The design of this project conforms to all applicable provisions of the New York State Uniform Fire Prevention and Building Code, the New York State Energy Conservation Code, and the building standards of the New York State Education Department.
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DATE: ________________.

CONTRACT: ________________.

DRAWING: ________________.

SPECIFICATION SECTION: ________________.

REQUEST: INCLUDE ATTACHMENTS AS REQUIRED TO CLARIFY QUESTION:

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

Requested by: ____________________________________________

Name / Company Name

ANSWER:

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

By: ____________________________ Date: ____________________________ RFI #: ____________________________.
PART 1 GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary
      Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES
   A. Project Identification
   B. Work covered by Contract Documents
   C. Work Sequence
   D. Contractor use of Premises
   E. Occupancy Requirements

1.3 RELATED SECTIONS
   A. Section 01 50 00 - Temporary Facilities and Controls

1.4 PROJECT
   A. Project Name: 2940-002 TCAT Bus Lift & Wash Replacement
      Contract Documents, dated July 21, 2017 were prepared for the Project by Hunt
      Engineers, Architects, Land Surveyors & Landscape Architect, DPC, Airport Corporate
      Park, 100 Hunt Center, Horseheads, NY 14845-1019.
   B. Owner's Name: Tompkins Consolidated Area Transit, Inc.
      737 Willow Ave
      Ithaca, NY 14850
   C. Architect's Name: Hunt Engineers, Architects, Land Surveyors & Landscape Architect, DPC.
      Airport Corporate Park
      100 Hunt Center
      Horseheads, NY 14845-1019
      Phone: 607-358-1000
      Fax: 607-358-1800
      Contact: Scott Cyr
   D. The Project consists of the replacement of existing bus wash system and bus lifts and
      associated work.

1.5 CONTRACT DESCRIPTION
   A. The project will be constructed under a single Prime Contract Agreement.
   B. Prime Contracts for this Project include:
      1. General Trades
1.6 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.

B. Owner intends to occupy the Project upon Substantial Completion.

C. Cooperate with Owner to minimize conflict and to facilitate Owner’s operations.

D. Schedule the Work to accommodate Owner occupancy.
   1. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy, the Owner will operate and maintain mechanical and electrical systems serving occupied portions of the building.
   2. Upon occupancy, the Owner will assume responsibility for maintenance and custodial service for occupied portions of the building. However, the Owner will not clean up behind contractors; responsibility for any debris caused by contractor operations remains with the Prime Contractor.

E. The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion, provided that such occupancy does not interfere with completion of the work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total work. Cooperate fully with the Owner or its representatives and Architect/Engineer during construction operations to minimize conflicts and facilitate owner’s usage.

1.7 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings. Do not disturb portions of the site beyond the areas in which the work is indicated.

B. Arrange use of site and premises to allow:
   1. Owner occupancy.
   2. Work by Owner.
   3. Use of site and premises by the public.

C. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
      a. All exit and escape windows shall be maintained at all times.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.
   3. Do not use driveways, entrances or sidewalks for parking or storage of materials.
   4. Keep temporary driveways and entrances serving the premises clear and available to the Architect, Owner and emergency vehicles at all times.

D. Existing building spaces may not be used for storage.

E. Time Restrictions:
   1. Work hours shall be between the hours of 8:00 AM and 5:00 PM daily, Monday through Friday, except when it interferes with the Owner’s activities.
      a. Shift work between the hours of 3:00 PM and 7:00 AM, or on weekends, may occur with the permission the Owner.
   2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

F. Any work that requires disruption to the occupants, entry/exits, utilities, etc shall be coordinated with and approved by the Owner.
G. Utility Outages and Shutdown:
1. Limit disruption of utility services to hours the building is unoccupied.
2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
3. Prevent accidental disruption of utility services to other facilities.

H. Construction Staging Area:
1. Contractors will be instructed to use designated staging/parking areas before start of construction.
2. All staging of equipment, trailers, storage containers, etc to be coordinated through the Owner and cannot interfere with any other Contractor's work.
3. Activity in the staging area shall be conducted in a manner that causes minimal disruption of the Owner's activities.

1.8 WORK SEQUENCE
A. All Work will be conducted in a "single" phase to provide the least possible interference to the activities of the Owner's personnel and to permit the facilities to be partially utilized during implementation of the work.
1. The Contractor is expressly forewarned that impacts to the construction schedule will not be permitted.

B. Schedule:
1. Schedule of Completion: All work of this project shall be substantially completed by May 4, 2018 unless noted otherwise.
2. Upon Notice to Proceed the overall Project CPM Schedule will be prepared by the Contractor in accordance with Section 01 32 16 - Construction Progress Schedule.

C. Coordinate construction schedule and operations with Owner.

D. Should overtime or second shift work be required by the Contractor to ensure the completion within the specified (phased) schedule, all costs for this work is the responsibility of the Contractor. The Owner shall have the authority to direct the contractors and subcontractors to work overtime including weekends to maintain the schedule at no additional cost to the Owner. Contractors warrant that the work shall be physically complete, including punch list, startup, and commissioning, within the early start and late finish schedule milestones.

E. The Contractor shall provide multiple crews to maintain project schedule. Each crew is to be furnished with its own supervision, cranes, scaffold and other means necessary to maintain the Project Schedule.

F. The intention of the work is to follow a logical sequence; however, the Contractor may be required by the Owner to temporarily omit or leave out any section of his work, or perform his work out of sequence. All such out of sequence work and returning to these areas shall be at no additional cost to the Owner.

G. The Contractor is responsible for supervision of their Sub-Contractors at all times.

1.9 REQUIREMENTS OF ALL CONTRACTS
A. The following Documents are specifically included and defined as integral to the Contract:
1. Bidding requirements, contract forms and conditions of the Contract:
   a. TCAT RFP Document 1201-2017
2. Division 01 - General Requirements

B. Substitutions: The contractor shall cooperate with other contractors involved to coordinate approved substitutions with remainder of the Work.
C. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Section 01 50 00 - Temporary Facilities and Controls, the contractor is responsible for the following:

1. The Contractor shall assist the Architect and Owner in identifying a plan detailing how exiting required by the applicable building code will be maintained, and a plan detailing how adequate ventilation will be maintained during construction.
2. Installation, operation, maintenance, and removal of each temporary facility usually considered as its own normal construction activity, and costs and use charges associated with each facility.
3. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
4. Its own field office, complete with necessary furniture, utilities, and telephone service. The Contractor shall provide leveling, stone, and/or removals necessary to install Field Offices. At end of construction, when field offices are removed, the Contractor is responsible to return the area to its original condition, including any re-seeding required.
5. Its own storage and fabrication sheds.
6. Temporary enclosures for its own construction activities.
7. Hoisting requirements for its own construction activities, including hoisting material or equipment into spaces below grade, and hoisting requirements outside building enclosure.
8. Progress cleaning of its own areas on a daily basis.
9. Secure lockup of its own tools, materials, and equipment.
10. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.

1.10 CONTRACT NO. 1 - GENERAL CONSTRUCTION

A. The General Trades Contractor shall be responsible for all work in all Specification Divisions and further defined on all Drawings.

B. Furnish and install all labor, material, supervision, equipment, scaffolding, layout, engineering, deliveries, trucking, hoisting, rigging, shop drawings, submittals, and all other items related and required to complete all General Trades Work in accordance with the Contract Documents and all applicable codes having jurisdiction.

C. The Contractor represents they have expertise in the performance of Work for this trade and assures all items to be complete, functional and installed in accordance with the best practices consistent with premium quality material and workmanship.

D. THE CONTRACTOR shall be responsible for all costs and for procurement of all permits and fees necessary for construction.

PART 3 EXECUTION

2.1 COORDINATION

A. The Contractor shall coordinate scheduling and installation of work with the work of other Contractors, sub-contractors and other trades. The Contractor is also required to coordinate all work of their Contract with Owner-supplied materials, direct contacts and normal building operations.

B. The Contractor shall take special care in verifying that his equipment matches the characteristic of the power being supplied. The Contractor shall coordinate electrical power requirements for all equipment requiring power.
SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1  GENERAL

1.1  SECTION INCLUDES
A. Schedule of Values.
B. Applications for payments.
C. Change procedures.
D. Defect assessment.
E. Unit Prices.
F. Allowances
G. Schedule of Allowances.
H. Schedule of Unit prices.

1.2  RELATED REQUIREMENTS
A. Section 01 30 00 - Administrative Requirements: General submittal procedures.
B. Section 01 60 00 - Product Requirements: Substitution limitations and procedures.
C. Section 01 70 00 - Execution and Closeout Requirements: Project record documents.

1.3  SCHEDULE OF VALUES
A. Submit printed schedule on Form: AIA G703 - Continuation Sheet for G702.
B. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement established in Notice to Proceed.
C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization and bonds and insurance.
D. Provide 1% of contract value for execution of closeout documents.
E. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.
F. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.
G. Revise schedule to list approved Change Orders, with each Application For Payment.

1.4  APPLICATIONS FOR PAYMENTS
A. Payment Period: Submit at intervals stipulated in the Agreement.
B. Form to be used: AIA G702 and G703.
C. Content and Format: Use data from approved Schedule of Values for listing items in Application for Payment.
D. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.

E. Submit three copies of each Application for Payment.

F. Include the following with the application:
   1. Transmittal letter as specified for Submittals in Section 01 30 00.
   2. Updated Construction schedule, Section 01 32 16.

G. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Include with Application for Payment:
   1. Partial release of liens from major Subcontractors and vendors.
   2. Project record documents as specified in Section 01 78 00, for review by Owner which will be returned to the Contractor.
   3. Affidavits attesting to off-site stored products.
   4. Certified payrolls.
   5. Updated project schedule and timelines.

1.5 CHANGE PROCEDURES

A. Change Order Forms: AIA G701 Change Order.

B. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to the Contract Documents.

C. For minor changes not involving an adjustment to the Contract Sum/Price or Contract Time, Architect will issue supplemental instructions on AIA Form G710 directly to Contractor.

D. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

E. Architect/Engineer may issue a Proposal Request that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change. Contractor shall prepare and submit an estimated price quotation within 15 days.

F. Contractor may propose a change by submitting a request for change to Architect/Engineer, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 60 00.

G. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's price quotation.
   2. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit prices. For unit costs or quantities of units of work which are not pre-determined, execute Work under Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.
   3. Construction Change Directive: Architect/Engineer may issue directive, on AIA Form G713 Construction Change Directive signed by Owner, instructing contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will...
describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.

   a. Maintain daily detailed records of work completed on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work. Daily Time and Material tickets must be validated and signed by the Owner's Representative to be acceptable for issuance of the change order.

H. Substantiation of Costs: Provide full information for change in cost or time with sufficient data to allow evaluation of quotation.

I. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

J. Correlation of Contractor Submittals:
   1. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum/Price.
   2. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
   3. Promptly enter changes in Project Record Documents.

1.6 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Architect/Engineer, it is not practical to remove and replace the Work, the Architect/Engineer will direct appropriate remedy of adjust payment.

C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Architect/Engineer and Owner.

D. Defective Work will be partially repaired to instructions of Architect/Engineer and Owner, and unit sum/price will be adjusted to new sum/price at discretion of Architect/Engineer and Owner.

E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.

F. Authority of Architect/Engineer to assess defects and identify payment adjustments, is final.

G. Non-Payment for Rejected Products: Payment will not be made for rejected products for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from transporting vehicle.
   4. Products placed beyond lines and levels of require Work.
   5. Products remaining on hand after completion of the Work.

1.7 UNIT PRICES

A. Authority: Measurement methods are delineated in Schedule at the end of this section.

B. Take measurements and computer quantities. Architect/Engineer and/or Owner will verify measurements and quantities.
C. Unit Quantities: Quantities and measurements indicated in Bid Form are for contract purposes only.
   1. When actual Work requires more or fewer quantities than those quantities indicated, provide required quantities at unit sum/price contracted.
   2. When actual Work requires 25 percent or greater change in quantity than those quantities indicated, Owner or Contractor may claim for Contract Price adjustment.

D. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application or installation of item of the Work; overhead and profit.

E. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by Architect/Engineer multiplied by unit sum/price for Work incorporated in or made necessary by the Work.

F. Measurement of Quantities:
   1. Weigh Scales: Inspected, tested and certified by applicable State Weights and Measures Department within past year.
   2. Platform Scales: Of sufficient size and capacity to accommodate conveying vehicle.
   3. Metering Devices: Inspected, tested and certified by applicable State department within past year.
   4. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
   5. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
   6. Measurement by Area: Measured by square dimension using mean length and width of radius.
   7. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
   8. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the Work.

1.8 ALLOWANCES

A. Costs Included in Allowances: Cost of product to Contractor or Subcontractor, less applicable trade discounts; delivery to site and applicable taxes.

B. Costs Not Included in Allowances But Included in Contract Sum/Price: Product delivery to site and handling at site, including unloading, uncrating, and storage; protection of products from elements and from damage; and overhead and profit.

C. Architect Responsibilities:
   1. Consult with Contractor for consideration and selection of products, suppliers, and installers.
   2. Select products in consultation with Owner and transmit decision to Contractor.
   3. Prepare Change Order.

D. Contractor Responsibilities:
   1. Assist Architect/Engineer in selection of products, suppliers and installers.
   2. Obtain proposals from suppliers and installers and offer recommendations.
   3. On notification of selection by Architect/Engineer, Owner, execute purchase agreement with designated supplier and installer.
   4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
   5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

E. Differences in costs will be adjusted by Change Order.
F. At Project closeout, credit unused amounts remaining in the allowance to the Owner by Change Order.

G. Refer to the Allowance Schedule at the end of this Section.

1.9 SCHEDULE OF ALLOWANCES

A. General Trades Contract: Include the stipulated sum of $30,000.00

1.10 SCHEDULE OF UNIT PRICES

A. General Trades-Unit Prices

1. Unit Price No. 1 - Excavation and Replacement of Unsuitable Material Below Subgrade
   a. Description: Excavation and removal from site of material below subgrade level deemed unsuitable by and as directed by Architect and backfill to subgrade with Select Granular Fill in accordance with Specification Sections 31 23 16.
   b. Unit of Measurement: Cubic Yard

2. Unit Price No. 2 - Portland Cement Concrete Slab on Grade:
   a. Description: Construction of Portland Cement Concrete Slab on Grade of additional or lesser widths, lengths, or locations to those indicated on the Drawings. Work includes excavation, aggregate base course, and all other work to provide a complete installation of slab on grade. See relevant Specification Sections.
   b. Unit of Measurement: Square Feet

3. Unit Price No. 3 - Removal and Disposal of Disturbed Soils to a local Landfill:
   a. Description: Provide a unit price for add to the contract for removal and disposal of disturbed and contaminated soils to the appropriate Landfill.
   b. Unit of Measurement: 10 cubic yards

4. Unit Price No.4 - Removal and Disposal of Disturbed Soils to a Hazardous Waste Landfill:
   a. Description: Provide a unit price for add to the contract for removal and disposal of disturbed soils to a Hazardous Waste Landfill, in accordance with the Soil Management Plan as detailed and specified in the contract documents.
   b. Unit of Measurement: 10 cubic yards

5. Unit Price No. 5 - Removal and Disposal of Liquids from Existing Lift Pits:
   a. Description: Provide a unit price for add to the contract for removal and disposal of contaminated liquids greater than total indicated in Base Bid to the appropriate landfill
   b. Unit of Measurement: Gallon.

END OF SECTION
PART 1  GENERAL

1.1  SECTION INCLUDES
   A. Coordination and project conditions.
   B. Field engineering.
   C. Preconstruction meeting.
   D. Site mobilization meeting.
   E. Progress meetings.
   F. Superintendent's meetings.
   G. Preinstallation meetings.
   H. Submittal procedures.
   I. Electronic submittal procedure.

1.2  RELATED REQUIREMENTS
   A. Section 01 32 16 - Construction Progress Schedule: Form, content, and administration of schedules.
   B. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.
   C. Section 01 78 00 - Closeout Submittals: Project record documents.

1.3  COORDINATION AND PROJECT CONDITIONS
   A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
   B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.
   C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
   D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements. Install utilities parallel with structure and as inconspicuous as possible in exposed spaces.
   E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's partial occupancy.
   F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
1.4 FIELD ENGINEERING


B. Locate and protect survey control and reference points. Promptly notify Architect/Engineer of discrepancies discovered.

C. Control datum for survey is shown on Drawings.

D. Verify set-backs and easements; confirm drawing dimensions and elevations.

E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

F. Submit copy of site drawing and certificate signed by Land Surveyor certifying elevations and locations of the Work are in conformance with Contract Documents.

G. Maintain complete and accurate log of control and survey work as Work progresses.

H. On completion of foundation walls and major site improvements, prepare certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

I. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

J. Promptly report to Architect/Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.

K. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect/Engineer.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   3. Contractor.

C. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
   5. Designation of personnel representing the parties to Contract and Architect.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   7. Scheduling.
D. Architect will record minutes and distribute copies five days after meeting to participants, with copies to participants, and those affected by decisions made.

3.2 SITE MOBILIZATION MEETING

A. Architect will schedule a meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Contractor's Superintendent.
   5. Major Subcontractors.

C. Agenda:
   1. Use of premises by Owner and Contractor.
   2. Owner’s requirements and occupancy prior to completion.
   3. Construction facilities and controls provided by Owner.
   4. Temporary utilities provided by Owner.
   5. Security and housekeeping procedures.
   7. Application for payment procedures.
   8. Procedures for testing.
  10. Requirements for start-up of equipment.
  11. Inspection and acceptance of equipment put into service during construction period.

D. Architect will record minutes and distribute copies within five days after meeting to participants, with copies to participants, and those affected by decisions made.

3.3 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum bi-weekly intervals.

B. Architect will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Architect, as appropriate to agenda topics for each meeting.

D. Agenda:
   1. Review minutes of previous meetings.
   2. Review of Work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Review of off-site fabrication and delivery schedules.
   7. Maintenance of progress schedule.
   8. Corrective measures to regain projected schedules.
   9. Planned progress during succeeding work period.
  10. Coordination of projected progress.
  11. Maintenance of quality and work standards.
  12. Effect of proposed changes on progress schedule and coordination.
  13. Other business relating to Work.

E. Architect will record minutes and distribute copies within five days after meeting to participants, with copies to participants, and those affected by decisions made.
3.4 PREINSTALLATION MEETING

A. When required in individual specification sections, convene preinstallation meeting at Project site prior to commencing work of specific section.

B. Require attendance of parties directly affecting, or affected by, Work of specific section.

C. Notify Architect/Engineer seven days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of installation, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies after meeting to participants, with copies to Architect/Engineer, Owner, and those affected by decisions made.

3.5 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
      a. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers’ standard data to provide information specific to this Project.
      b. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
   2. Shop drawings.
      a. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
      b. Do not reproduce the Contract Documents to create shop drawings.
      c. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.
      d. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed only for aesthetic, color, or finish selection.
   1. Submit samples of finishes from full range of manufacturers’ standard colors, in custom colors selected, textures, and patterns for Architect/Engineer selection.
   2. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   3. Include identification on each sample, with full Project information.
   4. Submit number of samples specified in individual specification sections; Architect/Engineer will retain one sample.
   5. All samples and color selections must be submitted in hard copy format. No color selections will be made from electronic charts.
   6. Reviewed samples which may be used in the Work are indicated in individual specification sections.
   7. Samples will not be used for testing purposes unless specifically stated in specification section.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below.
3.6 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
      a. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Architect/Engineer, 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 Architect/Engineer.
   3. Test reports.
   4. Manufacturer's instructions.
      a. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing.
      b. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
   5. Manufacturer's field reports.
      a. Submit report in duplicate within 30 days of observation for information.

