately cast to the required location and elevations as indicated on the Drawings.

D. Steps: Manhole and appurtenant steps shall be cast in the wall and installed in a straight vertical alignment.

E. Infiltration Seal: Install rain guard or approved equal manhole inserts.

3.2 ALTERATIONS TO EXISTING MANHOLES

A. Existing manholes to be altered shall be reconstructed as indicated on the Plans or as directed by the Engineer. Adjusting to grade or connecting to an existing pipe stub is not considered an alteration.

B. Alterations covered include, but are not limited to, adjustments to manhole invert channel caused by new pipe connections or removal of existing pipe connections, and removal and plugging of existing catch basin lead and replacing with a new lead connection conforming to the appropriate section of the Specifications contained herein.

3.3 ADJUSTING EXISTING MANHOLES

A. Existing manholes to be adjusted to grade shall be reconstructed to the required grade. The existing frames, grates, and covers shall be re-used unless otherwise directed.

B. The existing structure shall be dismantled to a sufficient depth to allow reconstruction conforming to the standard details.

C. Adjustment will take place just prior to placing of surface pavement for adjustments of the frame and cover. Adjustments which require dismantling and reconstruction of the super structure shall be accomplished at the time of subgrade preparation. Pavement which is removed for this adjustment shall be cut square, tack coated, and capped with 2" of bituminous concrete. No separate payment will be made for furnishing the bituminous cap.

D. Each structure that is adjusted shall be cleaned of accumulated silt, debris, or foreign matter prior to final acceptance of the work.

3.4 ABANDONING MANHOLES

A. Existing manholes designated to be abandoned shall be removed to a depth of one (1) foot below the subgrade line, unless otherwise indicated on the Plans or directed by the Engineer. The existing pipes shall be plugged with concrete and brick masonry and the catch basins and manholes shall be filled with heavy gravel satisfactorily compacted in 9 inch lifts. Prior to backfilling, the sump shall be pumped and cleaned of all water and foreign material.

3.5 MANHOLE ADAPTERS

A. When altering an existing manhole or where a pre manufactured manhole adapter cannot be installed in precast manhole sections, the Contractor shall use a Fernco, or equal, concrete manhole adapter. The adapter shall be designed to provide a positive, watertight seal between the manhole and pipe and shall be mortared in place with Five Star grout or approved equal non-shrink grout.

3.6 PRECAST TANKS, VAULTS, AND APPURTENANCES

A. These precast items shall be set in a dry excavation, proof-rolled, and prepared with one of the following bedding materials:

- Compacted ¾" crushed stone (8" min.),
- Compacted MDOT 703.06 Type D gravel.

If the subgrade is weak and/or unstable, a layer of Mirafi 600X shall be installed between the prepared subgrade and the bedding.

B. The anti-flotation slab shall be carefully laid out and aligned, and set on the bedding with reinforcement and forms set on a dry excavation site. Concrete shall be poured and protected from inclement weather during the cure period.

C. Tanks shall be set on the anti-flotation slab. Where necessary for plumbness and level, the tank shall be shimmed with a strong slurry grout installed to fill the void space.

D. Multiple section tanks shall be set in place using approved sealants. Double rows shall be required when joint mastics are used. An approved adhesive primer shall be installed prior to installing the mastics and setting the concrete.

E. The tank shall be anchored to the anti-flotation slab with approved stainless steel masonry anchors. All anchors shall be inspected by the Contractor to assure the anchor is secure and will provide the required resistance.

F. After anchorage, the tank excavation shall remain dewatered and backfilled. The backfill shall be brought up uniformly around the tank and compacted in place. Pipe connections shall occur after the tank has been backfilled to the level of the bottom of the pipe bedding.

G. Any voids created by removal of sheeting, bracing or shielding shall be filled and recompacted.

3.7 TESTING

A. Testing shall meet the requirements of Section 33 05 00 "Common Work Results for Utilities".

END OF SECTION

SECTION 33 41 00

STORM UTILITY DRAINAGE PIPING

1. GENERAL

1.1 SUMMARY

A. This Section includes gravity-flow, non-pressure storm drainage outside the building, with the following components:

1. Cleanouts.
2. Precast concrete manholes.
3. Flared inlets/outlets.
4. Catch basins.

1.2 PERFORMANCE REQUIREMENTS

A. Perimeter building underdrains are required and shall be installed as part of the site work. Refer to Section 33 46 00.

B. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: Watertight when installed below permanent pond elevation, silt tight in other areas.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For manholes and catch basins. Include plans, elevations, sections, details, and manhole frames and covers and catch basin frames and grates.

C. Coordination Drawings: Show pipe sizes, locations, and elevations for all manholes and appurtenances.

D. Field quality-control test reports. Product Data: For each type of product indicated.

1.4 DEFINITIONS

A. Bedding: Fill placed under, beside and directly beside pipe to midpoint of pipe, prior to subsequent backfill operations.

B. Special Backfill: Fill placed above bedding beside and over pipe prior to other backfill operations.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of pipes and mains, connections, catch basins, cleanouts and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 COORDINATION

A. Coordinate the work with termination of storm connections outside building and trenching.

B. The exact location of roof drain leaders shall be determined from the Architectural Plans and including as shown on the plumbing drawings. The number and location of the roof drains may be different than shown in the site drawings. Verify roof drain lead locations with the Owner. Provide fittings to raise grade to accept roof drain 5’-0” outside of building where necessary.

C. All building underdrains shall be connected to the storm drainage system. Refer to Section 33 46 00.

2. PRODUCTS

2.1 MANUFACTURERS

Provide any one of the following materials subject to any restrictions noted in this subsection or on plans. The Contractor shall provide catalog cuts to the Owner and indicate the proposed materials to be used prior to ordering materials. The approval of the Owner must be obtained prior to ordering materials.

A. Reinforced Concrete Pipe: Comply with requirements of ASTM C 76, Class IV unless another class type is indicated on Drawings, installed with flexible plastic (Bitumen) gaskets at all joints. Gaskets shall comply with AASHTO M-198 75I, Type B, and shall be installed in strict accordance with pipe manufacturer's recommendations.

B. Polyvinyl Chloride (PVC) Pipe: Pipe and fittings shall comply with ASTM D 3034, rated SDR 35. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification. Pipe joints shall be integrally molded bell ends in accordance with ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant. PVC shall not be used for any drainage pipe which will be permanently exposed to sunlight.

C. Corrugated Polyethylene Pipe (CPP), Smooth Interior: Shall conform with AASHTO Designations M294 and M252. Pipe must be installed in accordance with manufacturer’s installation guidelines for culvert and other heavy duty drainage applications. Acceptable manufacturers: Advanced Drainage Systems, Inc. (ADS) N-12 and HANCOR, INC. (HiQ smooth interior). CPP pipe shall not be used for any drainage pipe which will be permanently exposed to sunlight. Piping below the water table, subject to surcharge, or which could affect a pond level, shall be watertight. All other piping shall be silt tight.

D. Polyvinyl Chloride (PVC) Large Diameter Closed Profile Gravity Sewer Pipe, UNL-B-9: Pipe and fittings shall be installed in accordance with pipe manufacturer’s installation guidelines.

Acceptable manufacturer: CARLON (Vylon HC). PVC pipe shall not be used for any drainage pipe which will be permanently exposed to sunlight.

E. Storm drain inlets, outlets, and culverts to include:

- Rip rapped aprons.
- Concrete flared inlets/outlets for pipes larger than 18” in diameter.
- Bar racks for pipes larger than 18” diameter.
- HDPE flares for pipe smaller than 18” in diameter. High density polyethylene flares with added carbon black for exposure to sunlight.

F. Manholes and Catch Basins Outlet Control Structures, Stilling, Basins, Water Quality Unit, and Water Quality Control Structures shall be provided where shown on the contract drawings.

2.2 CLEANOUTS

A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.

1. Manufacturers:

a. Josam Company.
b. MIFAB Manufacturing Inc.
c. Smith, Jay R. Mfg. Co.
d. Wade Div.; Tyler Pipe.
e. Watts Industries, Inc.
f. Watts Industries, Inc.; Enpoco, Inc. Div.
g. Zurn Industries, Inc.; Zurn Specification Drainage Operation.

2. Top-Loading Classification(s): Heavy duty.

3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.3 MANHOLES

A. Standard Precast Concrete Manholes: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.

1. Diameter: 48 inches (1200 mm) minimum, unless otherwise indicated.

2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.

3. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (100-mm) minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.

4. Riser Sections: 4-inch (100-mm) minimum thickness, and of length to provide depth indicated.

5. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
6. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
7. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
8. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 36 inches (900 mm).
9. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and diameter matching manhole frame and cover. Include sealant recommended by ring manufacturer.
10. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.
11. Manhole Frames and Covers: Ferrous; 24-inch (610-mm) ID by 8-inch (203-mm) riser with 4-inch- (100-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
    a. Material: ASTM A 48, Class 35 gray iron, unless otherwise indicated.