B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

C. SUBMITTALS FOR PROJECT CLOSEOUT
   1. Submit Correction Punch List for Substantial Completion.
   2. Submit Final Correction Punch List for Substantial Completion.
   3. When the following are specified in individual sections, submit them at project closeout:
      a. Project record documents.
      b. Operation and maintenance data.
      c. Warranties.
      d. Bonds.
      e. Other types as indicated.
   4. Submit for Owner's benefit during and after project completion.

3.7 SUBMITTAL PROCEDURES

A. General:
   1. Transmit each submittal with form provided by Architect via Newforma Info Exchange.
   2. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
   3. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
   4. Apply Contractor's stamp, signed or initialed certifying that review, approval, 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.
   5. Deliver submittals, containing samples, to Architect at Airport Corporate Park, 100 Hunt Center, Horseheads, NY 14845-1019. All other submittals to be submitted through Newforma Exchange as specified below.
   6. Schedule submittals to expedite the Project, and coordinate submission of related items.
   7. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
   8. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
   9. When revised for resubmission, identify all changes made since previous submission.
10. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
11. Submittals not requested, or incomplete, will not be recognized or processed.

B. Proposed Product List:
1. Within 15 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
2. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

3.8 ARCHITECT’S SUBMITTAL ACTION
A. Except for submittals for the record or information, where action and return is required, the Architect or his consultant will review each submittal, mark to indicate action taken, and return
1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Architect will stamp each submittal with a uniform, action stamp. The Architect will mark the stamp appropriately to indicate the action taken, as follows:
1. Final Unrestricted Release: When the Architect marks a submittal "Reviewed" the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
2. Final-But-Restricted Release: When the Architect marks a submittal "Reviewed as Noted," 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 payment depends on that compliance.
3. Returned for Re-submittal: When the Architect marks a submittal "Revise and Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
   a. Do not use, or allow others to use, submittals marked "Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.
4. Rejected: When the Architect marks a submittal “Rejected,” do not proceed with any Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Prepare a new submittal conforming to the product characteristics specified by the contract documents; resubmit without delay. Repeat if necessary to obtain different action mark.
5. Submit Specified Item: When submittal is marked “Submit Specified Item”, the Contractor shall immediately resubmit the specified item.

C. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned marked “Action Not Required”.

3.9 ELECTRONIC SUBMITTAL PROCEDURES - NEWFORMA
A. Using the electronic cover sheet provided by the Architect in Excel format, fill out the information required for the submittal. Each submittal must be provided with the submittal cover sheet.
B. Convert/print cover sheet to a PDF format.
C. Combine PDF cover sheet with product submittal. Cover sheets are to precede the product submittal information.
D. If shop drawings are over 11” x 17” in size, hard copies are to be provided.
E. Electronic submittals shall be up-loaded to the Project Team through Newforma Info Exchange. Directions to access Newforma will be provided by the Architect.
F. Notification will be automatically be generated by Newforma to the Project Team when a new submittal has been created.

END OF SECTION
TCAT Inc
Bus Wash & Lift Replacement

HUNT Project No.: 2940-002

Contractor Submittal Control No.

Hunt Submittal Control No.

Prime Contractor: Name & Address

Name of Preparer:

P.C. Tel. No.: 

P.C. Fax No.: 

Locations where product will be installed:

Subcontractor:

Supplier:

Product Name:

Manufacturer 

Model/Item No. 

Product Data

Shop Drawings

Samples

Test Reports

Schedule

Certification Letter

Warranty

Other

CONTRACTOR’S COMMENTS INCLUDING ANY DEVIATION FROM CONTRACT DOCUMENTS:

ARCHITECT/ENGINEERS COMMENTS:

CONSTRUCTION MANAGER’S STAMP

THIS SUBMITTAL HAS BEEN REVIEWED AND APPROVED BY THE PRIME CONTRACTOR IN ACCORDANCE WITH THE CONTRACT DOCUMENTS INCLUDING ARTICLE 3.2 AND ARTICLE 4 OF THE GENERAL CONDITIONS. THE PRIME CONTRACTOR ALSO CERTIFIES THAT ALL PRODUCTS/MATERIALS USED ON THIS PROJECT CONTAIN LESS THAN ONE PERCENT OF ASBESTOS BY WEIGHT. IT IS ALSO CERTIFIED THAT ALL PRODUCTS/MATERIALS ARE IN READINESS FOR SERVICE FOR THE YEAR 2017.

Contractors Signature:
SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Preliminary schedule.
   B. Construction progress schedule, bar chart type.

1.2 RELATED SECTIONS
   A. Section 01 10 00 - Summary: Work sequence.

1.3 SUBMITTALS
   A. Within 10 days after date established in Notice to Proceed, submit preliminary schedule.
   B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
   C. Submit updated schedule with each Application for Payment.
   D. Submit under transmittal letter form specified in Section 01 30 00 - Administrative Requirements.

1.4 SCHEDULE FORMAT
   A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
   B. Scale and Spacing: To allow for notations and revisions.

PART 2 SCHEDULE

2.1 GENERAL
   A. Upon Notice to Proceed the overall Project CPM Schedule will be prepared by the General Trades Contractor in accordance with the following.

PART 3 EXECUTION

3.1 GENERAL
   A. The CPM Schedule network plan including any appropriate milestone dates and the computer produced reports shall be part of the Owner/Contractor agreement as stipulated herein.
   B. The purpose of the plan and schedule will be to assure adequate planning, coordination and execution of the work of the Contractor, and to assist the Architect and Owner in monitoring the progress of the work and evaluating proposed changes to the contract and schedule.
   C. The project management tool commonly called the Critical Path Method (CPM) will be employed for the planning, scheduling and report of all work to be performed under the
contract. The precedence diagramming method shall be utilized in preparing the CPM Schedule network diagrams.

D. The Architect may modify the network diagram to provide interface points for other contracts for this Project.

E. Activity time delays shall not automatically mean that an extension of the Contract Completion Date is warranted or due the Contractor. A Contract Modification or delay may not affect existing critical activities or cause noncritical activities to become critical. A Contract Modification or delay may result in only absorbing part of the available total float that may exist within an activity chain on the Network, thereby not causing any effect of any interim milestone date or the Contract Completion Date.

F. Total float is defined as the amount of time between the early start date and late start date, or the early finish date and the late finish date, for each and every activity in the schedule. Float is for the exclusive use or benefit of the Owner. Extensions of time to milestone dates for the Contract Completion Date under the Contract will be granted only to the extent that is equitable time adjustments to the activity or activities affected by the Contract Modification or delay exceed the total float of the affected or subsequent paths and extends any interim milestone date or the Contract Completion Date.

3.2 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

B. To the extent necessary for the General Trades Contractor to reflect in a computerized CPM Schedule network diagram the Contractor’s proposed plan for completion of their work, all subcontractors shall be prepared to meet with and assist the General Contractor, and furnish information subsequent to award of the contract.

C. Within (3) calendar days following the Contract Issuance, the Architect will meet with the Contractor and conduct a review of the Prebid Milestone/phasing to assure their understanding of said project schedule requirements and contractual milestone dates.

D. Within four (4) calendar days after the meeting to review the Milestone/Phasing Schedule, the Contractor will provide their proposed plans of operation. The Contractor’s plan of operations shall consist of, but not limited to, the following:
   1. List of proposed Construction Activities
   2. List of proposed Durations of Construction Activities (in workdays)
   3. List of proposed Durations for major procurement items (in workdays).

E. The Architect and the General Trades Contractor will meet and jointly review the CPM project schedule, based on the General Contractor’s proposed plan and sequences of operation. Any areas of such plans which, in the opinion of the Architect, will conflict with timely completion of the project will be subject to revision by the General Contractor unless adequate justification for these plans, durations and logic (as determined by Architect) is provided by the Contractor within (10) calendar days of the Architect’s notice to the Contractor of the Architect’s intent to revise the schedule. At these meetings, the Contractor with the aid of the Architect, will manually construct a precedence diagram describing the activities to be accomplished, their dependency relationships and their durations. The Contractor will then, using the manual precedence diagram, prepare a computer produced schedule showing starting and completion dates for each activity.

F. In preparing the manual precedence diagram, the Contractor will be responsible for assuring that any/all subcontractor work, as well as his own work, is included and that the diagram shows a coordinated plan of work.

G. The manually prepared precedence diagram, when fully developed, will show the sequence and interdependence of activities required for complete performance of all the work. In
developing the precedence diagram, the work will be divided into activities with a maximum duration of twenty (20) working days each, unless otherwise directed by the Architect, except for non-construction activities such as procurement of materials, delivery of equipment, and concrete curing.

H. Proposed durations assigned to each activity shall reflect the Contractor’s best estimate of time required to complete activity considering the scope and resources planned for activity.

I. Failure by the Contractor or Architect to include the element of work required for performance of the contract shall not excuse the Contractors from completing all their work within the Contract Completion Date. If the Architect questions any of the Contractor’s proposed durations, the Contractor shall within ten (10) calendar days provide estimates of his labor and intended crew and/or equipment sizes required for the activity which support the proposed duration to the satisfaction of the Architect.

J. Seasonal weather conditions will be considered in the planning and scheduling of all work influenced by high or low ambient temperatures to insure the completion of all contract work within the allotted contract time milestone completion dates.

3.3 CONTENT
A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Identify work of separate stages and other logically grouped activities.

D. Provide sub-schedules to define critical portions of the entire schedule.

E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

F. Provide legend for symbols and abbreviations used.

3.4 BAR CHARTS
A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

3.5 REVIEW AND EVALUATION OF SCHEDULE
A. Participate in joint review and evaluation of schedule with Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.6 UPDATING SCHEDULE
A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.
F. Submit reports required to support recommended changes.

G. The Approved Project Schedule will be updated by the Contractor and reviewed by the Architect on a monthly basis for the purpose of recording and monitoring the progress of work. The Contractor shall meet with the Architect each month to review actual progress made to date, dates of activities started and completed, and the percentage of work completed to date on each activity started but not completed.

H. Upon completion of the review, the Contractor will revise the network to reflect progress to date plus any approved revisions to the network, and carry out a computer calculation to determine status.

I. Based on the result of the monthly progress update, when the schedule no longer represents the actual prosecution and progress of the work, a revision to the schedule logic sequence and the precedence diagram may be required by the Architect.

J. If a revision to the schedule logic sequence is contemplated, the Contractor shall so advise the Architect in writing at least two (2) weeks prior to the next Schedule Update meeting, describing the revision and setting forth the reasons therefore.

K. All reasonable requests by the Contractor for revisions will be implemented by the Architect if not reasonably objected to by any party.

L. Architect directed revisions to the schedule will not be implemented without written notice to the Contractor, who shall respond within ten (10) days, either agreeing with the Architect's proposed revision or setting forth justification why it should not be accomplished. If the Contractor's justification for not accomplishing the change is reasonable, such change will not be implemented.

M. Updating the schedule to reflect actual progress made up to the date of an update shall not be considered revisions to logic sequence and schedule; in case of disagreements concerning actual progress to date, the Architect's determination shall govern.

N. If the Contractor does not record any exceptions to the published Project Schedule update within ten (10) calendar days of its receipt, he will be deemed to have accepted and approved it.

3.7 RESPONSIBILITY FOR COMPLETION

A. The Contractor shall furnish sufficient forces, plant and equipment, and shall work such hours including night shift and overtime operations, as necessary to ensure the prosecution of the work in accordance with the current monthly update of the Project Schedule. If, in the opinion of the Architect, the Contractor falls behind in meeting the schedule as presented in the current monthly update, the Contractor shall take such steps as may be necessary to improve his progress, and the Architect may require him to increase the hours of work, the number of shifts, overtime operations and/or the amount of construction plant and equipment without additional cost to the Owner or Architect. All additional expenses incurred by the Owner, and Architect due to such work will be deducted from the amount due the Contractor. The provisions of this section shall not be construed as prohibiting work on Saturdays, Sundays and holidays if the Contractor so elects and if approved by the Architect and Owner.

B. Failure of the Contractor to comply with the requirements of this subsection shall be a basis for determination by the Owner that the Contractor is not prosecuting the work with such diligence as will ensure completion within the time stipulated. Upon such determination, the Owner may terminate the Contractor's right to proceed with the work or any separable part thereof, in accordance with the provisions of the General Conditions, or may take such other actions as may be deemed appropriate.

C. It shall be the responsibility of the Contractor to maintain their progress so as not to delay the progress of the project. If the Contractor delays the progress of the projected, it shall be the
responsibility of the Contractor causing the delay to increase the number of shifts, days of work, and/or to the extent permitted by law, to institute or increase overtime operations all without additional cost to the Owner to regain the time lost and to maintain the over schedule.

3.8 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Requirements for protection of existing facilities.
   2. Demolition and removals.
   3. Cutting and Patching Requirements

1.2 SUBMITTALS

A. Comply with requirements of Section 01 30 00 as modified below:
   1. Submit Samples of all materials used in patch to match work, specifically grout, ground
      face block, brick, stained and/or painted finishes, and any other material deemed
      necessary by the Architect to ensure appropriate matching of existing finishes.
   2. Submit written explanation of “cutting and patching” procedures when construction means
      and methods deviate from standard industry practices. At a minimum provide the
      following:
      a. Describe extent of cutting and patching, and methods to be used.
      b. Products to be used.
      c. Utilities that will be affected.
      d. Details and Engineering calculations when structural members will be affected either
         by adding reinforcement or altering the structural member.

1.3 DEFINITIONS

A. “Cutting and Patching” – The process of “opening up”, or “exposing” new or existing
   construction to facilitate the coordination of work, the installation of new work, the testing or
   inspection of work or building components, and the subsequent “closing up” or “restoration” of
   affected area back to it’s original condition.
   1. Cutting: Physical modification of construction work, both new and existing, or removal of
      existing or installed materials necessary to permit installation or performance of other
      work, including but not limited to; cutting, drilling, core-drilling, chopping, excavating,
      saw-cutting, trenching, backfill and compaction and other similar operations.
   2. Patching: Restoration, replacement and installation of construction material, new and
      existing, required to restore surfaces to original conditions and maintain fire rated
      assemblies after installation of other work.

1.4 PROTECTION OF EXISTING FACILITIES

A. Responsibilities of the Contractor
   1. Provide and maintain protective measures required to prevent damage to existing
      facilities and to protect workmen and public, including protective construction required by
      applicable state and municipal laws, OSHA regulations, Contract Documents, site
      conditions, and as considered normal for operations involved in the work.
      a. Construct protective measures of types and materials that provide required
         protection continuously.
      b. Remove protective measure only when need for protection no longer exists.
      c. Provide additional protection as directed by Owner or Architect.
2. Roof Protection: During operations on existing or newly-constructed roofs, provide protection for roof in work area in adjacent roof areas.
   a. Where construction operations on roof require removal of existing roofing system, apply roof protection to roof areas adjacent to work area and to approved access routes to work area.
   b. Where construction operations on roof do not require removal of existing roofing system, apply roof protection to all roof areas in work area and to approved access routes to work area.
   c. Limit traffic on roof to protected areas.
   d. Strictly comply with roof protection recommendations of agency, or agencies, holding bond, guarantee, or warranty in force for existing roof; however, if such recommendations are not available, provide minimum protection as follows:
      1) Minimum 1 layer of 1/2" exterior grade plywood laid over existing roof with 1 layer of 1/8" asphalt saturated protection board on top of plywood.
      2) On loose-laid elastic sheet roofing systems with stone ballast, remove existing ballast from area to receive protection, and apply minimum 6 mil. thick polyethylene sheeting over exposed membrane before laying plywood, unless otherwise recommended by roofing system manufacturer.
   e. Where roofing is cut to permit new construction, provide temporary roofing, temporary curbs, temporary coverings, and similar measures to prevent entrance of water. Refer to Section 01 50 00. Remove minimum amount of existing roofing and insulation required to accomplish new construction.

B. Damage to Existing Construction
1. The Contractor shall be responsible for damage to existing and newly installed construction caused by his, or his subcontractor's personnel and he shall repair, replace, or restore damaged construction immediately without additional cost to Owner.
   a. If the Contractor fails to immediately make efforts to repair, replace, or restore damaged construction, Owner may, after due notice, accomplish required repair, restoration, or replacement in accordance with provisions in General Conditions.
   b. The Owner will make no additional payment to the Contractor for additional work resulting from failures described above.
   c. When damage to existing facilities occur and Contractors do not admit to damage the Architect will research to find responsible party. If party cannot be determined all trades will share the cost of appropriate repairs to return the damaged area to original condition.
2. Provide work required to repair, reconstruct, or replace existing construction due to failure of protective measures provided or due to failure of the Contractor to provide adequate protective measures.
   a. Coordinate all repair, replacement, or restoration activities through the Architect.
   b. Patch damaged surfaces and refinish to match existing surfaces as required or as directed by Architect.

1.5 DEMOLITION AND REMOVALS
A. Responsibility for Demolition and Removals
1. The Contractor shall provide cutting and patching of existing surfaces disturbed by the work of their contract unless noted to be provided by another contract.
2. The Contractor shall make provisions for removal, demolition, or disconnection of existing construction, equipment, and similar items as required for completion of his contract as shown in the Contract Documents, or encountered during the Project.
   a. Coordinate requirements for removal, disconnection, or demolition.
   b. Remove all related items not shown or specified as required to complete removals shown on Drawings, including but not limited to insulation, hangers, supporting construction, and similar items. Consult Architect for instructions when such removals involve removal or cutting of structural components.
3. Equipment removal:
   a. Owner shall remove furniture and small loose equipment, unless otherwise specified. Review removals with Owner prior to beginning demolition and removals.
   b. Prime Contractor requiring work shall remove, relocate, and reinstall existing equipment, built-in cabinets, casework, and similar items, including disconnection and capping of utility connections at existing location unless noted to be provided by others.
      1) Connection of utilities at new locations shall be by trade that would normally have installed the item.
      2) Comply with requirements for "Disposal of Removed Materials" below for equipment designated to be turned over to Owner.

B. Verification of Conditions: The Contractor shall be responsible for visiting the site and building, studying the Drawings, making his own determination as to items and quantities of demolition and removal required, and including required demolition and removals in his bid.
   1. Additional payment will not be made on claims resulting from incomplete estimate of demolition or removals by Prime Contractor.
   2. Any definition of scope of demolition and removals within Contract Documents is intended to establish general limits and responsibilities for demolition and removal work.
      a. Where details in Construction Documents indicate a typical situation requiring demolition or removals, consider such situation to apply to similar conditions throughout and make required demolition or removals.
      b. Verify exact locations of existing piping shown on Drawings.
      c. Check load bearing function of walls and partitions before starting removal.

C. Concealed Conditions
   1. Where structural items, piping, conduit, or other items are exposed during demolition whose function is unknown, notify Architect and await instructions before proceeding with removal.
   2. Where exact locations of existing piping differs from locations shown on drawings, modify indicated connections, relocations, and deletions as required by project conditions, including necessary extensions with new piping to nearest approved point of connection.