2.4 CONCRETE

A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:
1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water-cementitious materials ratio.
1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.

2.5 CATCH BASINS

A. Standard Precast Concrete Catch Basins: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.
1. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (102-mm) minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
2. Top Section: Eccentric-cone type unless flat-slab-top type is indicated.
3. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.

B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch (610-mm) by 8-inch (203-mm) riser with 4-inch (102-mm) minimum width flange, and 26-inch- (660-mm-) diameter flat grate with bicycle proof drainage openings.

1. Grate Free Area: Approximately 50 percent, unless otherwise indicated.
2. The location of catch basins shall be accurately located by a registered land surveyor. Catch basins shall be located as follows:
   - Edge of frame 6" off face of curb where shown near slopes granite or bit concrete curblines.
   - The center of aisle or parking modules when shown on plans.
   - In other cases, verify with Engineer.

3. EXECUTION

3.1 PIPING APPLICATIONS

A. Pipe couplings and fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

1. Use non pressure-type flexible couplings where required to join gravity-flow, non-pressure sewer piping, unless otherwise indicated.
   a. Flexible couplings for same or minor difference OD pipes.
   b. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Install gravity-flow, non-pressure drainage piping according to the following:

1. Install piping pitched down in direction of flow, at the slope provided on the contract drawing.

2. The pipe shall be accurately laid to the line and grades to the satisfaction of the Engineer. The line and grade may be adjusted by the Engineer from that shown on the Drawings to meet field conditions and no extra compensation shall be claimed therefore. The Owner or his representative reserves the right to check the elevations and alignment on any pipe for conformance with proposed line and grade. Installed grades shall be within the tolerance of plus or minus 0.02 feet from theoretical computed grades. Alignment shall be within a tolerance of plus or minus 0.04 feet. Pipe grade shall be defined as the invert elevation of the pipe. Pipe not meeting the grade tolerance or of poor alignment shall be adjusted by the Contractor.

3. No pipe laying will be allowed to begin at any point other than a manhole or other appurtenance without the expressed consent of the Engineer. The interior of each length of pipe will be swabbed and wiped clean before laying the next length. No length of pipe shall be laid until the previous length has had sufficient fine material placed and tamped about it to secure it firmly in place to prevent any disturbance. Bell ends shall be laid uphill. Whenever the work is stopped temporarily, or for any reason whatsoever, the end of the pipe shall be carefully protected against dirt, water, or other extraneous material. Bedding shall be as shown on the Plans.

4. The pipe shall be cut as necessary for appurtenances. In general, the pipe material shall be cut by using a saw or milling process, approved by the pipe manufacturer and not by using any impact device, such as a hammer and chisel, to break the pipe. The pipe shall be cut, not broken. The cut end of the pipe shall be square to the axis of the pipe and any rough edges ground smooth.

5. Clean interior of all pipe thoroughly before installation. When work is not in progress, open ends of pipe shall be closed securely, in a manner approved by the Engineer, to prevent entrance of trench water, dirt, or other substances.

6. All joints shall be made in a dry trench in accordance with the manufacturer's recommendations.

7. A minimum of two (2) pipe lengths or pipe stubs shall be used between any two (2) appurtenances.

8. When connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions which least interfere with operation of existing pipeline service. Provide facilities for dewatering and for disposal of water removed from dewatering lines and excavations without damage to adjacent properties.

9. Install piping below frost line or with rigid insulation where required by profiles and details.

10. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."

11. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.

F. Clear interior of piping and manholes of dirt and superfluous material as work progresses.

3.3 PIPE JOINT CONSTRUCTION

A. Basic pipe joint construction is specified in Division 33 Section "Common Work Results for Utilities." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. Join gravity-flow, non-pressure drainage piping according to the following:

1. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
2. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-gasket joints.
3. Join dissimilar pipe materials with non-pressure-type flexible couplings.

3.4 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use light-duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.

2. Use medium-duty, top-loading classification cleanouts in paved foot-traffic areas.

3. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.

4. Use extra-heavy-duty, top-loading classification cleanouts in roads.

B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch (25 mm) above surrounding grade in lawn areas.

C. Set cleanout frames and covers in pavement with tops flush with pavement surface.

3.5 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections with sealants according to ASTM C 891.

C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 0-1” (0-25 mm) above finished surface elsewhere, unless otherwise indicated.