D. Safety: carefully perform demolition and removals in such manner to insure safety in handling and to prevent damage to construction and materials indicated to remain.
   1. Provide shoring, bracing, and other temporary measures as required to maintain safe conditions, including structural safety of building.
   2. Provide rigging, hoists, cutting equipment, and similar items required for demolition and removals.

E. Removal of existing ceilings: where existing ceiling finish is scheduled for removal, include existing suspension system in suspended ceiling systems, existing gypsum backer boards in adhesive-applied acoustical tile installation, and other ceiling system components as applicable.

F. Disposal of removed materials
   1. Materials, fixtures, and equipment requested by Owner while still in place, or before removal from site, shall be left on site in location designated by Owner. Itemize in memorandum of transmittal, and obtain receipt from Owner for all such items.
   2. Carefully remove and store in protected locked location items noted in contract documents and items designated to be turned over to owner until they can be relocated and reinstalled.
      a. Where storage in protected, locked location is not possible, provide proper protection against weather and damage by suitable temporary enclosures.
      b. Items damaged or lost during removal or storage shall be replaced in kind and quantity, at expense of responsible prime contractor.
3. Materials, fixtures, and equipment not designated to be reinstalled, relocated, or turned over to owner and all waste materials and debris shall be promptly removed to dumpsters and legally disposed of.
   a. Materials or fixtures suitable for re-use may be used in temporary structured or partitions only.
   b. No removed materials, fixtures, or equipment items shall be reused in permanent structure, unless specified in contract documents.

1.6 CUTTING AND PATCHING

A. Unless otherwise noted, each Contractor shall be responsible for all cutting and patching, required in conjunction with the work of their contract and to:
   1. Be familiar with all the Contract Documents, including other trades, to determine the extent of the cutting and patching requirements to be performed.
   2. Ensure all components fit properly.
   3. Remove out of sequence work installed prematurely.
   4. Remove and correct defective work and work not conforming to requirements of Contract Documents.

B. In addition to contract requirements, upon written instructions of the Architect/Engineer:
   1. All new work must be inspected prior to enclosing. If inspection has not been conducted, Contractor shall uncover newly installed work to provide for Architect/Engineer's observation.

C. All Contractors shall bear the responsibility not to cut or otherwise alter the Owner's property or any separate Contractors' work except with the written consent of the Owner and of such separate Contractor. The Contractor shall not un-reasonably withhold from the Owner or any separate Contractor, consent to cutting or otherwise altering the work.

D. Provide equipment, labor, materials, and incidentals necessary for cutting and patching as required for the installation of new work.

E. Prior to Cutting:
   1. Provide shoring, bracing and support as required to maintain structural integrity of project. Contractor shall pay all cost of engineering associated with design of shoring system.
   2. Provide protection for materials on adjacent surfaces.
   3. Provide protection when work will be exposed to the elements.
   4. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the project that might be exposed during cutting and patching operation. The Contractor is responsible to cover and protect furniture, equipment, etc. not being used in rooms where furniture and equipment will remain during Contractors working hours.

F. Take all precautions necessary to avoid cutting existing pipe, conduit, or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

G. Cut back around removals to point where removal can be concealed with construction matching existing adjacent surfaces.

H. Trim edges of cuts neatly and properly where cuts are to be left exposed or where replacement work is to be installed.

I. Cap, plug, or otherwise seal disconnected items, openings, or devices.

J. Each prime contractor is responsible for all expenses related to “cutting and patching” procedures required to complete the work of their contract.

K. Do not cut and patch structural elements in a manner that would change their load bearing capacity or load - deflection ratio without first receiving approval from the Architect.
1. Specific items include:
   a. Foundation construction.
   b. Bearing and retaining walls.
   c. Structural concrete.
   d. Structural steel.
   e.Lintels.
   f. Timber and primary wood framing.
   g. Structural decking.
   h. Stair systems.
   i. Miscellaneous structural metals.
   j. Exterior curtain-wall construction.
   k. Equipment supports.
   l. Piping, ductwork, vessels, and equipment.
   m. Structural systems of special construction.

L. Do not cut and patch operating elements or related components that would result in reducing their capacity to perform as intended or increase maintenance or decrease operational life or safety.
   1. Specific items include:
      a. Primary operational systems and equipment.
      b. Air or smoke barriers.
      c. Water, moisture, or vapor barriers.
      d. Membranes and flashings.
      e. Fire protection systems.
      f. Noise and vibration control elements and systems.
      g. Control systems.
      h. Communication systems.
      i. Conveying systems.
      j. Electrical wiring systems.

M. Do not cut and patch construction that would, in the Architect's opinion reduce the building's aesthetic qualities.

N. Unless otherwise specified, provide patching materials to match adjacent materials in type, construction, installation, and detailing.
   1. Plaster: do not use plaster patching compounds containing asbestos.
   2. Ceramic tile/structural glazed tile: match existing color and pattern of existing tile units.
   3. Resilient floor tile: match thickness, color, and composition of existing tile units.

O. Provide cutting and patching operations to ensure new work is flush with existing adjacent surfaces and terminations.

P. When finished surfaces are cut so that smooth transition with new work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Architect/Engineer for review.

Q. Where change of plane of 1/4 inch or more occurs, submit recommendation for providing smooth transition; to Architect/Engineer for review.

R. Prepare substrates to receive new finish as required for proper application of new finish in accordance with new finish manufacturer's recommendations for existing conditions, including patching holes, leveling uneven surfaces, and similar work. Remove existing finishes where new wall, floor, or ceiling finishes are indicated.

S. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
   1. Fit the several parts together, to integrate with other Work.
   2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective work and work not conforming to requirements of Contract Documents.
4. Provide equipment, labor, materials and incidentals necessary for cutting and patching as required for the installation of new work.
5. Remove samples of installed Work for testing.
6. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

T. Execute work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.

1.7 EXECUTION

A. Plaster - patch existing plaster surfaces as follows:
   1. Missing plaster or plaster damaged to extent removal is required:
      a. Areas 20 sq. in. or less: apply plaster directly to substrate.
      b. Areas more than 20 sq. in.: use metal lath and plaster system over substrate.
   2. Cracked plaster not requiring removal: clean / remove any loose plaster, apply new plaster directly over crack w/ fiber mesh tape. complete finish to extend a minimum 6" on both sides of crack and minimum 6" beyond both ends of crack. match existing texture.

B. Ceramic tile: match patterns and installation methods of existing tile.

C. Ceilings: review revised ceiling patterns with Architect in field prior to removal of existing ceiling.

D. Resilient flooring: clean mastic, dirt, and similar contaminants from substrate after removal of existing resilient flooring, and prepare substrate in accordance with recommendations of new flooring manufacturer.
   1. Where patching of existing resilient flooring constitutes more than 50 percent of existing floor surface in room, replace entire floor.

E. Hard surface floor: remove hard surfaces to required depth for installation of new finish materials, and prepare substrate as recommended by new finish material manufacturer, including acid etch or similar method.

F. Painting
   1. Where alteration work involves 1 or 2 walls in room or area, paint entire surface of only the walls involved in alteration.
   2. Where alteration work involves more than 2 walls in room or area, paint all walls in room or area, unless otherwise indicated.

1.8 QUALITY ASSURANCE

A. General: Structural and other conditions shall be verified with the Architect before proceeding with cutting, demolition and alterations work. Inspect structures prior to start of Work and notify the Architect in writing of any conditions detrimental to the execution of the Work.

B. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

C. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

D. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect’s opinion, reduce the building’s aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.
E. Costs caused by out of sequence work prematurely installed, defective work, or work not conforming to the Contract Documents, including costs for additional services of the Architect/Engineer, will be paid for by the party responsible for out of sequence, rejected or non-conforming work.

F. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
   1. Water, moisture, or vapor barriers.
   2. Membrane and flashings.
   3. Exterior curtain-wall construction.
   4. Equipment supports.
   5. Piping, ductwork, vessels, and equipment.
   6. Noise and vibration-control elements and systems.

G. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

H. Cut masonry and concrete materials using masonry saw or core drill.

I. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

J. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

K. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of penetrated element.

1.9 HAZARDOUS MATERIALS PROCEDURES

A. Hazardous materials: The Contractor is advised that if materials suspected to be lead, pcb, or to contain asbestos are encountered during construction, he shall immediately notify owner and take precautions as required to avoid disturbing materials until directed by owner.

PART 2 PRODUCTS

2.1 NOT USED.

PART 3 EXECUTION

3.1 PERFORMANCE

A. Remove and store in protected location, material, which is to be reused and relocated.

B. Cutting shall be done in a manner that will not adversely affect the strength of the building. Holes and openings shall be neatly cut so as to provide a finished appearance and shall be patched around the edge where required for a finished appearance.

C. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances and finishes.

D. Restore work, which has been cut or removed. Provide new products to complete work in accordance with requirements of Contract Documents.
E. Refinish entire surfaces as necessary to provide an even finish:
   1. Continuous Surfaces: to nearest intersections.
   2. Assembly: entire refinishing.

F. Fill and patch openings and holes in existing construction when bolts, piping, ducts, conduit and other penetrating items are removed.

G. Visual requirements: Do no cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities or result in visual evidence of cutting and patching. Remove and replace work cut and patched in a visually unsatisfactory manner.

H. Fire resistive integrity: Where holes or gaps remain from removed elements, fill void using solid fire resistive materials full depth of structure; terminate below finishes to allow new finish to be installed (see patching). Maintain the fire resistive and structural integrity of the structures.

I. Firestopping: All products used for through-penetration firestop systems shall be tested and meet all federal, state, and local codes.

J. Cutting: cut existing construction use methods least likely to damage elements to be retained or adjoining construction. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.
   1. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. To avoid marring existing surfaces, cut or drill from the exposed or finished side into concealed surfaces.
   3. Cut through concrete and masonry using a cutting machine such as a Carborundum saw or diamond core drill.

K. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
   1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
   2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
   3. Where removal of walls or partitions extends from one finished area to another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new.
   4. Patching around piping and penetrations: Provide firestopping at perimeter of penetrations for smoke-tight seal to maintain integrity of fire resistive and smoke barrier qualities.
   5. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch, after the patched area has received primer and second coat.
      a. If two walls or more of a room are patched and painted, prepare and repaint the entire room - all wall surfaces.

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

3.2 CLEANING

A. Daily cleaning of alteration areas of the building shall be the responsibility of the Contractor.

B. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely, paint, mortar, oils, putty, and items of similar nature. Thoroughly
clean piping, conduit, and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

C. Dust generated by cutting and patching shall be controlled in a manner so as to prevent infiltration into occupied spaces. Contractor(s) responsible for dust infiltrating the existing duct systems shall bare the cost of cleaning these systems.

D. Demolished Materials shall be removed from the project site at frequent intervals. Piles of demolished materials will not be allowed to accumulate.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
A. References and standards.
B. Testing and inspection agencies and services.
C. Control of installation.
D. Mock-ups.
E. Tolerances.
F. Manufacturers’ field services.
G. Defect Assessment.
H. Examination and Preparation

1.2 RELATED REQUIREMENTS
A. Section 01 30 00 - Administrative Requirements: Submittal procedures.
B. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.3 REFERENCES AND STANDARDS
A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
B. Conform to reference standard of date of issue current on BID DATE, except where a specific date is established by applicable code.
C. Obtain copies of standards where required by product specification sections.
D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.
G. Definitions:
   1. General: Basic contract definitions are included in the Conditions of the Contract.
   2. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the reader locate the reference. Location is not limited.
3. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Architect, requested by the Architect, and similar phrases.

4. "Approved": The term "approved," when used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.

5. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

6. "Furnish": The term "furnish" means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.

7. "Install": The term "install" describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

8. Product: The term "product" refers to materials, systems, and equipment.

9. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

10. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.
   a. The term "experienced," when used with the term "installer," means having a minimum of 5 previous projects similar in size and scope to this project, being familiar with the special requirements indicated, and having complied with requirements of authorities having jurisdiction.
   b. Trades: Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trade persons of the corresponding generic name.
   c. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.
      1) This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.

11. "Project Site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction, with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

12. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

H. Specification Format and Content Explanation:
1. Specification Format: These Specifications are organized into Divisions and Sections based on the CSI-04 -Division format and Master Format numbering system.
2. Specification Content: This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
   a. Specifying Methods: The techniques or methods of specifying to record requirements varies throughout text and may include "prescriptive", "open generic-descriptive", "
“compliance with standards”, “performance”, “proprietary” or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.

b. Abbreviated Language: Language used in Specifications and other Contract Documents are abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated, as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.

c. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

1) The words "shall be" are implied where a colon (:) is used within a sentence or phrase.

d. Overlapping and Conflicting Requirements: Where compliance with two or more industry standards or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent is intended and will be enforced, unless specifically detailed language written into contract documents clearly indicates that a less stringent requirement is to be fulfilled. Refer apparently-equal-but-different requirements, and uncertainties as to which level of quality is more stringent, to the Architect for a decision before proceeding.

e. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended to be the minimum for the work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with the minimum (within specified tolerances), or may exceed that minimum (within reasonable limits). In complying with these requirements, indicated numeric values are either minimums or maximums as noted or as appropriate for context of the requirements. Refer instances of uncertainty to the Architect for decisions before proceeding.

f. Specialists, Assignments: In certain instances, specification of text (requires or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the contractor has no choice or option. These requirements should not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the work; they are also not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party of entity involved in a specific unit of work is recognized as “expert” for the indicated construction process or operation. Nevertheless, the final responsibility for fulfillment of the entire set of requirements remains with the Contractor.

3. Conflict: If there be conflicting variance between the Drawings and the Specifications, the provisions of the Specifications shall control. In case of conflict on the drawings between larger and small scale details and plans, the larger scale plans and details shall control.

I. Industry Standards:
1. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
2. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.
3. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and
requirements that are different but apparently equal to the Architect for a decision before proceeding.
a. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.

4. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
a. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source and make them available on request.

1.4 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform certain specified testing and inspection. Refer to Section 01 41 00 - Special Inspections and Structural Testing.
B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
B. Comply with manufacturers' instructions, including each step in sequence.
C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
E. Have Work performed by persons qualified to produce required and specified quality.
F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the
following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Integrated Exterior Mock-ups: construct integrated exterior mock-up as indicated on Drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.

D. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

E. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

F. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.

G. Accepted mock-ups shall be a comparison standard for the remaining Work.

H. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.3 TOLERANCES
A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.4 MANUFACTURERS' FIELD SERVICES
A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Architect 15 days in advance of required observations.

1. Observer subject to approval of Architect.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.5 DEFECT ASSESSMENT
A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

3.6 EXAMINATION
A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.
C. Examine and verify specific conditions described in individual specification sections.

3.7 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substrate.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section specifies requirements for temporary construction, utilities, facilities, and controls required to support the successful construction of the Project and maintain services until the permanent utilities, facilities, and controls are complete. They shall be installed, maintained, and removed as required to meet project conditions and contract requirements.

1. General
   a. Quality Assurance
   b. Project Conditions
   c. Installation

2. Environmental
   a. Environmental Protection, NPDES, and PPC
   b. Excavation
   c. Storm Sewers
   d. Dewatering Facilities

3. Materials & Equipment
   a. Deliveries
   b. Material Inventories
   c. Materials
   d. Equipment

4. Utilities & Systems

5. Facilities
   a. Temporary sanitary facilities.

6. Construction Aids
   a. Lifts and Hoists

7. Enclosures
   a. Barricades, Warning Signs, and Lights
   b. Site Enclosure Fence

8. Security requirements.

   a. Access, Staging & Parking

10. Waste removal and progress cleaning.

11. Project identification.

12. Field offices.

13. Operation, Termination & Removal

14. Protection of Property

1.2 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary.

B. Section 01 51 00 - Temporary Utilities.

1.3 GENERAL

A. Quality Assurance
   1. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:
      a. New York State Uniform Building Code
b. Health and safety regulations  
c. Utility company regulations  
d. Police, Fire Department and Rescue Squad rules  
e. Environmental protection regulations

2. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits. Submit copies to the Architect.

B. Project Conditions  
1. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit to interfere with progress. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site. Remove, relocate and replace temporary facilities and controls as required by the progress of the Work, or as requested by the Owner and/or Architect. The above will be done at no cost to the Owner.

2. No firearms, alcoholic beverages, tobacco products or controlled substances shall be allowed on the Project at any time per local, state and federal laws/regulations. Any violators will be immediately and permanently removed from the job site.

C. Installation  
1. Use of qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

2. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

1.4 ENVIRONMENTAL

A. Environmental Protection, NPDES and PPC  
1. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner and Architect/Engineer, their employees and agents, from claims, losses, damage, and expenses including, but not limited to, attorney’s fees arising out of performance of the Work as it relates to any type of pollution related situations. This would apply to bodily injury, sickness, disease or death, or to damages or destruction or contamination of tangible property arising out of the acts or omission of the Contractor or the joint negligent acts of the Owner, Architect/Engineer or anyone for whose acts the Contractor may be liable.

2. The Contractor, prior to construction, must comply with the National Pollution Discharge Elimination System (NPDES) and submit and coordinate State and Local Preparedness, Prevention and Contingency Plans (PPC) with the Architect before the start of work.

3. Area must be provided and maintained by the Contractor to provide protection for each individual worker, as well as the protection of property or real estate of the construction site and environment.

4. The Contractor shall provide protection, operate temporary facilities, and conduct construction in ways and methods that comply with all environmental regulations, and minimize the possibility that air, water, and soil become contaminated or polluted as a result of work or storage of supplies and materials, or equipment usage.

5. The Contractor will designate and train a responsible employee in environmental contamination procedures, including, but not limited to, emergency responses, material and waste inventories, spills and leak precautions and responses, inspections, housekeeping, security and external factors.

6. Open burning shall not be permitted.

7. The Contractor is responsible for dust control of the entire site as to eliminate the spread of dust to adjacent spaces withing the building as well as to neighboring properties. A dust control plan shall be coordinated with the Architect and Owner.
B. Excavation
1. Material Protection: Any Contractor performing excavation shall protect all excavated materials from moisture, freezing and drying, so that the same materials excavated can be utilized for backfill.
2. Shoring: The Contractor shall provide shoring for all excavations that require same per OSHA standards. Shoring must be coordinated by the Contractor.

C. Storm Sewers
1. If storm sewers are available; the Contractor shall provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available, or cannot be used, The Contractor shall provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used or discharge of effluent, provide containers to remove and dispose of effluent off site in lawful manner.
2. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.
3. Comply with the soil erosion and sedimentation control plan and authorities having jurisdiction.

D. Dewatering Facilities
1. For temporary drainage and dewatering facilities, and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable codes and authorities having jurisdiction. Where feasible, utilize the same facilities. The Contractor shall be responsible to maintain the site, excavations and construction free of water, unless noted otherwise.
2. The Contractor shall be responsible to drain or pump water and remove debris from the site so as not to delay continuous work or progress of their work. This shall include operating pumps during second shift in order to facilitate next-day continuation of work.
3. The Contractor shall excavate in a manner that prevents all surface water from flowing into the building area. The Site Contractor shall continue to drain site and remove debris until designed grades are obtained.
4. Once excavation grades are complete, The Contractor shall be responsible to remove all water and debris to install the required foundations.
5. Upon completion of required foundations, The Contractor shall be responsible to remove water and debris required to complete his work.
6. The Contractor shall provide temporary storm water drainage from the building and roofs and connect to storm water drainage system.

1.5 MATERIALS AND EQUIPMENT

A. Deliveries
1. Contractors shall coordinate delivery and storage on the jobsite of all significant materials. Coordinate delivery schedule with the Owner to prevent disruption to Owner's operations.
2. All Contractors are required to properly instruct material suppliers and vendors to address deliveries to them specifically by named responsible party at the jobsite and require advance notice.
3. All deliveries addressed to the project in general, the Owner or Architect/Engineer shall be refused and returned to the shipper.
4. The Owner will not be responsible for receipt, handling, or loss of any materials which are shipped to the Owner in error and received unknowing of relationship to the Project.
5. Contractors shall provide his superintendent with a telephone to enable locating the superintendent on and off site.

B. Material Inventories
1. Contractors shall coordinate the delivery and storage on the jobsite of all signification materials.
2. Each Contractor shall be responsible for the proper location, secure, and weather resistant storage as required of all materials. This includes placement of materials not to
obstruct passage on site or within building structures or in any way which causes impediment or obstruction to the Work.
3. All material inventories must be stored by the Contractor to avoid excessive loads on building structure.
4. When required for the progress of the project, a Contractor shall remove or relocate material inventories.

C. Materials
1. General: Provide new, undamaged materials in serviceable condition may be used. Provide materials suitable or the use intended.
2. Lumber and Plywood: Comply with requirements in Section 06 10 00 - Rough Carpentry.
3. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride fire retardant tarpaulins. Each Contractor shall provide tarpaulins as required for their work.
4. Water: The Contractor shall provide potable drinking water for their workmen approved by local health authorities.

D. Equipment
1. General: Provide new equipment, or undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable or use intended.
2. Water Hoses: The Contractor shall provide their own ¾” heavy-duty, abrasion-resistant, flexible rubber hoses, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at host discharge.
3. Electrical Power Cords: The Contractor shall provide their own grounded extension cords (12 Gauge minimum); use “hard-service” cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. All power cords are to be elevated, supported and hung from structure above wherever possible to avoid trip hazards.
4. Electrical Welding Outlets: These will not be provided. The Contractor will be responsible for his own welding power.
5. First Aid Supplies: Comply with governing regulations.
6. Fire Extinguishers: The Contractor shall provide hand-carried, portable UL-rated, class “ABC” fire extinguishers for the entire construction area, as defined by OSHA Standards. In other locations, provide hand-carried, portable, UL-rated, class “ABC” dry chemical extinguishers. Comply with NFPA10 classification, extinguishing agent and size required by locations and class of fire exposure. The Contractor shall provide fire extinguishers for their own use.

1.6 UTILITIES

A. Utilities and Systems:
1. Contractors interrupting services due to their construction operations shall provide temporary utility lines, as required, to maintain services.
2. The Contractor shall provide temporary electrical power service where required to construction office, if required, and shall remove temporary service at completion of the Project. Power will be made available twenty-four (24) hours per day.

B. Temporary Utilities - See Section 01 51 00

C. Temporary Telecommunications Services
1. It is the responsibility of the Contractor to provide and maintain (including any cost) any data or phone line they deem necessary for their day to day operations.

1.7 FACILITIES

A. Temporary Sanitary Facilities
1. The Contractor shall provide and maintain required facilities and enclosures with sanitary handwash. Facilities shall be located at staging areas and in reasonable proximity of all work areas as directed by Owner. Provide at time of project mobilization.
   a. Unit provided shall be self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber, reinforced polyester shell or similar nonabsorbent material.
2. Provide at least one unit of each twelve (12) construction personnel on site. Refer to Site Safety and Logistics plans for locations.
3. Use of existing facilities is not permitted.
4. The Contractor shall be responsible to maintain weekly in clean and sanitary condition.
   a. Provide all toilet supplies including toilet paper, hand sanitizer and waster receptor.
5. At end of construction, remove temporary sanitary facilities and return site to same or better condition as originally found.
6. Provide a minimum of one facility at each building site. Location of units to be field coordinated with Owner.

1.8 CONSTRUCTION AIDS & PROTECTION

A. Protection:
1. The Contractor shall provide handrails and barricades on all perimeters, stairs and landings according to OSHA regulations.
2. The Contractor shall install safety coverings, as needed to protect workers from hazards associated with any open holes or other openings, including but not limited to floors, walls and roofs. This work shall comply with all OSHA requirements and remain in place until permanent construction fills those openings.
3. All Contractor upon working in any of the areas named in the above paragraph shall remove the safety covering and handrail to perform their work. Upon completion of his work for the day, lunch, or breaks, or any time when the individual Contractor is not working in that opening, the safety covering and handrail must be replaced by The Contractor removing it. At the end of each day, the Contractor shall inspect the site and install all safety coverings and handrails. At the end of the Project, or in order to install permanent construction, the Contractor shall remove coverings and handrails.
4. The Contractor requiring access to above grade work are responsible for providing ladders, scaffolding and appropriate methods to access their work. The Contractor desiring use of in-place above grade work platforms must arrange directly with the party that owns the equipment and make all rental and insurance arrangements directly with that party.
5. All work platforms, scaffolding, etc. on the Project shall be available for access by the Owner, Architect/Engineer, Authorities having jurisdiction, and Testing Agencies.

B. Lifts and Hoists
1. Lifting and hoisting of all materials and equipment will be the responsibility of the Contractor.
2. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and shall be provided by the contractor requiring the tools and equipment.
3. The Contractor shall be responsible to provide all site and subsurface modification preparation and replacement required to use his lifting and hoisting equipment.

1.9 ENCLOSURES

A. Barriers
1. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public and to protect existing facilities and adjacent properties from damage from construction operations.
2. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
3. Provide protection for plants designated to remain. Replace damaged plants.
4. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

B. Barricades, Warning Signs and Lights
   1. The Contractor, at the interior and entrances of the building, and at the exterior of the building, shall comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against.

C. Exterior Enclosures
   1. The contractor shall be responsible for proper enclosure of their own openings for protection of exterior construction in progress and completed from exposure, bad weather, other construction operations, and similar activities and to maintain the progress schedule.
   2. The Contractor shall provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.
      a. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
   3. Install tarpaulins securely with noncombustible wood framing and other materials. Close openings of 25 sq. ft. or less with plywood or similar materials.

D. Interior Enclosures
   1. The Contractor shall provide temporary partitions as required by Owner and/or Architect to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture from all trades' work into Owner-occupied areas, and to prevent damage to existing materials and equipment.
   2. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:
      a. Maximum flame spread rating of 75 in accordance with ASTM E84.

1.10 SECURITY

A. Each contractor shall be responsible for coordinating their own forces and providing security and protection.

B. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
   1. The Contractor shall install substantial temporary enclosure of partially completed areas of construction. Provide and maintain locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security. This does not relieve the Contractor from responsibility for vandalism, theft, and similar violations of security to their own materials, equipment, tools and installations.
   2. The Contractor is responsible for maintaining a secure building and door locks at all times. The Contractor shall designate responsible individual or individuals that will tour the entire Project and close and secure all doors and windows and turn off non-emergency and non-security lighting at the end of each work day. The Contractor shall open all doors and turn on all lights prior to the start of each work day.
   3. The Contractor is responsible for the secure storage for their own materials and equipment on and off the site.
   4. The Contractor shall supply the Owner with keys for any lock installed on the project.

C. Coordinate with Owner's security program.

D. Maintain program throughout construction period until owner occupancy.

E. Entry Control:
   1. Restrict entrance of persons and vehicles into Project site and existing facilities.
2. Allow entrance only to authorized persons with proper identification.
3. Maintain log of workers and visitors, make available to Owner on request.
4. Owner will control entrance of persons and vehicles related to Owner's operations.

F. Personal Identification:
1. Provide identification badge to each person authorized to enter premises.
2. Badge to include: Personal photograph, name and assigned number expiration date and employer.
3. Maintain list of accredited persons, submit copy to Owner on request.
4. Require return of badges at expiration of their employment on the Work.

1.11 VEHICULAR CONSIDERATIONS

A. Access, Staging and Parking
1. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
   a. Maintain 20 feet wide driveways with turning space between and around combustible materials.
2. Coordinate access and haul routes with governing authorities and Owner.
3. Provide and maintain access to fire hydrants and control valves, free of obstructions.
4. The Contractor shall provide means of dust/dirt/debris control from vehicles leaving the Construction Site and entering surrounding public streets.
5. Existing on-site roads may be used for construction traffic.
6. Maintenance:
   a. All site areas disturbed by the work of this contract shall be maintained by the Contractor including public roads immediately outside property.
   b. Snow removal for all staging areas will be provided by the Contractor. The Contractor is responsible for snow removal as it pertains to their work.
   c. The Contractor shall maintain traffic and parking areas in sound condition free of excavated material, construction equipment, product, mud, snow, and ice.
   d. The Contractor shall maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.
7. Use of site and premises for Contractor staging, access and employee parking shall be coordinated with the Architect and approved by the Owner.
8. The Contractor shall provide all work required to restore site, including but not limited to construction staging area, parking, and roads during the latter time of the Project in addition to all other patching required as a result of disturbances for work of the Project including underground electric, communication, network, etc.
9. Existing parking areas may be used for construction parking. Tracked vehicles not allowed on pavement.
10. Removal, Repair:
    a. The Contractor shall provide all work required to restore site, including but not limited to construction staging area, parking, and roads prior to Substantial Completion, in addition to all other patching required as a result of disturbances for work of the Project including underground electric, communication, network, etc.
    b. Remove temporary materials and construction when permanent paving is usable.
    c. Remove underground work and compacted materials to depth of 2 feet; fill and grade site as specified.
    d. Repair existing and permanent facilities damaged by use, to original and/or specified condition.

B. Traffic Regulation
1. Flag Persons: Each Contractor shall provide trained and equipped flag persons to regulate traffic when their construction operations or traffic encroach on public traffic lanes.
2. Traffic Signs and Signals:
a. Provide signs at approaches to site and on site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
b. Provide, operate, and maintain traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.
c. Relocate as Work progresses, to maintain effective traffic control.

3. Removal:
   a. Remove equipment and devices when no longer required. Repair damage caused by installation.
   b. Remove post settings to depth of 2 feet.

1.12 WASTE REMOVAL AND PROGRESS CLEANING

A. The Contractor is responsible for general clean-up and trash removal resulting from the work or employees of that contract. The Contractor shall provide dumpster(s) as required for the purpose of trash removal for all Contractors, location to be coordinated with Owner. Hazardous materials shall not be placed in dumpsters, but shall be removed from the site by the Contractor's licensed subcontractor responsible for the material.

B. The Contractor on the Project will be required to clean up, and deposit in the dumpster, all debris generated by his Contract Work on a daily basis. This requirement will be enforced and will result in cost assessment against the Contractor who fails to perform daily cleanup. The Contractor will be responsible for flattening or crushing all trash as necessary when placed into the dumpster.

C. The Contractor will be responsible for weekly broom cleaning of all floor surfaces, for dust, dirt and general trash. He will deposit the same in the dumpster.

D. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

E. Remove trash from site weekly or when dumpster is full.

F. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

G. Comply with requirements of NFPA 241 for removal of combustible waste material and debris.

H. Dumpsters shall be located at the site, accessible to building and roads.

I. Contractors may load legally acceptable construction debris to the Dumpster (from this project only). Cost of all disposal fees shall be the responsibility of the Contractor.

J. Dumpsters shall remain on the project until project completion, or as directed by Architect.

K. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing spaces.

1.13 PROJECT IDENTIFICATION

A. Temporary Signs: The Site Contractor shall prepare signs to provide directional information to construction personnel and visitors as required by the Owner.

B. Erect on site at location(s) indicated by Owner.

C. No other signs are allowed without Owner permission except those required by law.

1.14 FIELD OFFICES

A. Contractor's Field Office
1. The Contractor shall provide and maintain such offices, storage and fabrication shed, and other temporary buildings or trailers on the project site as required for his own use. Contractors are advised that spaces within the existing building for storage of materials will not be available for their use. All steps and platforms connected to shelters must be per OSHA regulations. Unless written permission is obtained from the Owner through the Architect, only Prime Contractors will be allowed an on-site office due to space limitations. Contractors shall provide offices for their own personnel.

2. Locate offices a minimum distance of 30 feet from existing and new structures.

3. All Contractor’s offices and sheds must have the Contractor’s identification on them.

4. Construction:
   a. Structurally sound, secure, weather tight enclosures for office and storage spaces. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations with steps and landings at entrance doors.
   b. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible and occupancy and storage requirements.
   d. Interior Materials in Offices: Sheet type materials for walls and ceilings, pre-finished or painted; resilient floor and bases.
   e. Lighting for Offices: 50ft C at desk top height, exterior lighting at entrance doors.
   f. Fire Extinguishers: Appropriate type fire extinguisher at each office and each storage area.
   g. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.

5. Preparation: The Contractor shall fill and grade sites for temporary structures sloped for drainage away from buildings.

6. Removal: At completion of Work remove buildings, foundations, utility services and debris. The Contractor shall restore areas.

1.15 OPERATION, TERMINATION AND REMOVAL

A. Supervision: The Contractor shall enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: The Contractor shall maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
   1. Maintain operation of temporary enclosures, heating cooling, humidity control, ventilation and similar facilities on a 24-hour a day basis where required to achieve indicated results and to avoid possible damage.
   2. Protection: Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the Owner requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility or not later than Substantial Completion. Complete or, if necessary restore, permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

1.16 PROTECTION OF PROPERTY

A. General:
   1. The Contractor shall continuously protect the Work, other work, and the property of the Owner and others from damage, injury or loss arising in connection with the Work. Owner and Architect shall not be responsible for any loss or damage to the Work,
however caused, until after final acceptance thereof by the Owner, nor shall Owner or Architect be responsible for loss of or damage (however caused) to materials, equipment, appliances and other personal property of Contractors used in the performance of the Work.

2. The Contractor shall provide, erect and maintain barricades, warning signs, flags, lights as may be necessary to protect the Work and safeguard the workers and the general public. As such protection shall comply with the requirements of the proper authorities having jurisdiction.

3. The Contractor shall begin repair of damages resulting from any occurrence immediately if it is a life safety or security issue or presents the eminent possible of further damage. Otherwise repairs must begin within three days after (in the judgment of the Architect) the commencement of repairs is possible.

B. Fire Safety:

1. The Contractor shall store combustible materials in containers in fire-safe locations.

2. The Contractor shall maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas. Smoking is not permitted on the Owner’s property.

3. The Contractor shall provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

4. Owner shall be notified prior to any and all hot work.
   a. The Contractor performing hot work shall provide a fire watch during and for at least 30-minutes after potential fire ignition work has been performed.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Temporary Utilities: Electricity, lighting, heat, ventilation, and water.

1.2 RELATED REQUIREMENTS
   A. Section 01 50 00 - Temporary Facilities and Controls:
      1. Temporary telecommunications services for administrative purposes.
      2. Temporary sanitary facilities required by law.

1.3 TEMPORARY ELECTRICITY
   A. Service Cost: By Contractor.
   B. Energy Costs: By Owner.
   C. Connect to Owner's existing power service.
      1. Do not disrupt Owner's need for continuous service.
      2. Exercise measures to conserve energy.
   D. Provide temporary electric feeder from existing building electrical service at location as directed.
   E. Power Service Characteristics: Provide GFCI distribution system, for voltages up to 220/208 volt.
      1. Temporary system shall be sufficient to accommodate temporary lighting and construction operations, including the use of power tools, and start-up of specified building equipment which must be tested, started or placed into use prior to completion of its permanent power connections.
      2. Provide weatherproof, grounded wiring with overload protection; with direct wired connections, where feasible.
      3. Locate multiple outlets for 120 volt power, not less than 4 gang, at each story and area of construction, spaced so that the entire area of construction can be reached by power tools on a single 100’ extension cord. Maximum 20 Amp circuit breaker, four (4) receptacles per circuit breaker.
   F. Complement existing power service capacity and characteristics as required.
   G. Provide adequate number and size breakers and power outlets for all construction trades, with branch wiring and distribution boxes located as required. The Contractor shall provide flexible power cords as required.
      1. The Contractor shall have a cord inspection program in place and shall maintain the inspection records on site. This requirement does not relieve any other user of the power or any other party in the area of the temporary power from their legal responsibilities for seeing that the system is maintained to OSHA and NEC requirements.
   H. Provide main service disconnect and over-current protection at convenient location and meter.
   I. Permanent convenience receptacles may be utilized during construction.
   J. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.
1. Provide 20 ampere duplex outlets, single phase circuits for power tools for every 100 sq ft of active work area.
2. Provide 20 ampere, single phase branch circuits for lighting.
3. Construction circuits shall be separate and independent from temporary lighting.

K. The Contractor shall provide and pay for all maintenance, servicing, operation, equipment, and supervision of lines installed.

L. When temporary electrical lines are no longer required, they shall be remove by the Contractor and any part, or parts of the grounds or building disturbed or damaged shall be brought back to their original condition.

M. The Contractor shall maintain and operate permanent electrical supply and distribution system until time of final acceptance and transfer of operation to Owner’s personnel.

N. The Contractor shall provide temporary power connections to all mechanical and any additional equipment indicated on E series drawings until permanent power/new electric feeds and new electric components are in place.

O. The Contractor will provide 24-hour temporary power to any heat tape (installed by others) on temporary water and/or fire line. All temporary heat work shall comply with existing OSHA requirements.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Special lighting required for construction activities shall be provided by the contractor requiring it.

B. Permanent building lighting may be utilized during construction.
   1. The Electrical Contractor shall maintain and operate permanent lighting system until time of final acceptance and transfer of operation to Owner’s personnel, including turning off lighting during off-construction hours.
   2. The Electrical Contractor shall replace bulbs that are burned out or substantially dimmed by substantial hours of use or broken by construction.

1.5 TEMPORARY HEATING

A. Cost of Equipment: By Contractor.

B. Cost of Energy: By Owner.

C. Enclose building prior to activating temporary heat in accordance with Section 01 50 00.

D. Provide heating devices and heat as needed to maintain specified conditions for construction operations.

E. The following temporary heating specification is to be utilized and provided by the Contractor, if temporary heating is required:
   1. Heaters shall be direct-fired Make-up Air units with discharge modulation. Units must be designed to operate either inside or outside the building while positioned to draw 100% outside air.
   2. All equipment must employ squirrel cage blower for quiet operation. Noisy propane heaters will not be allowed.
   3. Temperature control units must have discharge modulation with remote space thermostats. Discharge temperature not to exceed 180 degrees F. No open flame visible for discharge will be allowed.
   4. Units must ignite pilot and prove flame before main burner is opened.
   5. Units to include high and low temperature shutdown.
6. Heaters shall comply with all applicable state, local and OSHA regulations and shall have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.

7. It is required that a routine maintenance is performed at least once a month to insure the units are operating properly. This cost will be figured into the equipment unit rates and there will be no additional costs for these visits.

8. All equipment to be utilized will meet the design criteria in Items 1 through 7 above.

F. In the event of equipment failure or repairs, alternate equipment must be in place within 12 hours of failure or the Owner and Architect shall have the right to take action necessary to restore the heat to the design temperature and will deduct any and all charges from The Mechanical Contractor.

G. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1. If the permanent heating system is not available for use when any Contractor requires that the temperature be maintained above 50 degrees (for proper installation of finishes for example), the Mechanical Contractor shall be responsible to provide the additional heating.

H. Humidification: Where control of ambient humidity is required for proper performance of the work, or for curing/drying of installed work or for protection of installed work from deterioration due to variations ambient conditions, The Contractor shall provide their own temporary humidification or dehumidification equipment to maintain the required conditions. Coordinate the use of the equipment with temporary heating to produce the required conditions with a minimum overall use of energy.

I. The Contractor shall provide power for oil or gas fired temporary heaters. It will be connected so that it can remain “live” when the temporary lighting has been turned off.

J. The Contractor shall provide a temporary natural gas service (as directed by Architect) for required temporary heat. All supply lines for natural gas fired temporary heaters to be provided by Contractor.

K. The Contractor may make suitable provisions for use of permanent heating system in temporary heating. The Contractor shall maintain and operate permanent system for temporary heating purposes, including service to occupied areas, if any, until time of final acceptance or transfer of operation to Owner’s personnel, for major parts of system if not for entire heating system.

1. All permanent heating equipment used to supply temporary heat shall be completely cleaned and reconditioned by The Contractor prior to final acceptance. Radiator traps and valves used in the heating system during the period of its operation to supply temporary heat shall not be reinstalled in the permanent system. Install new disposable filters and clean non-disposable filters prior to final acceptance. Replace worn parts and parts that have been subject to unusual operating conditions.

L. The Contractor shall remove all soot, smudges, and other deposits from walls ceilings and all exposed surfaces which are the result of the use of any temporary heating equipment including the use of the permanent heating system for temporary heat purposes. Finish work shall not be done until all such surfaces are properly cleaned.

1.6 TEMPORARY VENTILATION

A. A contractor requiring ventilation for work shall provide fans or other necessary equipment to ventilate and condition air as the work requires.

1.7 TEMPORARY WATER SERVICE

A. Cost of Service: By Contractor.
B. Cost of Water Used: By Owner.

C. Provide and maintain suitable quality water service for construction operations at time of project mobilization.

D. Connect to existing water source.
   1. Exercise measures to conserve water.

E. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION
SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. General product requirements.
B. Re-use of existing products.
C. Transportation, handling, storage and protection.
D. Product option requirements.
E. Substitution limitations and procedures.
F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.2 RELATED REQUIREMENTS
A. Document 00 21 13 - Instructions to Bidders: Product options and substitution procedures prior to bid date.
B. Section 01 40 00 - Quality Requirements: Product quality monitoring.

1.3 SUBMITTALS
A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.
B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers’ standard data to provide information specific to this Project.
C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.1 EXISTING PRODUCTS
A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.2 NEW PRODUCTS
A. Provide new products unless specifically required or permitted by the Contract Documents.
B. DO NOT USE products having any of the following characteristics:
   1. Made using or containing CFC's or HCFC's.
   2. Made of wood from newly cut old growth timber.
   3. Containing lead, cadmium, asbestos.
C. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
D. Furnish interchangeable components from same manufacturer for components being replaced.
E. All electrical work to conform to current national electric code requirements.
F. All electrical products, components and packaged systems are to be approved and labeled by a nationally recognized testing agency such as Underwriters Laboratory (UL) or equal.
G. The Electrical Trades Contractor shall provide a third party certificate of inspection, such as the New York State Board of Fire Underwriters or equivalent inspection agency.

2.3 PRODUCT OPTIONS
A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.4 MAINTENANCE MATERIALS
A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.1 SUBSTITUTION PROCEDURES
A. Instructions to Bidders specifies time restrictions for submitting requests for substitutions during the bidding period and the documents required. Comply with requirements specified in Section 00 21 13.
B. Substitutions will be considered when a product, through no fault of the Contractor, becomes unavailable or unsuitable due to regulatory change.
C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

PRODUCT REQUIREMENTS
Section 01 60 00   Page 2
D. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure (after contract award):
   1. Architect will consider requests for substitutions only within 30 days after date of Agreement.
   2. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
   3. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
   4. Architect will notify Contractor in writing of decision to accept or reject request.

3.2 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.3 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer’s warranty conditions, if any.

I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

J. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

K. Prevent contact with material that may cause corrosion, discoloration, or staining.

L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

M. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION
SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Coordination.
B. Examination.
C. Preparation.
D. General installation requirements.
E. Progress cleaning.
F. Protection of installed work.
G. System start-up.
H. Cleaning and protection.
I. Starting of systems and equipment.
J. Demonstration and instruction of Owner personnel.
K. Testing, adjusting and balancing.
L. Final cleaning.
M. Closeout procedures.
N. General requirements for maintenance service.

1.2 RELATED REQUIREMENTS
A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
B. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

1.3 REFERENCE STANDARDS

1.4 COORDINATION
A. See Section 01 10 00 for occupancy-related requirements.
B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
C. Notify affected utility companies and comply with their requirements.
D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

F. In finished areas, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean-up of work of separate sections.

H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner’s activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXAMINATION
   A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
   B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
   C. Examine and verify specific conditions described in individual specification sections.
   D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
   E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
   F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION
   A. Clean substrate surfaces prior to applying next material or substance.
   B. Seal cracks or openings of substrate prior to applying next material or substance.
   C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 GENERAL INSTALLATION REQUIREMENTS
   A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.
   B. Install products as specified in individual sections, in accordance with manufacturer’s instructions and recommendations, and so as to avoid waste due to necessity for replacement.
C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.4 PROTECTION OF INSTALLED WORK
A. Protect installed work from damage by construction operations.
B. Provide special protection where specified in individual specification sections.
C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
F. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.
G. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.5 SYSTEM STARTUP
A. Coordinate schedule for start-up of various equipment and systems.
B. Notify Architect and owner seven days prior to start-up of each item.
C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
E. Verify that wiring and support components for equipment are complete and tested.
F. Execute start-up under supervision of applicable Contractor personnel and manufacturer’s representative in accordance with manufacturers’ instructions.
G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.6 DEMONSTRATION AND INSTRUCTION
A. Demonstrate operation and maintenance of products to Owner’s personnel two weeks prior to date of final inspection.
B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Provide a qualified manufacturer's representative who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.

E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

G. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

3.7 TESTING, ADJUSTING AND BALANCING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.8 FINAL CLEANING

A. The Contractor shall be responsible for final cleaning. All contractors shall be responsible for daily cleaning of work areas as described elsewhere in this section.

B. Execute final cleaning prior to final project assessment.
   1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

C. Use cleaning materials that are nonhazardous.

D. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

E. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

F. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

G. Clean filters of operating equipment.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.9 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
   1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
      a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
      b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
   2. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
EXECUTION AND CLOSEOUT REQUIREMENTS

3. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases, including but not limited to:
   a. Affidavit of Release of Liens on AIA Form G706-A:
      1) From Contractor
      2) From Subcontractor(s)
      3) From Major Material Supplier(s)
   b. Affidavit of Debts and Claims Payment on AIA G706:
      1) From Contractor
      2) From all tiers of Subcontractor(s)
   c. Consent of Surety on AIA G707 From Contractor.
   d. One (1) year warranty from date of Substantial Completion.

4. Submit final record information.
5. Complete final cleanup requirements, including touchup painting.
6. Touch up and otherwise repair and restore marred, exposed finishes.

B. Inspection Procedures: Upon receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
   1. The Architect will repeat inspection when requested and assured that the Work is substantially complete.
   2. Results of the completed inspection will form the basis of requirements for final acceptance.

3.10 FINAL ACCEPTANCE

A. Each Contractor shall submit, prior to requesting final inspection, written certification that:
   1. Work has been completed in accordance with contract documents, listing any exceptions.
   2. Project has been inspected for compliance with contract documents.
   3. Equipment and systems have been tested in the presence of the Owner and are operational and video-taped instructions prepared and submitted through the Architect to the Owner.
   4. Owner’s designated staff have been instructed on all equipment and systems and an Owner signed receipt furnished to the Architect.
   5. Operational and Maintenance Manuals have been submitted and reviewed by the Architect.
   6. Owner has been furnished the specified warranties, guarantees and spare parts and an Owner signed receipt furnished to the Architect.
   7. Project has been completed and is ready for final inspection.

B. If the Architect considers the work complete in accordance with the requirements of the Contract Documents, the Contractor will submit his final requisition (including final changes to the Contract Sum) together with the following to the Architect.
   1. AIA G706 - Contractor’s Affidavit of Payments of Debts and Claims.
   2. Contractor’s Release of Liens and Waiver of Liens.
   3. AIA G707 Consent of Surety to Final Payment.
   4. Evidence of continuing insurance coverage.

C. If the Architect does not consider the work finally complete, the Contractor will be notified, in writing by the Architect with a copy to the Owner, with the reasons stated.

D. Re-inspection Procedure: The Architect will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Architect.
   1. Upon completion of re-inspection, the Architect will prepare a certificate of final acceptance. If the Work is incomplete, the Architect will advise the Contractor of Work
that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

2. The Contractor shall achieve FINAL COMPLETION of all Work, including correction of punch list items, preparation and delivery of manuals, presentation of training and completion of final paper submissions not later than sixty (60) days following the Contract-scheduled Substantial Completion date. In the event the Contractor shall fail to achieve Final Completion in a timely manner in accordance with this provision, the Contractor and the Contractor’s Surety shall be liable for and shall reimburse the Owner for any and all Architectural fees, materials or expenses made necessary by the Contractor’s failure. Additional fees and expenses shall be charged by the Owner against any Final Payment due or which may become due the Contractor.

3.11 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities. Refer to Section 01 78 00 - Closeout Submittals.
   1. Provide copies to Architect/Engineer.
B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor’s Correction Punch List for Contractor’s Notice of Substantial Completion.
C. Notify Architect when work is considered ready for Substantial Completion.
D. Submit written certification containing Contractor’s Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect’s Substantial Completion inspection.
E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect’s and Contractor’s comprehensive list of items identified to be completed or corrected and submit to Architect.
F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
G. Accompany Project Coordinator on Contractor’s preliminary final inspection.
H. Notify Architect when work is considered finally complete and ready for Architect’s Substantial Completion final inspection.
I. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.
J. Submit final application for payment identifying total adjusted contract sum, previous payments and sum remaining due.

3.12 GENERAL REQUIREMENTS FOR MAINTENANCE SERVICE

A. Provide service and maintenance of components indicated in specification sections.
B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Project Record Documents.
   B. Operation and Maintenance Data.
   C. Manual for Equipment and Systems
   D. Warranties and bonds.
   E. Spare Parts and Maintenance Products

1.2 RELATED REQUIREMENTS
   A. Section 00 72 00 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.
   B. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
   C. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.
   D. Individual Product Sections: Specific requirements for operation and maintenance data.
   E. Individual Product Sections: Warranties required for specific products or Work.

1.3 SUBMITTALS
   A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
   B. Operation and Maintenance Data:
      1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
      2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
      3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
      4. Submit two sets of revised final documents in final form within 10 days after final inspection.
   C. Warranties and Bonds:
      1. For equipment or component parts of equipment put into service during construction with Owner’s permission, submit documents within 10 days after acceptance.
      2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
      3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.
PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS
   A. Maintain on site one set of the following record documents; record actual revisions to the Work:
      1. Drawings.
      2. Specifications.
      3. Addenda.
      4. Change Orders and other modifications to the Contract.
      5. Reviewed shop drawings, product data, and samples.
      6. Manufacturer's instruction for assembly, installation, and adjusting.
   B. Ensure entries are complete and accurate, enabling future reference by Owner.
   C. Store record documents separate from documents used for construction.
   D. Record information concurrent with construction progress.
   E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
      1. Manufacturer's name and product model and number.
      2. Product substitutions or alternates utilized.
      3. Changes made by Addenda and modifications.
   F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
      1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
      2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
      3. Field changes of dimension and detail.
      4. Details not on original Contract drawings.

3.2 OPERATION AND MAINTENANCE DATA
   A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
   B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
   C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
   D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.3 MANUAL FOR EQUIPMENT AND SYSTEMS
   A. For Each Item of Equipment and Each System:
1. Description of unit or system, and component parts.
2. Identify function, normal operating characteristics, and limiting conditions.
3. Include performance curves, with engineering data and tests.
4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.

E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

G. Provide servicing and lubrication schedule, and list of lubricants required.

H. Include manufacturer's printed operation and maintenance instructions.

I. Include sequence of operation by controls manufacturer.

J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

K. Provide control diagrams by controls manufacturer as installed.

L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

O. Include test and balancing reports.

P. Additional Requirements: As specified in individual product specification sections.

3.4 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Arrangement of Contents: Organize each volume in parts as follows:
   1. Project Directory.
   2. Table of Contents, of all volumes, and of this volume.
   3. Operation and Maintenance Data: Arranged by system, then by product category.
      a. Source data.
      b. Product data, shop drawings, and other submittals.
      c. Operation and maintenance data.
      d. Field quality control data.
      e. Photocopies of warranties and bonds.
   4. Design Data: To allow for addition of design data furnished by Architect or others, provide a tab labeled "Design Data" and provide a binder large enough to allow for insertion of at least 20 pages of typed text.

3.5 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

3.6 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

END OF SECTION
SECTION 02 41 00
SELECTIVE STRUCTURAL DEMOLITION

PART 1  GENERAL

1.1  SECTION INCLUDES

A. Selective demolition of building elements for alteration purposes.
B. Abandonment and removal of existing utilities and utility structures.
C. Demolishing designated building equipment and fixtures.
D. Demolishing designated construction.
E. Protecting items designated to remain.
F. Removing demolished materials.

1.2  RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.
B. Section 01 10 00 - Summary: Sequencing and staging requirements.
C. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
D. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
E. Section 31 23 23 - Fill: Filling holes, pits, and excavations generated as a result of removal operations.

1.3  REFERENCE STANDARDS


1.4  SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Site Plan: Showing:
   1. Vegetation to be protected.
   2. Areas for temporary construction and field offices.
   3. Areas for temporary and permanent placement of removed materials.
C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
   2. Include a summary of safety procedures.
D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.
1.5 QUALITY ASSURANCE
   A. Conform to applicable code for demolition work, dust control, products requiring electrical
disconnection and re-connection.
   B. Conform to applicable code for procedures when hazardous or contaminated materials are
discovered.
   C. Obtain required permits from authorities having jurisdiction.

1.6 SEQUENCING
   A. Section 01 10 00 - Summary: Requirements for sequencing
   B. Owner will conduct salvage operations before demolition begins to remove materials Owner
chooses to retain.

1.7 SCHEDULING
   A. Section 01 32 16 - Construction Progress Schedule: Requirements for scheduling.
   B. Schedule work to coincide with new construction.
   C. Cooperate with Owner in scheduling noisy operations and waste removal that may impact
Owner operations.
   D. Performance of noisy, malodorous, dusty, and removal of hazardous material work:
      1. All activities must be coordinated with the Owner to ensure that programming and
services will be uninterrupted by construction activities and to ensure the safety of the
occupants.
   E. Coordinate utility and building service interruptions with Owner.
      1. Do not disable or disrupt building fire or life safety systems without five days prior written
notice to Owner.
      2. Schedule tie-ins to existing systems to minimize disruption.
      3. Coordinate work to ensure fire sprinklers, fire alarms, smoke detectors, emergency
lighting, exit signs and other life safety systems remain in full operation in occupied areas.

1.8 PROJECT CONDITIONS
   A. Each contractor shall be responsible for the cutting and patching of existing surfaces as
required to complete the work of their contract unless noted otherwise.
   B. Conduct demolition to minimize interference with adjacent and occupied building areas.
   C. Cease operations immediately if structure appears to be in danger and notify Architect. Do not
resume operations until directed.
PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Comply with applicable requirements of NFPA 241.
   3. Use of explosives is not permitted.
   4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   6. Provide, erect, and maintain temporary barriers and security devices.
   7. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   8. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   9. Do not close or obstruct roadways or sidewalks without permit.
  10. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
  11. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

F. Carefully remove building components indicated to be reused.
   1. Disassemble components as required to permit removal.
   2. Package small and loose parts to avoid loss.
   3. Mark components and packaged parts to permit reinstallation.
   4. Store components, protected from construction operations until reinstalled.

G. At completion of the demolition work restore, repair or refinish all building systems, components and finishes disturbed as the result of the demolition process.
3.2 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.3 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof and odor partitions of construction.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

F. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
4. Patch as specified for patching new work.

3.4 SALVAGE REQUIREMENTS
A. Coordinate with Owner to identify building components and equipment required to be removed and delivered to Owner.
B. Tag components and equipment Owner designates for salvage.
C. Protect designated salvage items from demolition operations until items can be removed.
D. Carefully remove building components and equipment indicated to be salvaged.
E. Disassemble as required to permit removal from building.
F. Package small and loose parts to avoid loss.
G. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.
H. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.
I. Deliver salvaged items to Owner. Obtain signed receipt from Owner.

3.5 DEBRIS AND WASTE REMOVAL
A. Remove debris, junk, and trash from site as work progresses.
B. Remove from site all materials not to be reused on site; do not burn or bury.
C. Leave site in clean condition, ready for subsequent work.
D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete formwork.
B. Floors and slabs on grade.
C. Concrete lift pits.
D. Concrete reinforcement.
E. Concrete finishing.
F. Concrete curing.

1.2 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Products and installation for sealants for saw cut joints and isolation joints in slabs.

1.3 REFERENCE STANDARDS

C. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete; 1998 (Reapproved 2004).
D. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
E. ACI 302.1R - Guide for Concrete Floor and Slab Construction; 2004 (Errata 2007).
G. ACI 305R - Hot Weather Concreting; 2010.
I. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).
J. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
K. ACI 347R - Guide to Formwork for Concrete; 2014.
Z. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.
AG. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting; 2015.
AI. ASTM E1155M - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers (Metric); 1996 (Reapproved 2008).

1.4 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Submit manufacturers’ data on manufactured products such as joint devises, attachment accessories, and admixtures, showing compliance with specified requirements.  
1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
C. Mix Design: Submit proposed concrete mix design.
1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.

D. Design Data:
1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
   a. Hot and cold weather concrete work.
   b. Air entrained concrete work.
2. Identify mix ingredients and proportions, including admixtures.
3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.


F. Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed in the State in which the Project is located.

G. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

H. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

I. Samples: Submit two, 12 inch long samples of waterstops and construction joint devices.

J. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution & Closeout Requirements.

B. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.6 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

1.7 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Steel.
   2. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
   3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
   4. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.2 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished, unless otherwise indicated.

B. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.
   1. Form: Flat Sheets.
   2. WWR Style: As indicated on drawings.

C. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
   3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

D. Fiber Reinforcement: Alkali-resistant polypropylene complying with ASTM C1116/C1116M, 130 ksi minimum tensile strength. Mixing rate per manufacturer's recommendations.
   1. Fiber Length: 0.75 inch, nominal.
   2. Products:
      a. Fibermesh 150 by Propex Concrete Systems: www.fibermesh.com
      b. FRC Mono 150 by FRC Industries: www.frcindustries.com
      c. FORTA-FERRO by Forta Corporatio: www.forta-ferro.com
      d. Substitutions: See Section 01 60 00 - Product Requirements.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
   1. Acquire all cement for entire project from same source.
   2. Coarse Aggregate Maximum Size: In accordance with ACI 318

   1. Acquire all aggregates for entire project from same source.
   2. Coarse Aggregate Maximum Size: In accordance with ACI 318

C. Lightweight Aggregate: ASTM C330/C330M.

D. Fly Ash: ASTM C 618, Class F. Loss on ignition requirement waived if used in flowable fill concrete mix.

E. Water: ACI 318; Clean and not detrimental to concrete.

2.4 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260/C260M.
C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.
F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
G. Accelerating Admixture: ASTM C494/C494M Type C.
H. Retarding Admixture: ASTM C494/C494M Type B.
I. Water Reducing Admixture: ASTM C494/C494M Type A.

2.5 ACCESSORY MATERIALS
A. Underslab Vapor Retarder: Refer to Section 07 25 00.
B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Minimum Compressive Strength at 48 Hours, ASTM C109/C109M: 2,000 pounds per square inch.
   2. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 10,000 pounds per square inch.
C. Non-Shrink Epoxy Grout: Moisture-insensitive, two-part; consisting of epoxy resin, non-metallic aggregate, and activator.
   1. Minimum Compressive Strength at 7 days, ASTM D695: 12,000 pounds per square inch.

2.6 BONDING AND JOINTING PRODUCTS
A. Latex Bonding Agent: Non-redispersible acrylic latex, complying with ASTM C1059/C1059M, Type II.
B. Epoxy Bonding System:
   1. Complying with ASTM C881/C881M and of Type required for specific application.
   2. Manufacturers:
      b. Kaufman Products Inc; SurePoxy HM Class B: www.kaufmanproducts.net.
      d. Substitutions: See Section 01 60 00 - Product Requirements.
C. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
   1. Material: ASTM D1751, Nonextruding, resilient asphalt impregnated fiberboard or felt.
D. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with rectangular or round knockout holes for conduit or rebar to pass through joint form at 6 inches on center; ribbed steel stakes for setting.
   1. Provide removable plastic cap strip that forms wedge-shaped joint for sealant installation.
   2. Height: To suit slab thickness.

2.7 CURING MATERIALS
B. Curing and Sealing Compound, Low Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.

C. Moisture-Retaining Sheet: ASTM C171.
   1. Polyethylene film, clear, minimum nominal thickness of 0.0040 inch.
   2. Non-staining cotton fabric, weighing not less than 8 oz/per square yd, bonded to prevent separation during handling and placing.

D. Polyethylene Film: ASTM D2103, 4 mil thick, clear.

E. Water: Potable, not detrimental to concrete.

2.8 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations.

C. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
   1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

E. Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard, or as recommended by manufacturer for specific project conditions.

2.9 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
   1. Fiber Reinforcement: Batch and mix as recommended by manufacturer for specific project conditions.

B. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify requirements for concrete cover over reinforcement.

C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Remove debris and ice from formwork, reinforcement, and concrete substrates.

C. Remove water from areas receiving concrete before concrete is placed.

D. Verify that forms are clean and free of rust before applying release agent.
E. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

F. Wet sticking anchor rods shall not be permitted.

G. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions. Remove laitance, coatings & unsound materials.
   1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
   2. Use latex bonding agent only for non-load-bearing applications.

H. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

I. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.3 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

3.4 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Notify testing laboratory and Architect/Engineer not less than 24 hours prior to commencement of placement operations.

D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

E. Finish floors level and flat, unless otherwise indicated, within the tolerances specified under FLOOR FLATNESS AND LEVELNESS TOLERANCES

3.5 SLAB JOINTING

A. Locate joints as indicated on the drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

E. Repair underslab vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.

F. Separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.
G. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

H. Extend joint filler from bottom of slab to within 1/4 inch of finished slab surface. Conform to Section 07 90 05 for finish joint sealer requirements.

I. Install joint device anchors for expansion joint assemblies specified in Section 07 95 13. Maintain correct position to allow joint cover to be flush with floor and wall finish.

J. Install joint covers in longest practical length, when adjacent construction activity is complete.

K. Apply sealants in joint devices in accordance with Section 07 90 05.

L. Place concrete at final position. Prevent segregation of mix.

M. Place concrete in continuous operation for each panel or section determined by predetermined joints.

N. Consolidate concrete.

O. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

P. Place concrete continuously between predetermined expansion, control, and construction joints.

Q. Do not interrupt successive placement; do not permit cold joints to occur.

R. Place floor slabs in checkerboard or saw cut pattern indicated.

S. Saw cut joints within 12 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.

T. Screed floors level, maintaining the following minimum F(F) Floor Flatness and F(L) Floor Levelness values when measured in accordance with ASTM E 1155/ASTM E 1155M. Refer to Section 03 35 00 for tolerances.

3.6 SEPARATE FLOOR TOPPINGS

A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.

B. Place required dividers, edge strips, reinforcing, and other items to be cast in.

C. Apply bonding agent to substrate in accordance with manufacturer’s instructions.

D. Place concrete floor toppings to required lines and levels.
   1. Place topping in checkerboard panels not to exceed 20 feet in either direction.

E. Screed toppings level, maintaining surface flatness of maximum 1/8 inch in 10 feet.

3.7 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. An independent testing agency, as specified in Section 01 40 00, will inspect finished slabs for conformance to specified tolerances.

B. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
   1. Exposed to View and Foot Traffic: F(F) of 35; F(L) of 25, on-grade only.
   2. Under Thick-Bed Tile: F(F) of 20; F(L) of 15, on-grade only.
   3. Under Carpeting: F(F) of 25; F(L) of 20, on-grade only.
   4. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.
C. Measure F(F) Floor Flatness and F(L) Floor Levelness in accordance with ASTM E1155 (ASTM E1155M), within 48 hours after slab installation; report both composite overall values and local values for each measured section.

D. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value.

E. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.8 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
   2. Parge coating is not acceptable.

D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:

E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1/4 inch per foot nominal if not indicated on the drawings.

3.9 CURING

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Surfaces Not in Contact with Forms:
   1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   2. Final Curing: Begin after initial curing but before surface is dry.

3.10 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Field inspection and testing will be performed by Owner’s testing laboratory in accordance with ACI 318 and applicable code.

C. Provide free access to concrete operations at project site and cooperate with appointed firm.

D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

E. Concrete Inspections:
   1. Continuous Placement Inspection: Inspect for proper installation procedures.
   2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures

F. Strength Test Samples:
   1. Sampling Procedures: ASTM C172
3. Sample concrete and make one set of four cylinders for every 50 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls.
4. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
5. Make one additional cylinder during cold weather concreting, and field cure.

G. Field Testing:
   1. Slump Test Method: ASTM C143/C143M.
   2. Air Content Test Method: ASTM C173/C173M.
   3. Temperature Test Method: ASTM C1064/C1064M.
   4. Measure slump and temperature for each compressive strength concrete sample.
   5. Measure air content in air entrained concrete for each compressive strength concrete sample.

H. Cylinder Compressive Strength Testing:
   2. Test Acceptance: In accordance with ACI 318 and applicable code.
   3. Test one cylinder at 7 days.
   4. Test two cylinders at 28 days.
   5. Retain one cylinder for 56 days for testing when requested by Architect/Engineer.
   6. Dispose remaining cylinders when testing is not required.

I. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

3.11 PATCHING

A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.
C. Patch imperfections as directed by Architect/Engineer in accordance with ACI 318.

3.12 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
C. Repair or replacement of defective concrete will be determined by the Architect/Engineer. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

3.13 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION
SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Rough opening framing for doors, windows, and roof openings.
   B. Preservative treated wood materials.
   C. Concealed wood blocking, nailers, and supports.
   D. Miscellaneous wood nailers, furring, and grounds.

1.2 RELATED REQUIREMENTS
   A. Section 03 30 00 - Cast-in-Place Concrete: Setting anchors in concrete.
   B. Division 22 and 26 – All products requiring blocking or backboards.

1.3 REFERENCE STANDARDS
   A. ALSC (American Lumber Standards Committee) - Softwood Lumber Standards.; 2011
   G. PS 1 - Structural Plywood; 2009.
   I. SPIB (GR) - Grading Rules; 2014.

1.4 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide technical data on wood preservative materials.

1.5 DELIVERY, STORAGE, AND HANDLING
   A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

2.2 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.3 CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

B. Other Applications:
   1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
   2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
   3. Other Locations: PS 1, C-D Plugged or better.

2.4 ACCESSORIES

A. Fasteners and Anchors:
   2. Anchors: Toggle bolt type for anchorage to hollow masonry.
   3. Fasteners for roof replacements must be included in the Singly-Ply Roofing membrane manufacturer’s warranty to meet uplift pressures determined in accordance with Chapter 16 of the New York State Building Code using a basic wind speed of 90 MPH.

2.5 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Treatment: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.
   1. Manufacturers:
   a. Timber Treatment Technology, LLC: TimberSil.
   b. Substitutions: See Section 01 60 00 - Product Requirements.

2. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using sodium silicate based preservative to 0.25 lb/cu ft retention.
   a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
   b. Treat lumber exposed to weather.
   c. Treat lumber in contact with masonry or concrete.
   d. Treat lumber less than 18 inches above grade.

PART 3 EXECUTION

3.1 PREPARATION
   A. Coordinate installation of rough carpentry members specified in other sections.

3.2 INSTALLATION - GENERAL
   A. Select material sizes to minimize waste.
   B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
   C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.3 BLOCKING, NAILERS, AND SUPPORTS
   A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
   B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
   C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.4 INSTALLATION OF CONSTRUCTION PANELS
   A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
      1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
      2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
      3. Install adjacent boards without gaps.
3.5 CLEANING

A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
A. Board insulation at underside of floor slabs.
B. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.

1.2 RELATED REQUIREMENTS
A. Section 03 30 00 - Cast-in-Place Concrete
B. Section 07 25 00 - Weather Barriers: Separate air barrier and vapor retarder materials.
C. Section 07 53 00 - Elastomeric Membrane Roofing: Insulation specified as part of roofing system.
D. Section 07 84 00 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.

1.3 REFERENCE STANDARDS

1.4 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
C. Manufacturer's Installation Instructions: Include information on special environmental
conditions required for installation and installation techniques.

1.5 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to
successful installation.

PART 2 PRODUCTS

2.1 APPLICATIONS

A. Insulation Under Concrete Slabs: Extruded polystyrene board.

2.2 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene Board Insulation: ASTM C 578, Type IV; Extruded polystyrene board
cellular type surface; with the following characteristics:
1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
4. Board Thickness: As noted on drawings.
6. Thermal Resistance: R-value of 5.0 per 1 inch at 75 degrees F mean temperature.
8. Board Density: 2.5 lb/cu ft.
9. Water Absorption, Maximum: 0.1 percent, by volume.
10. Manufacturers:
    c. Johns Manville Insulation Group
    d. W.R. Grace Construction Products
11. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates
are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or
substances that may impede adhesive bond.

3.2 BOARD INSTALLATION UNDER CONCRETE SLABS

A. Place insulation under slabs on grade after base for slab has been compacted.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing
slab.
3.3 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Vapor Retarders: Under concrete slab on grade.

1.2 RELATED REQUIREMENTS
   A. Section 03 30 00 - Cast-in-Place Concrete.
   B. Section 07 21 00 - Thermal Insulation
   C. Section 07 92 00 - Joint Sealants.

1.3 DEFINITIONS
   A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor
      retarders.
   B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor
      permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent
      surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are
      classified as vapor retarders.
   C. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable,
      to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
      1. Water Vapor Permeance: For purposes of conversion, \(57.2 \text{ ng/(Pa s sq m)} \approx 1 \text{ perm}\).

1.4 REFERENCE STANDARDS
      Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
   C. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with
      Soil or Granular Fill under Concrete Slabs; 2011.

1.5 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data on material characteristics.
   C. Manufacturer's Installation Instructions: Indicate preparation.

1.6 FIELD CONDITIONS
   A. Maintain temperature and humidity recommended by the materials manufacturers before,
      during and after installation.
PART 2 PRODUCTS

2.1 WEATHER BARRIER ASSEMBLIES
   A. Exterior Vapor Retarder:
      1. On under side of concrete slabs use vapor retarder sheet.

2.2 VAPOR RETARDER MATERIALS (AIR BARRIER AND WATER-RESISTIVE)
   A. Vapor Retarder Sheet Type 1 - Below Slab Locations: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E1745, Class A; stated by manufacturer as suitable for application indicated. Single ply polyethylene is prohibited.
      1. Water Vapor Permeance: 0.1 perm, maximum, when tested in accordance with ASTM E96/E96M.
      2. Seam and Perimeter Tape: Polyethylene self adhering type, mesh reinforced, 2 inches wide, compatible with sheet material.
      3. Products:
         b. Insulation Solutions, Inc. Model - Viper VaporCheck 16 (16mil).
         c. Substitutions: See Section 01 60 00 - Product Requirements.

2.3 ACCESSORIES
   A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
   C. Thinners and Cleaners: As recommended by material manufacturer.
   D. Repair Tape: Polyethylene self-adhering type, 2 inch wide, compatible with sheet material.
   E. Mastic Tape: Double sided, asphaltic, pressure sensitive mastic tape compatible with sheet material.

PART 3 EXECUTION

3.1 EXAMINATION
   A. Verify that surfaces and conditions are ready to accept the work of this section.

3.2 PREPARATION
   A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
   B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

3.3 INSTALLATION
   A. Install materials in accordance with manufacturer's instructions.
B. Under Slab Vapor Retarder (sheet retarder type 1):
   1. Installation shall be in accordance with manufacturer's instructions and ASTM E1643.
   2. Unroll Vapor Barrier with the longest dimension parallel with the direction of the pour.
   3. Lap Vapor Barrier over footings and seal to foundation walls.
   4. Overlap joints 6 inches and seal with manufacturer's tape.
   5. Seal all penetrations (including pipes) with pipe boot and tape.
   6. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities. Seal all penetrations.
   7. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all four sides with tape.

C. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.

3.4 FIELD QUALITY CONTROL
   A. See Section 01 40 00 - Quality Requirements, for additional requirements.
   B. Do not cover installed weather barriers until required inspections have been completed.
   C. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

3.5 PROTECTION
   A. Do not leave materials exposed to weather longer than recommended by manufacturer.
   B. Do not leave paper- or felt-based barriers exposed to weather for longer than one week.

END OF SECTION
SECTION 07 84 00
FIRESTOPPING

PART 1  GENERAL

1.1 SECTION INCLUDES
A. Firestopping systems.
B. Firestopping of all joints and penetrations in fire-resistance rated and smoke-resistant assemblies, whether indicated on drawings or not.

1.2 REFERENCE STANDARDS
C. ITS (DIR) - Directory of Listed Products; current edition.
D. FM (AG) - FM Approval Guide; current edition.
E. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.3 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on product characteristics, performance ratings, and limitations.
C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
B. Installer Qualifications: Company specializing in performing the work of this section and:
   1. With minimum 3 years documented experience installing work of this type.

1.5 MOCK-UP
A. Install one firestopping assembly representative of each fire rating design required on project.
   1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
B. If accepted, mock-up will represent minimum standard for the Work.
C. If accepted, mock-up may remain as part of the Work. Remove and replace mock-ups not accepted.
1.6 FIELD CONDITIONS
   A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
   B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.1 FIRESTOPPING - GENERAL REQUIREMENTS
   A. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.
   B. Fire Ratings: Refer to drawings for required ratings.

2.2 FIRESTOPPING ASSEMBLY REQUIREMENTS
   A. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
      1. Temperature Rise: In addition, provide systems that have been tested to show T Rating as indicated.
      2. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.
      3. Watertightness: In addition, provide systems that have been tested to show W Rating as indicated.
      4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.3 FIRESTOPPING SYSTEMS
   A. Manufacturers:
      2. Dow Corning Corp.
      3. Hilti Corp.
      4. 3M fire Protection Products .
      5. United States Gypsum Co.
      6. Substitutions: Section 01 60 00 - Product Requirements .
   B. Firestopping at uninsulated Metallic Pipe and Conduit Penetrations, of diameter 4 inches or less: Caulk or putty.
      2. GWB Partitions: UL Design No. WL-1001, F Rating 1 hour.
   C. Firestopping at Cable Penetrations, not in Conduit or Cable Tray: Caulk or putty.
      1. Other Interior Partitions: UL Design No. CAJ3045, F Rating 1 hour.
   D. Firestopping Between Top of Partition Wall and Roof Slab: Fiber firestopping with smoke seal coating;UL Design No. U4005, F Rating as required by wall rating.

2.4 MATERIALS
   A. Elastomeric Silicone Firestopping: Single component silicone elastomeric compound and compatible silicone sealant; conforming to the following:
      1. Elongation: 40 percent.
2. Durability and Longevity: Permanent.

B. Foam Firestopping: Single component silicone foam compound; conforming to the following:
   1. Density: 18 lb/cu ft.
   2. Durability and Longevity: Permanent.

C. Fibered Compound Firestopping: Formulated compound mixed with incombustible non-asbestos fibers; conforming to the following:
   1. Density: 3.5 lb/cu ft.
   2. Durability and Longevity: Permanent.

D. Dam Materials: Permanent
   1. Mineral fiber matting
   2. Sheet Metal
   3. Alumina silicate fire board

PART 3 EXECUTION

3.1 EXAMINATION
   A. Verify openings are ready to receive the work of this section.

3.2 PREPARATION
   A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
   B. Remove incompatible materials that could adversely affect bond.
   C. Install damming materials to arrest liquid material leakage.

3.3 FIELD QUALITY CONTROL
   A. Section 01 40 00 - Quality Requirements.
   B. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing
   C. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.4 INSTALLATION
   A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
   B. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.
   C. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
   D. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating to uniform density and texture.
   E. Compress fibered material to maximum 40 percent of its uncompressed size.
   F. Place foamed material in layers to ensure homogenous density, filling cavities and spaces.
   Place sealant to completely seal junctions with adjacent dissimilar materials.
G. Remove dam material after firestopping material has cured.

3.5 CLEANING
   A. Clean adjacent surfaces of firestopping materials.

3.6 PROTECTION
   A. Protect adjacent surfaces from damage by material installation.

END OF SECTION
SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Nonsag gunnable joint sealants.
B. Self-leveling pourable joint sealants.
C. Joint backings and accessories.

1.2 RELATED REQUIREMENTS
A. Section 03 30 00 - Cast-in-Place Concrete.
B. Section 07 25 00 - Weather Barriers: Sealants required in conjunction with vapor retarders.
C. Section 07 84 00 - Firestopping: Firestopping sealants.

1.3 REFERENCE STANDARDS
F. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.4 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
   6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
   7. Certification by manufacturer indicating that product complies with specification requirements.
C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

E. Installation Log: Submit filled out log for each length or instance of sealant installed.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience and approved by manufacturer.

1.6 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.
      b. Joints between different exposed materials.
      c. Other joints indicated.
   2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.
b. Other joints indicated.

3. Do not seal the following types of joints.
   a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
   b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
   c. Joints where installation of sealant is specified in another section.

B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
   1. General Purpose Exterior (non-Traffic): Type 1, use for:
      a. Control, expansion, and soft joints in masonry.
      b. Joints between concrete and other materials.
      c. Joints between metal frames and other materials.
      d. Other exterior non-traffic joints for which no other sealant is indicated

C. Interior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
   1. Wall and Ceiling Joints in Non-Wet Areas; Type 2, use for:
      a. Interior wall and ceiling control joints.
      b. Joints between door and window frames and wall surfaces.
      c. Other interior joints for which no other type of sealant is indicated
   2. Floor Joints in Wet Areas: Self-leveling polyurethane "traffic-grade" sealant suitable for continuous liquid immersion; Type 3.

2.3 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

B. Colors: As selected by Architect.

2.4 NONSAG JOINT SEALANTS

A. Type 1 - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M, G and A; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
   2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
   3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
   4. Color: Match adjacent finished surfaces, Submit colors to Architect for approval.
   5. Cure Type: Single-component, neutral moisture curing.
   6. Manufacturers:
      c. Substitutions: See Section 01 60 00 - Product Requirements.

B. Type 2 - Silicone Sealant: ASTM C920, Type S, Grade NS, Class 50, for Use NT, G, M, and A.
   1. Movement Capability: Plus and minus 50 percent, minimum.
   2. Color: Match adjacent finished surfaces, Submit colors to Architect for approval.
   3. Cure Type: Single-component, neutral moisture curing
   4. Manufacturers:
      b. Substitutions: See Section 01 60 00 - Product Requirements
2.5 SELF-LEVELING SEALANTS

A. Type 3 - Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion.
   2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.
   5. Manufacturers:
      a. BASF; MasterSeal SL2.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.6 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
   1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
   2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
   3. Open Cell: 40 to 50 percent larger in diameter than joint width.
   4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
   5. Manufacturers:
      a. Substitutions: See Section 01 60 00 - Product Requirements.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

D. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
3.3 INSTALLATION

A. Perform work in accordance with sealant manufacturer’s requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer’s recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer’s approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.4 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at the low temperature in the thermal cycle. Report failures immediately and repair.

END OF SECTION
SECTION 08 33 23
OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Overhead coiling doors, operating hardware, exterior, electric operation.
B. Wiring from electric circuit disconnect to operator to control station.

1.2 RELATED REQUIREMENTS
A. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
B. Section 11 14 00 - VEHICLE WASH SYSTEMS: Connection between wash activation system and door operator.
C. Section 26 05 34 - Conduit: Conduit from electric circuit to operator and from operator to control station.

1.3 REFERENCE STANDARDS
B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
I. NEMA MG 1 - Motors and Generators; 2014.

1.4 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide general construction, electrical equipment, and component connections and details.

C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.

F. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

B. Products Requiring Electrical Connection: Listed and classified by UL (DIR) acceptable to authority having jurisdiction as suitable for the purpose specified and indicated.

C. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years documented experience in the fabrication and installation of security closures.

D. Installer Qualifications: Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 COORDINATION

A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Overhead Coiling Doors:
1. Basis of Design: Rapidslat Model 626 Advance Performance Rolling Service Doors as manufactured by Overhead Door Corp.
2. Other Acceptable Manufacturers:
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 DESIGN / PERFORMANCE REQUIREMENTS

A. Advanced Rolling Service doors:
1. Windload: Design door assembly to withstand wind/suction load of 20 psf (958 Pa) without damage to door or assembly components. Does not apply to doors with optional wearstrip guides.
2. Operation: Design door assembly, including operator, to operate for not less than 200,000 cycles

2.3 COILING DOORS

A. Exterior Coiling Doors: Aluminum slat curtain.
1. Capable of withstanding positive and negative wind loads of 20 psf, without undue deflection or damage to components.
2. Curtain: Interlocking roll-formed metal slats as specified with endlocks attached to each end of alternate slats to prevent lateral movement.
   a. Flat Profile insulated type F-265i with 24 gauge back covering for doors up to 20 feet wide fabricated of:
      1) 16 gauge (.050 inch) aluminum
3. Insulation: Slat cavity shall be filled with CFC-free, foamed in place, polyurethane insulation:
   a. R-Value: 7.7, U-Value: 0.13
   b. Sound Rating: STC-21
4. Finish: Powder coated, color to be selected by Architect.
5. Bottom Bar: Two metal angles, minimum thickness 3/16 inch, bolted back to back to reinforce curtain in the guides and incorporating a wireless, monitored safety edge.
   a. Material:
      1) Extruded aluminum
   b. Finish:
      1) Powder coat, color as selected by Architect.
   c. Provide with high usage guide wear strip to minimize wear and reduce sound.
7. Hood: Protecting drive motor, barrel, chain, and sprocket from dirt and debris and extending between the support brackets. Fabricated of aluminum.
   a. Finish: Powder coated, color to be selected by Architect.
8. Brackets: Provide steel brackets to support motor, curtain, and hood and fabricated of powder coat, color as selected by Architect.
   a. Motor: Direct drive, integrated gear motor/brake assembly sized for openings. Provide with a manual hand chain for operation during power outages. Operator and drive assembly is factory pre-assembled and provided with all wiring harnesses needed direct from the factory.
      1) Opening Speed: Up to 24 inches per second.
      2) Closing Speed: 12 inches per second.
      3) Electrical Characteristics: 460V AC, 3 phase per motor/drive.
      4) Right hand mount
10. Control Panel: Provide electronic Variable Frequency drive controller with microprocessor self-diagnostics. LCD readout indicates door action, alarm conditions, and fault conditions. Timer to close programming options and non-resettable cycle counter are
included. Enclosure is NEMA 4X rated. Control system is UL508A certified. Junction box is IP67 rated.

11. Door Roll: Directly driven, springless roll shall be steel tube with integral shafts, keyed on the Drive End and supported by self-aligning greaseable sealed bearings. Door shall not require any counterbalance device.

12. Safety Devices: Provide door with following safety devices:
   a. Photoelectric sensors that cast an invisible beam across the door opening and reverses the downward motion of the door when an object enters the path of the beam.
   b. Wireless, monitored safety edge reverses downward motion upon impact.
   c. Built-in (to motor assembly) brake mechanism eliminates uncontrolled curtain travel independent of other safeties.

13. Actuators:
   a. One Open/Close/Stop push button station incorporated into Control Panel.
   b. Interior Push button OPEN CLOSE STOP
   c. Control from 2 contacts on bus wash system. (Open/Close)


15. Locking Devices: Lock and latch handle on outside.
   a. Provide Cylinder cores and keys to match existing manufacturer and locking system.

2.4 ELECTRIC OPERATION

A. Electric Operators:
   1. Motor Rating: 1/3 hp; continuous duty.
   2. Motor Voltage: 460v volt, three phase, 60 Hz.
   5. Opening Speed: 12 inches per second.

B. Control Station: Standard three button (OPEN-STOP-CLOSE) momentary control for each operator.
   1. 24 volt circuit.
   2. Surface mounted, NEMA 4X rated.

C. Safety Edge: Located at bottom of curtain, full width, electro-mechanical sensitized type, wired to stop operator upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

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. Install units in accordance with manufacturer's instructions.
B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
E. Coordinate installation of electrical service with Section 26 27 17. Complete wiring from disconnect to unit components.
F. Complete wiring from disconnect to unit components.
G. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 05 - Joint Sealers
H. Install perimeter trim and closures.
I. Instruct Owner’s personnel in proper operating procedures and maintenance schedule.

3.4 TOLERANCES
A. Maintain dimensional tolerances and alignment with adjacent work.
B. Maximum Variation From Plumb: 1/16 inch.
C. Maximum Variation From Level: 1/16 inch.
D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.5 ADJUSTING
A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.6 CLEANING
A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
B. Remove labels and visible markings.
C. Touch-up, repair or replace damaged products before Substantial Completion.

3.7 PROTECTION
A. Protect installed products until completion of project.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gantry style vehicle wash systems as shown on the contract drawings including:
   1. Under chassis wash system
   2. Air blower system
   3. Associated support structures, safety equipment, pumps, controls and accessories
   4. All associated piping, valves and fittings required for a functioning system and as required for connecting to water sources as specified herein and as indicated on the Contract Drawings.
   5. All controls, motors, motor starters, switches, blowers, power wiring and control wiring up to the (mechanical and electrical) utility points of connection for the building

1.2 RELATED REQUIREMENTS

A. Division 22 - Associated plumbing work.
B. Division 26 - Associated electrical work.

1.3 REFERENCE STANDARDS

B. American Society of Heating, Refrigerating, and air-conditioning Engineers (ASHRAE): Provide and install equipment to comply with ASHRAE 90A “Energy Conservation in New Building Design.”
C. American Society of Mechanical Engineers (ASME).
E. National Electrical Manufacturers Association (NEMA): Provide electric motors and components, which comply with NEMA Standards.
F. Underwriters Laboratories, Inc. (UL): Provide electric motors and components which are listed and labeled by UL. Design, manufacturer, and install pumps in accordance with UL 778, “Motor Operated Water Pumps.” Design, manufacture, and install vehicle wash controls in accordance with UL 508, “Industrial Control Equipment.”

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Product Data - for each type of product:
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
a. Provide UL listing card or equivalent document of Nationally Recognized Testing Laboratories from the company building the electrical panel(s) and attach with the electrical drawings indicating that the electrical panels will be built to the required standards

C. Shop Drawings - For vehicle wash equipment:
   1. Include plans, elevations, sections, details, and attachments to other work.
   2. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of anchors and field connection.
   3. Electrical layout
   4. Mechanical layout
   5. Any related in-ground electrical or mechanical installation

D. Submit Qualification Data for Installer.

E. Operation and Maintenance Data: For vehicle wash system, to include in operation and maintenance manuals:
   1. Description of method of operation and motor control system.
   2. Parts catalog with complete list of replacement parts.
   3. Maintenance requirements and frequency, and periodic adjustments required
   4. Schematic wiring diagrams of installed electrical equipment.
   5. Provide Final As-Built drawings with O&M Manual. O&M Manual Shall be provided hard copy bound in 3 ring binder and on CD in PDF Format. Provide 3 copies of each

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in the fabrication of the products of this section with not less that five years documented experience.

B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer. Company specializing in performing the work of this section with not less than five years documented experience.

C. The machine shall be of standard manufacture and the manufacturer shall provide names and addresses of installations presently in operation in North America with good performance records for inspection.

D. To set a minimum standard of quality, the manufacturer must be ISO certified 9001:2008 and provide certification document with the bid

1.6 WARRANTY

A. The manufacturer’s warranty for the machine and all components shall be for one (1) year and all labor for 90 days.

1.7 PREINSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting

B. Preinstallation Conference: Conduct conference at Project site, minimum one week prior to commencing work of this section.
   1. Inspect and discuss electrical roughing-in, equipment bases, and other preparatory work specified elsewhere.
   2. Review sequence of operation for each type of vehicle wash equipment.
   3. Review coordination of interlocked equipment specified in this Section and elsewhere.
   4. Review required testing, inspecting, and certifying procedures.
1.8 DELIVERY, STORAGE, AND HANDLING
   A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
   B. Deliver, store and handle all products of this section as recommended by the respective product manufacturer, to protect from damage.

1.9 FIELD MEASUREMENTS
   A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Gantry-type Roll-Over Vehicle Washer:
      1. Basis of Design: Roll-over Vehicle Washer Model 4M-12 as manufactured by NS Corporation, Inc.
   B. Other Acceptable Manufacturers:
      1. Westmatic Corp
   C. Substitutions: See Section 01 60 00-Product Requirements

2.2 GENERAL PERFORMANCE DESCRIPTION
   A. Gantry-type Roll-Over Vehicle Washer (travelling gantry on floor mounted tracks over stationary vehicles) with three full length rotating brushes (one horizontal and two vertical) that will wash and rinse with different selectable programs, front, roof, rear, and both sides of tractor-trailers, buses, vans, motorhomes, and cars and trains.

2.3 PERFORMANCE REQUIREMENTS
   A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.4 DIMENSIONAL SPECIFICATIONS
   A. Unit Dimensions
      4M-12
      1. Length of Unit 7'6"
      2. Width of Unit 15'7"
      3. Overall Height of Unit 16'5"
      a. Length of Unit Running Tracks 80'0"
      b. Vehicle Dimensions
         1) Length of Vehicle Up to 65'0"
         (a) Height of Vehicle Up to 14'0"
         (1) Width of Vehicle Up to 10'9"
      c. Washbay Dimensions
      d. Length of Washbay - Recommended 20' *plus length of longest vehicle
      e. Minimum Workable Washbay Length 12'6" *plus length of longest vehicle
      1) Height of Washbay - Recommended 19'0"
         (a) Width of Washbay - Recommended 20'0"
2.5 TECHNICAL DESCRIPTION

A. Structural Frame Construction
1. Steel gantry is made of welded tube 2” x 2” x 1/8” and 2” x 1-1/2” x 1/8”. All frame tube construction has reinforced stress points and are double welded.
2. Side brush frames are made of 2” x 4” x 1/8” steel, and are housed completely within the Gantry.
3. Gantry shall be covered with baked white aluminum sheet (all sides and roof) to reduce water overspray. Sheets are to be attached to the gantry frame with double sided closed cell foam tape, all aluminum 3/16” rivets with anodized aluminum angle trims on corners, and 30-year life silicone sealer on all seams in splash shield area.
4. All of the frame and auxiliary structures that are not stainless steel, are hot dipped galvanized, and are 100% corrosion proof.
5. Electrical System
   a. All motors are totally enclosed 3-phase, squirrel type and are continuous duty rated, 2 drive brake motors 1/2 HP, 1700 RPM each, 2 side brush rotation motors 1.5 HP, 1800 RPM each, 1 top brush rotation motor 2 HP, 1800 RPM, and 1 top brush lift brake motor 3/4 HP, 1700 RPM. Drive and lift motors as well as rotation motors are interchangeable with each other. All motor cables, motor starters, control relays, and circuit breakers are UL approved.
   b. Each motor shall be protected by adjustable circuit breaker with thermal and instantaneous magnetic trip that may be manually reset. Circuit breakers shall be temperature compensated at least within 20 degrees - 40 degrees Centigrade (68 degrees - 104 degrees Fahrenheit).
   c. All electrical components, excluding motors, proximity switches, and solenoids, shall be placed inside main electrical control panel which is a sealed, lockable NEMA 4 enclosure with integral through the door disconnect device and door inter-locking hardware to prevent opening door while power is on to the machine.
   d. The entire machine shall be pre-wired and factory tested.
   e. Control voltage to be 115 Volts, 60 cycle supplied through control transformer in main control panel.
   f. Motor starters and control relays shall be heavy-duty industrial type.
   g. Push buttons and selector switches shall be of NEMA 4 design. Emergency stop buttons shall be latching twist-to-release mushroom head type.
   h. Control panel shall have numbered terminal strips for external wiring.
   i. Internal wiring shall be done by using wireways.
   j. Limit switches to be proximity type, and to be wired as motor overtravel safeties for drive and lift.
   k. Circuit breakers and motor starters shall be equipped with auxiliary contacts to switch off control circuit in event of any motor failure.
   l. All control shall be through a pre-programmed logic controller with minimum of 40 input/output points, rated for continuous use in high humidity and shock environment.
   m. Top brush shall be controlled by 4 fully adjustable load sensors, that shall maintain smooth even brush pressure against vehicle during operation.
   n. Top brush shall be equipped with an adjustable load sensor for safety that shall during operation automatically sense any over-pressure on the vehicle and allow top brush to release over-pressure, thereby washing around large mirrors, door ledges, refrigeration units, etc., without damage.

B. Water System
1. The machine water system shall be capable of functioning on cold water supply with pressure of 30-60 PSI using 20-25 Gallons per minute through one (1) inch service line.
2. All water nozzles and pipes shall be separately removable for cleaning purposes.
3. Soap and optional wax (rinse aid) program shall be automatically operational and the consumption of soap/wax shall be separately adjustable through metering pump systems.
4. All solenoids to be waterproof 115 Volt type.

C. Compressed Air System
1. The machine shall be able to operate at 80-120 PSI, 1-2 CFM, air pressure through 3/8" airline.
2. The function of the pneumatic system is to have a constant, adjustable pressure for side brushes through air cylinders.
3. Side brush air cylinders are duplex type, where the second stroke is activated only with the smaller vehicles to bring the side brushes closer to the center point.
4. Air cylinders are also used to retract side brushes to manually avoid any antennas, and west coast side mirrors if any.
5. The pneumatic system has an internal water removal and lubrication system.
6. The manufacturer shall provide a complete air system diagram with the machine.

D. Brushes
1. Brushes are made of polyethylene filaments which are tied into a rubber base. Top brush diameter is 55", side brush diameters are 42". All brushes are in segments and can be separately replaced.
2. All brush shafts shall be flange bearing mounted, direct worm gear drive. Side brushes are to be steel frame supported at top and bottom.
3. All brush rotation shall not exceed 125 RPM, to prevent damage to the vehicle paint finishes and obstacles such as mirrors, etc.
4. The top brush to have an electrical sensing device for the top brush pressure to be precisely adjusted to give optimum washing performance and pressure sensitivity. Sensing device shall automatically compensate for vehicle contact. (i.e. vertical or horizontal surfaces).
5. The top brush lifting mechanism shall consist of plates which carry the top brush and are attached to chains to raise and lower the brush. These chains shall attach at the top and bottom of each plate to form a closed-loop system insuring top brush stays level. No counterweights or cables will be accepted. An automatic tensioner sensor on the chain will sense any increased tension and perform as follows:

E. Drives
1. The machine shall have direct drives on all brushes, and chain drives on the top brush lift and drive mechanisms.
2. Top brush lift and gantry movement drives are through worm gear reducers at 60:1 ratio, have double output shafts, and are interchangeable. Brush rotation drives are through worm gear reducers at 15:1 ratio, permanently lubricated and sealed, and are interchangeable. All gear reducers are heavy-duty industrial type.
3. Gantry shall be power driven along track rails on four (4) drive wheels. Two drive motors, one on each side, move the machine 30 ft. per minute. Track shall be standard railroad "type", #12 Light Crane Rail. Double flanged drive and idler wheels, and unit mounted lock-pins eliminate the gantry from jumping off running tracks. Drive and idler wheels to be of case hardened to reduce wear on wheels and track. All wheels shall be mounted in heavy duty flange bearings with direct chain drives. Drive wheels shall not be directly mounted on worm gear reducers.
4. The machine shall be equipped with 22ft. long tire guide rails made of 4" diameter pipe, to control alignment of the vehicle up to the machine thus preventing possible damage.
5. Supply Cables and Cable Support
   a. The machine shall be delivered with a complete service cable/hose and trolley support system complete with support brackets, overhead track, hangers with trolleys and cord straps, and nipples for water and air line connections.
6. Undercarriage Wash and Rinse Unit
   a. The undercarriage washer shall be provided by a 1" diameter, schedule 40, galvanized pipe with brass or stainless steel nozzles, mounting brackets and manual shut-off valve.
b. The undercarriage rinse will be placed under the high-pressure spinner arch and the high-pressure pump supplies flow and pressure. Flow to the undercarriage shall be controlled by a manually adjustable ball valve.
c. Sufficient water shall be supplied with a 10 HP pump through the nozzles to completely cover the underside of the vehicle being cleaned in the wash.

2.6 SERVICES REQUIRED (PROVIDED BY OTHERS)
A. Water: 1" Cold Water Line at 50 PSI
B. Compressed Air: 3/8" Line at 100 PSI
C. Electrical Supply Required: 3 Phase, 60HZ, 460/480 Volts.

2.7 OPERATION
A. Basic Operation
1. The operator’s control panel for the operation of the machine shall have capability to be mounted on either side of the machine.
2. The machine to have the following three (3) programs:
   a. Selection of either 2 or 3 brush automatic wash cycle
   b. Selection of top brush to wash vehicle either once or twice or not at all
   c. Option to select wash for small vehicles or bus
      1) Machine start and stop. Start push button and red mushroom head stop push button shall be provided on the control panel. Additional red mushroom head stop button shall be mounted on the main electrical cabinet door.
   a. The machine shall have over-ride control flexibility for wash operations with capabilities to be controlled/operated manually to perform the following functions:
   b. Top brush shall have the capability of being raised and lowered using the joystick during any part of wash/rinse cycles.
   c. Gantry shall have the capability to move forwards/backwards by using the joystick during any part of wash/rinse cycles.
   d. Both side brushes shall be able to be retracted by using a push button during any part of wash/rinse cycle to avoid any obstacles, if needed.
   e. Functional Operations
      1) The machine shall be able to automatically wash/rinse a bus/tractor-trailer during the cycles required after the unit has been actuated.
      2) The machine shall be able to be programmed to do following different wash/rinse cycles automatically.
         (a) Two brush wash: for vehicles with obstacles on the roof, or open top trailers throughout the wash/rinse cycles, the top brush to remain stationary and not rotating in the up position. The two side brushes to perform the normal wash/rinse cycle.
         (b) Three-brush wash: during the wash cycle, the top brush will descent to the front bumper and follow the contours of the vehicle to the rear. At the rear, the brushes reverse rotation as the top brush cleans the rear and along the roof level without descending as the machine moves to the front of the vehicle.
            (1) Automatic back-track system: the machine to have full time built-in automatic backtracking capability for the top brush to clean in both wash and rinse cycles the underside of air-conditioning/refrigeration protrusions positioned at either end of the vehicle.
            (2) Intensified rear wash cycle: the machine shall be able to keep the top brush pressure constant while washing the rear of the vehicle, i.e.
when the pressure is not correct, the gantry shall be able to reverse automatically until the pressure is corrected.

(3) Large or small vehicle wash programs: the machine shall have separate selectable wash programs for complete brush coverage for all sizes of vehicles. The programming shall automatically compensate for the different top brush low level positions and side brush extension positions, for large/small vehicles.

(4) The machine shall have a programmed selector for adjustable height, to automatically prevent the top brush from descending too low between the tractor-trailer thus preventing the top brush tangling with cables and hose lines.

(5) Length of wash/rinse cycles: The machine shall automatically program itself for a shorter bus/tractor-trailer unit without travelling full length of tracks

(6) Interlock with coiling door. The controller shall have two auxiliary contacts that are connected to the coiling door. One shall be NO and close upon finish of the wash cycle to allow the door to open. The other shall be NO and close after 30 seconds to lower the door. The panel shall have an on/off selector to allow auto operation as described, and an off button to prevent the bus wash system from controlling the door.

(7) Interlocks with auxiliary equipment: The controller shall have a 120V auxiliary output that is energized when the system is on. That output will operate a light in the maintenance garage to warn occupants that the washer is functioning on the opposite side of the door. The light is specified on the electrical drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical systems for vehicle wash equipment to verify actual locations of connections before equipment installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate size and location of vehicle wash equipment indicated to be attached to or recessed into concrete or masonry, and furnish anchoring devices with templates, diagrams, and instructions for their installation.

3.3 INSTALLATION

A. Install vehicle washing equipment in accordance with manufacturer's instructions and placement drawings.

3.4 ADJUSTING

A. Adjust vehicle wash equipment to function smoothly and safely, and lubricate as recommended by manufacturer.
B. Test wash for horizontal travel within operating range indicated.
C. After completing installation of exposed, factory-finished vehicle wash equipment, inspect exposed finishes and repair damaged finishes.

3.5 DEMONSTRATION
A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain vehicle wash equipment

3.6 MAINTENANCE AND SERVICE
A. The manufacturer shall provide with the installation, a complete illustrated operating maintenance manual and parts catalogue.
B. All parts and components shall be readily available.
C. All operating personnel shall be fully trained by manufacturer's technicians for the operation and maintenance of the unit.

END OF SECTION
SECTION 14 45 00
VEHICLE LIFTS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Heavy Duty Vehicle Lifts including safety equipment, controls and accessories of the following types:
   1. Hydraulic / mechanical in-ground lifts.

1.2 RELATED SECTIONS
A. Section 03 30 00 - Cast-in-Place Concrete
B. Section 26 05 00 - Common Work Results For Electrical.
C. Section 31 05 13 - Soils for Earthwork.
D. Section 31 05 16 - Aggregates for Earthwork.
E. Section 31 23 23 - Fill

1.3 REFERENCES
A. ALI: Automotive Lift Institute.
D. Underwriters Laboratories Inc. (UL): UL201 - These requirements cover garage equipment, rated not more than 600 volts, for use in accordance with the National Electrical Code, NFPA 70.

1.4 SUBMITTALS
A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
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.
C. Shop Drawings: Template drawings and load reactions for lift application.

1.5 QUALITY ASSURANCE
A. Single Source Responsibility: Obtain lift units and power units from a single manufacturer.
B. Manufacturer Qualifications: Company specializing in the fabrication of the products of this section with not less that ten years documented experience.
C. Installer Qualifications: Factory trained authorized company, company insured for completed operations of installing lift. Company specializing in performing the work of this section with not less than five years.

D. Installer Qualifications: Factory trained authorized company, company insured for completed operations of installing lift.

E. In addition to the other requirements outlined herein, the lift or lifts, shall comply with all applicable requirements of ANSI standards. "Safety Requirements for the Construction, Care and Use of Automotive Lifts " as published by the American national Standards Institute. The lift company Quality Management System shall be ISO9001 certified.

F. Lift and all components shall be new. Used or refurbished lift and components not acceptable.

1.6 PROJECT CONDITIONS
A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.7 WARRANTY
A. System Warranty: Submit written warranty, signed by the contractor, the installer, and the manufacturer, guaranteeing to correct failures in lift system which occur within warranty period, without reducing or otherwise limiting any other rights to correction which the owner may have under the contract documents.
  1. Warranty period is 1 year from date of substantial completion of the project and shall cover manufacturing defects in materials, function and workmanship.
  2. This warranty is to include parts and labor.
  3. All parts shall be readily available in the United States

PART  2 PRODUCTS

2.1 MANUFACTURERS
A. Basis of Design: Rotary Lift Model EFX series 3
   2700 Lanier Dr
   Madison, IN 47250
   Tel: 800-640-5438
   www.rotarylift.com

B. Other Acceptable Manufacturers:
   1. Stertil-Koni USA Inc; www.stertil-koni.com

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 HEAVY DUTY HYDRAULIC / MECHANICAL IN-GROUND LIFTS
A. Basis of Design: EFX Series 3 Ultra-Shallow High Pressure / Low Volume Axle-Engaging Lifts as manufactured by Rotary Lift. Voltage 480V, 3PH, 3W
   1. Model EFX60-17
   2. Description: The lift shall consist of two or three lifting assemblies in line with the longitudinal axis of the vehicle, each lifting mechanism so equipped as to engage the axle and/or suspension as specified herein. One of the lifting mechanisms, will be movable fore and aft, to affect variable spacing between lifting mechanisms. The other lift assembly will be fixed.
B. Lift Type: Hydraulic / Mechanical In-Ground scissor style lifts
   1. Lift shall meet the following description: axle engaging, hydraulic / mechanical in-ground scissor articulating lift, with a fixed rear and movable front lifting unit. Total pit depth shall not exceed 34 inch (864 mm) below finished floor when installed in a concrete containment. The safety system shall include lockable, "press-to-lock" mechanical locks, and the lift shall have high pressure / low volume cylinders operated from a main console or optional pendant. The front lifting unit shall move fore and aft while fully recessed below floor and the entire lift system shall be drop-in, bolt-in and be completely removable and re-locatable.
   2. Lift is to be installed in a shallow concrete containment or precast pit, and equipment is not to exceed 34 inches (864 mm) below finished floor; any fluids in the containment shall gravity drain to the oil/water separator or be ejected into the user's specified collection system; cylinders shall operate at greater than 2500 psi and require less than a total of 3.5 gallons (13.25 L) each of hydraulic oil for lifting to full height; electric motors and reservoirs for oil shall be above ground in the control console; cylinders shall be double-acting with internal seals and have a maximum piston rod extension of 21 inches (533 mm) to reduce vulnerability to damage and increase maintenance reliability; the moveable lifting unit shall recess below floor anywhere within the travel range and shall be movable fore and aft when fully recessed; mechanical locking system shall have a "press-to-lock" push button to seat the locks in a fully engaged and locked position and relieve the hydraulic pressure; lift shall have a manual hand pump located in the console capable of lowering the lift in the event of a power or component failure to remove the vehicle; structural pit covers with a continuous hinge capable of supporting a 13,500 lb (6123 kg) drive over load; movable front lifting carriage that slides over low friction, low wear Nylatron in lieu of rollers and axles; the lift system shall not be embedded in concrete and shall be completely removable and re-locatable.

C. Dimensions and Capacities:
   1. Lifting Capacity: Lift shall be capable of raising 30,000 lbs. (13608 kg) per scissor section. The lift system can be operated with two or three scissor assemblies.
   2. Unbalanced Loads, Front to Rear: Lift shall be capable of raising 30,000 lbs (13608 kg) on one unit and 0 (zero) lbs. on the other unit.
   4. Number of Mechanical Lock Stops: 12, minimum.
   5. Vertical height spacing between each lock stop: 5 inches (127 mm), maximum.
   6. Vertical rise to first lock stop: 14 inches (356 mm), maximum.
   7. Rise: 70 inches (1778 mm) A.F.F. (above finished floor)
   8. Lifting Rate: 80 seconds; 50 inches (1270 mm) per minute, minimum.
   9. Maximum Depth Below Finished Floor for any structural component or member: 34 inches (864 mm) maximum.
   10. Front and Rear Synchronization: 2 inches (51 mm)
   11. Bolster Width: 40 inches (1016 mm) minimum.
   12. Adapter Adjustment: Minimum 18 inches (457 mm); Maximum 52 inches (1321 mm)
   13. Bolster and Base Adapters for both lifting units, movable and fixed, shall recess below finished floor. Base adapters shall not require pinning or locking mechanisms, but shall have retaining bolts.
   14. Wheelbases: From 96" to300".
   15. Drive-over capacity for interlocking, extruded structural aluminum covers: 13,500 lbs (6123 kg).

D. Lift Units:
   1. Independent Lifting Units, Front and Rear, shall be exactly identical, completely interchangeable and share the same operating and performance parameters for capacity, lifting rate, height and stroke.
   2. Movable lifting unit shall be mounted inside a steel insert, also known as a continuous recess.
3. Lift units and continuous recess insert shall be completely removable with no lift components or structural framing permanently embedded in the concrete.
4. Lift unit shall be a hydraulically powered, mechanically articulating scissor lift, complete with a mechanical locking system.
5. Hydraulic cylinder shall be dual acting so that the lift descends and then retracts below finished floor into the recess under power, after disengaging from the axle load.
6. Lift units shall be able to disengage from the axles at differing times and elevations and power down to their retracted positions at the same rate of descent as when fully loaded.
7. Lift unit shall be constructed of 2 inch (51 mm) thick bars, 2 inch (51 mm) thick inner leg assembly weldments, 2.25 inch (57 mm) diameter 4140 pins, greaseless polygon bushings, a 3/4 inch (19 mm) thick T-1 steel dual lock-jaw weldment, 7 inch (178 mm) diameter double-acting hydraulic cylinder, and UHMW slide blocks.
8. All steel surfaces shall be finished in a high wear epoxy coated paint.
9. By means of a centering link, the lifting structure shall articulate symmetrically about the center axis of the lift unit as it raises and lowers. As the lift raises and lowers, the top and bottom pins and sliding load blocks, shall travel toward and away from the centerline of the longitudinal axis of the lift at an equal rate and distance.

E. Continuous Recess / Movable Carriage Lifting Units:
1. The front unit shall be movable fore and aft while in the fully retracted position. The travel frame for the movable carriage shall be comprised of a drop-in, bolt-in-place open floor steel box insert that is completely removable and re-locatable.
2. When the entire travel frame insert has the covers in place and the lift is operational, it forms a continuous recess that shall meet the following design and performance criteria:
   a. The movable lift unit shall not be required to recess, or park, in only one "pocketed" location, providing increased productivity in servicing fleet vehicles of varying wheelbases.
   b. The movable lifting unit may be recessed below finished floor at any position between the minimum and maximum dimensions of the travel range.
   c. The lift unit shall be capable of fore and aft travel while recessed below floor.
3. Maximum depth below finished floor for the continuous recess insert, shall be 34 inches (864 mm)
4. The steel box insert shall have an open floor design, mounted off the concrete floor of the trench to allow for the collection, cleaning and drainage of all liquids and solids that accumulate in the trench.
5. The continuous recess shall have structurally shaped inter-locking extrusions that form a continuous movable cover that conveys along a top and bottom track and remains in the recess. These covers shall provide continuous closure over the trench as the carriage unit moves fore and aft. Flat plates that slide along the floor past the trench ends are not acceptable.
6. The covers shall be extruded with an anti-skid surface.
7. For service and repair, the cover plates shall be removable by sliding the covers apart to provide quick and easy access to the trench.
8. The movable carriage lifting unit shall be positioned by a bi-directional hydraulic drive motor mounted on the carriage to position it fore and aft to match the wheelbase.
9. The travel frame shall have a machined UHMW cover guide block at each end that tapers and self-aligns the covers about the centerline of the lift unit as the covers travel in and out of the recess.
10. The powered carriage drive shall have rack and gear engagement on both the left and right sides for smooth and even fore-aft travel without binding.
13. The rack shall be inverted and positioned under the load channel of the insert where it is protected so as not to collect dirt, grease etc.
14. The hydraulic drive motor shall freewheel such that, if the unloaded lift unit accidentally gets bumped, it will move freely without breaking any chains, racks or gears.
15. The hydraulic drive motor shall have a pre-set pressure switch to prevent fore-aft movement of a loaded lift unit carriage. The pressure switch will also prevent overdriving of the motor once it reaches either end of the travel frame.
16. No chains, sprockets or point-loading tapered rollers to power the movable carriage will be accepted.
17. Access holes for PVC conduits and wall fastener locations shall be provided in the walls of the continuous recess insert.
18. All hydraulic and compressed air service lines shall be fed from the control console to the insert through one PVC conduit.
19. Hose connections shall be made at a single bracket with bulkhead fittings. The hydraulic and pneumatic service lines from the bulkhead to the carriage shall be pre-piped at the factory.
20. All low voltage and intrinsically safe electrical components shall be fed to/from the control console to the lifting units via a rigid conduit that meets local requirements.
21. The concrete containment shall either be drained to the oil/water separator, or be sloped to a sump. In the case of the latter, any fluids collected in the sump shall be automatically evacuated and pumped into a waste container or into the oil/water drainage system.

F. Fixed Lifts:
1. The stationary lift shall be of the same design and construction as the moveable lift unit.
2. The base of the fixed lift shall be installed 34 inches (964 mm) below finished floor.
3. The rear lift unit shall be drop-in, and bolted in-place with eight (8) 3/4 inches (19 mm) anchors.

G. Hydraulic Systems:
1. System shall be comprised of two (2) high pressure, low volume, double-acting 7 inch (178 mm) diameter cylinders, one at each lifting unit, operating at greater than 2500 psi (17237 kPa).
2. Combined, the two cylinders shall only require 7 gallons (26.5 L) of AW 32 hydraulic oil for lifting to full height.
3. Each cylinder shall have a hose break velocity fuse (safety check valve) integrally mounted to prevent excessive loss of fluid from the cylinder.
4. Each double acting cylinder shall have both power-up and power-down capability to ensure smooth and efficient ascent/descent. Lifts designed to operate with power up, gravity down are not acceptable.
5. There shall be two hoses to each cylinder, one each for extend and retract.
6. The hoses shall be of steel reinforced construction and have O-ring Face Seal fittings throughout.
7. The lift shall be driven by matched gear pumps of U.S. manufacturer, readily available as an off-the-shelf component.
8. The lift shall be able to be raised from the locked position, and lowered from any position by means of a manual hand pump and manual override valves located in the control console.
9. High pressure seals shall be internal to the cylinder where they are protected from salt, dirt, corrosives etc. Low pressure seals for cylinders operating at 550 psi or less, which are exposed and vulnerable, are not acceptable.
10. The power unit shall be equipped with a replaceable filter element mounted in the tank top. The element must be a super fine, high efficiency, high capacity micro glass element to provide maximum service life with consistent removal efficiency.
11. The hoses feeding the front movable lift carriage shall be supported and contained by a cable carrier to prevent the hoses from dragging or tangling. The cable carrier shall be aligned and mounted to the carriage to ensure smooth operation of the carriage through its fore/aft travel.
H. Control Systems:
1. The control system shall conform to all current NEC, UL 201 and OSHA codes.
2. The control system shall be PLC operated and continuously monitor all operating functions and safety systems of the lifting units and movable carriage. The control system shall utilize intrinsically safe components that constantly monitor the lift system to ensure synchronized and equalized operation.
3. Audio and visual feedback controls that communicate operating fault codes and lockouts to the operator shall be part of the control system.
4. The electrical enclosure for control components shall be NEMA 4X rated and have following controls mounted on the front cover:
   a. Disconnect Switch, 3-phase.
   b. Power On-Off Switch.
   c. Push/Turn E-Stop Button.
   d. Push buttons for Lift Raise, Lower and Lock.
   e. Power On and fault code indicator lamps.
   f. Selector switch for synchronized, front, or rear lifting.
   g. Push buttons for hydraulic movable carriage drive.
5. Hardwired, redundant Emergency E-Stop circuit that de-energizes the motor outputs shall be standard.
7. Control console shall be equipped with a main power disconnect switch which interrupts all incoming power. Main power disconnect shall be lock-out capable.
8. Control door access shall be restricted.
9. Console access panels shall be easy to remove and install.
10. Automatic Wheel Base Positioning shall be standard.
    a. The control system shall be equipped with a programmable wheelbase positioning system. The system shall be capable of storing up to 16 different vehicle profiles. This positioning system will allow a user to select and position vehicles easier.
11. The control system shall prohibit horizontal movement of the moveable lifting assembly when the unit is raised 1" above finished floor.
12. The control system shall illuminate a blue light on the control panel when the lift has reached its fully retracted position (HOME). This light is an indicator that the lift stored and it is clear to move a vehicle into or out of a bay.

I. Safety Systems:
1. Each lifting unit shall be equipped with double lock jaw, gravity engaging mechanical locks with the first lock position at a minimum lock height of 14 inches (356 mm).
2. The mechanical locks shall be made of high strength T-1 steel
3. The control system shall monitor locks open.
4. Each lifting cylinder shall be equipped with a hydraulic velocity fuse to prevent excessive loss of fluid from the cylinder in the event of a hose failure.
5. All push buttons shall be of the momentary contact, dead man type.
6. The control systems and optional pendant shall be equipped with an emergency E-Stop button that de-energizes power to all outputs of the PLC. Re-activation of the control system requires resetting the E-stop the control system.
7. The control system shall be designed to prevent accidental use of the main operator controls when the pendant is connected. Any attempt to use main controls with pendant attached will result in an operator lock-out.
8. Control console shall monitor for low air to prevent operating the lift without sufficient air pressure to open locks.

J. Site Construction Requirements:
1. Lift pit shall not require a pit depth of more than 34 inches (864 mm).
2. No special rebar or elaborate pit construction shall be required (subject to soil conditions). Refer to manufacturer’s Equipment Foundation Requirement drawings for