3.6 CATCH BASIN INSTALLATION

A. Set frames and grates to elevations indicated.

B. Outlet Control Structure: Provide precast concrete unit, covers, weirs, orifices and appurtenances as shown on the drawings. Provide information on the method, materials, installation, and quality control measures which will be used to seal the wall between the inlet and outlet side of the manhole.

Precast Tanks, Vaults and Appurtenances: Precast tanks, vaults, and appurtenances shall be constructed of precast reinforced concrete with inside dimensions conforming to those indicated on the contract drawings and conforming to ASTM C478. The tank may be a monolithic section or constructed with tongue and grooves with approved watertight sealants such as butyl sealant. All penetrations through the tank shall use either cast in place wall sleeves with Link Seals or a flexible boot secured in the casting such as Kor N Seal. Any clamps or metallic connections shall be stainless steel.

The tanks, vaults, and appurtenances shall include shop drawings and submittals with supporting computations which demonstrate the tank can support an H20 loading, an equivalent external fluid pressure of 105 lb./cubic ft. (with the tank empty), and an internal fluid pressure of 65 lb./cubic ft. The pressures shall be assumed to apply from the base of the structure to the finish grade surface.

Tanks which require attachment to an anti-flotation slab shall use stainless steel angles and anchors sized to resist the uplift force.

The tanks shall be coated with a waterproof seal on the interior and exterior. Sections shall be fabricated to receive a watertight seal.

3.7 MANHOLES

A. General: All appurtenant structures shall be set level on compacted material as specified in Section 2 of these Specifications and as shown on the Plans.

B. Manhole Channels: Channels shall be constructed in all sanitary sewer and storm drain manholes in accordance with the details shown on the Plans by a mason whose qualifications meet the approval of the Engineer or a preformed manhole channel: “FIBERLINER” or equal. The sides shall be raised by brick masonry construction from the spring line perpendicular to the height of the crown of the pipe. Where changes in directions are made at manholes, the invert shall be shaped with as great a radius as possible, and to the complete satisfaction of the Engineer. Brick shall be carefully laid to present a smooth surface as indicated on the Plans and to the satisfaction of the Engineer.

C. Pipe Connections:

1. Stubs in Manholes: Stubs placed as specified and indicated on the Drawings shall be short pieces cut from the bell ends of appropriate pipe and shall have compatible watertight

stoppers. Stubs shall be set accurately to the required line and elevation and encased in the structure masonry as indicated on the Drawings.

2. Wall Sleeves and Castings: Wall sleeves and castings as specified and indicated on the Drawings shall be accurately cast to the required location and elevations as indicated on the Drawings.

D. Steps: Manhole and appurtenant steps shall be cast in the wall and installed in a straight vertical alignment.

3.8 ALTERATIONS TO EXISTING MANHOLES AND CATCH BASINS

A. Existing manholes and catch basins to be altered shall be reconstructed as indicated on the Plans or as directed by the Engineer. Adjusting to grade or connecting to an existing pipe stub is not considered an alteration.

B. Alterations covered include, but are not limited to, adjustments to manhole invert channel caused by new pipe connections or removal of existing pipe connections, and removal and plugging of existing catch basin lead and replacing with a new lead connection conforming to the appropriate section of the Specifications contained herein.

3.9 ADJUSTING EXISTING MANHOLES AND CATCH BASINS

A. Existing manholes and catch basins to be adjusted to grade shall be reconstructed to the required grade. The existing frames, grates, and covers shall be re-used unless otherwise directed.

B. The existing structure shall be dismantled to a sufficient depth to allow reconstruction conforming to the standard details.

C. Adjustment will take place just prior to placing of surface pavement for adjustments of the frame and cover. Adjustments which require dismantling and reconstruction of the super structure shall be accomplished at the time of subgrade preparation. Pavement which is removed for this adjustment shall be cut square, tack coated, and capped with 2" of bituminous concrete. No separate payment will be made for furnishing the bituminous cap.

D. Each structure that is adjusted shall be cleaned of accumulated silt, debris, or foreign matter prior to final acceptance of the work.

3.10 ABANDONING EXISTING CATCH BASINS AND MANHOLES

A. Existing catch basins and manholes designated to be abandoned shall be removed to a depth of one (1) foot below the subgrade line, unless otherwise indicated on the Plans or directed by the Engineer. The existing pipes shall be plugged with concrete and brick masonry and the catch basins and manholes shall be filled with heavy gravel satisfactorily compacted in 9 inch lifts. Prior to backfilling, the sump shall be pumped and cleaned of all water and foreign material.

3.11 MANHOLE ADAPTERS

A. When altering an existing manhole or where a pre manufactured manhole adapter cannot be installed in precast manhole sections, the Contractor shall use a Fernco, or equal, concrete manhole adapter. The adapter shall be designed to provide a positive, watertight seal between the manhole and pipe and shall be mortared in place with Five Star grout or approved equal non-shrink grout.

3.12 PRECAST TANKS, VAULTS, AND APPURTENANCES

A. These precast items shall be set in a dry excavation, proof-rolled, and prepared with one of the following bedding materials:

- Compacted ¾” crushed stone (8” min.)
- Compacted MDOT 703.06 Type D gravel

If the subgrade is weak and/or unstable, a layer of Mirafi 600X shall be installed between the prepared subgrade and the bedding.

B. The anti-flotation slab shall be carefully laid out and aligned, and set on the bedding with reinforcement and forms set on a dry excavation site. Concrete shall be poured and protected from inclement weather during the cure period.

C. Tanks shall be set on the anti-flotation slab when required to resist floatation. Where necessary for plumbness and level, the tank shall be shimmed with a strong slurry grout installed to fill the void space.

D. Multiple section tanks shall be set in place using approved sealants. Double rows shall be required when joint mastics are used. An approved adhesive primer shall be installed prior to installing the mastics and setting the concrete.

E. The tank shall be anchored to the anti-flotation slab with approved stainless steel masonry anchors when the anti-floatation slab is required. All anchors shall be inspected by the Contractor to assure the anchor is secure and will provide the required resistance.

F. After anchorage, the tank excavation shall remain dewatered and backfilled. The backfill shall be brought up uniformly around the tank and compacted in place. Pipe connections shall occur after the tank has been backfilled to the level of the bottom of the pipe bedding. The dewatering shall continue until the finish grade around the tank has been reached with the backfill.

G. Any voids created by removal of sheeting, bracing or shielding shall be filled and recompacted.

3.13 CONNECTIONS

A. Connect non pressure, gravity-flow drainage piping to building's storm building drains specified in Division 22 Section "Facility Storm Drainage Piping."

B. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch (150-mm) overlap, with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).

2. Insulation, when required by the Drawings, shall be Styrofoam SM or TG as manufactured by the Dow Chemical Company or equal.

3. Material submitted shall have a K factor of .20 @ 75 degrees by ASTM C518-70, 2-lb. density by ASTM C303-56, compressive strength of 30-lb. by ASTM D1621-64 and a water absorption of less than .05% by ASTM C272-53 and meet Federal Specification HH1524B Type II, Class B.

4. The Contractor shall coat the insulation material in accordance with the manufacturer's instructions.

3.14 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (600 mm) of backfill is in place, and again at completion of Project.

1. Submit separate report for each system inspection.

a. Horizontal Alignment: Less than full diameter of inside of pipe is visible between structures or ½" off design alignment.

b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.

c. Crushed, broken, cracked, or otherwise damaged piping.

d. Infiltration: Water leakage into piping.

e. Exfiltration: Water leakage from or around piping.

f. Vertical Alignment: Within ¼" of design grade.

2. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.

3. Re-inspect and repeat procedure until results are satisfactory.

B. Test new watertight piping systems that have been installed below the elevation of the permanent pool in the wet pond.

1. Do not enclose, cover, or put into service before inspection and approval.

2. Test completed piping systems according to requirements of authorities having jurisdiction.

3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.

4. Submit separate report for each test.

5. Air Tests: Test storm drainage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
    a. Option: Test plastic gravity sewer piping according to ASTM F 1417.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION

SECTION 33 46 00

SUBDRAINAGE

1. GENERAL

1.1 SECTION INCLUDES

A. This Section includes subdrainage systems for the building underdrains.

B. This section also includes subdrainage within the pavement and lawn areas as shown on the contract drawings.

1.2 SUBMITTALS

A. Submit under provisions of Division 1.

B. Product Data: For each type of drainage panel or piping indicated on the drawings.

2. PRODUCTS

2.1 PIPING MATERIALS

A. Refer to the "Piping Applications" Article in Part 3 for applications of pipe, fitting, and joining materials.

2.2 PERFORATED-WALL PIPES AND FITTINGS

A. Perforated PE Pipe and Fittings: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.

1. Couplings: Manufacturer's standard, band type.

B. Perforated PVC Sewer Pipe and Fittings: ASTM D 2729, bell-and-spigot ends, for loose joints.

2.3 SOLID-WALL PIPES AND FITTINGS

A. PE Drainage Tubing and Fittings: AASHTO M 252, Type S, corrugated, with smooth waterway, for coupled joints.

1. Couplings: AASHTO M 252, corrugated, band type, matching tubing and fittings.

B. PVC Sewer Pipe and Fittings: ASTM D 3034, SDR 35, bell-and-spigot ends, for gasketed joints.

1. Gaskets: ASTM F 477, elastomeric seal.

2.4 SPECIAL PIPE COUPLINGS – VACANT

2.5 CLEANOUTS

A. Cast-Iron Cleanouts: ASME A112.36.2M; with round-flanged, cast-iron housing; and secured, scoriated, Medium-Duty Loading class, cast-iron cover. Include cast-iron ferrule and countersunk, brass cleanout plug.

2.6 SOIL MATERIALS

A. Backfill, drainage course, impervious fill, and satisfactory soil materials are specified in Section 31 20 00 "Earth Moving".

2.7 GEOTEXTILE FILTER FABRICS

A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. (4480 to 13 440 L/min. per sq. m) when tested according to ASTM D 4491.

2.8 FLAT PANEL UNDERDRAINS

A. Flat Underdrains shall be ADS material wrapped in fabric. ADS Advanedge or equal shall be used. The flat drain underdrain shall be twelve inches in width and installed vertically. Flat panel underdrains shall be installed with the top flush with finish grade at any location where the finish grade is above the weep holes at the building face.

3. EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving".

3.2 PIPING APPLICATIONS

A. Underground Subdrainage Piping:

1. Perforated PVC sewer pipe and fittings for loose, bell-and-spigot joints.

B. Underslab Subdrainage Piping:

1. Perforated PVC sewer pipe and fittings and loose, bell-and-spigot joints.

C. Header Piping:

1. PE drainage tubing and fittings, couplings, and coupled joints.
2. PVC sewer pipe and fittings, couplings, and coupled joints.

3.3 CLEANOUT APPLICATIONS

A. In Underground Subdrainage Piping:

1. At Grade in Earth: PVC cleanouts.
2. At Grade in Paved or Walkway Areas: Cast-iron cleanouts.

3.4 FOUNDATION DRAINAGE AND UNDERDRAIN INSTALLATION

A. Install underdrainage system at locations shown on the Drawings. Lay pipe with the invert positioned down with invert elevation as shown on the Drawings.

B. Completely surround the underdrains pipes with a minimum of 6 inches of ¾" crushed stone and geotextile fabric. Place pipe with joints tightly closed in accordance with manufacturer's recommendations so that flow lines conform to required grades. For perforated collector pipe, lay pipe with perforations down.

C. Any sections of piping that are not true to lines and grades, or that show any undue settlement after being laid, or are damaged will be removed and re-laid or replaced at no additional cost.

D. Test or check lines before backfilling to assure free flow. Remove obstructions, replace damaged components, and retest system until satisfactory.

E. Provide cleanouts for drainage piping at changes of direction, bend of lines, and wherever indicated on the drawings, and necessary to enable system to be cleaned out. Extend cleanouts to finished grade and provide surface protection. Coordinate cleanout locations with structural and architectural improvements.

F. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

G. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

H. Install PVC piping according to ASTM D 2321.

3.5 PIPE JOINT CONSTRUCTION

A. Join PVC pipe and fittings according to ASTM D 3034 with elastomeric seal gaskets according to ASTM D 2321.

B. Join perforated PVC pipe and fittings according to ASTM D 2729, with loose bell-and-spigot joints.

C. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.6 CLEANOUT INSTALLATION

A. Cleanouts for Subdrainage:

1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.

2. In vehicular-traffic areas, use NPS 4 (DN 100) cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 18 by 18 by 12 inches (450 by 450 by 300 mm) in depth. Set top of cleanout flush with grade. Cast-iron pipe may also be used for cleanouts in non-vehicular-traffic areas.
3. In non vehicular-traffic areas, use NPS 4 (DN 100) cast-iron pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches (300 by 300 by 100 mm) in depth. Set top of cleanout plug 1 inch (25 mm) above grade.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect low elevations of subdrainage system to building's solid-wall-piping storm drainage system.

C. Where required, connect low elevations of foundation underslab subdrainage to stormwater sump pumps.

3.8 FIELD QUALITY CONTROL

A. Testing: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.9 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION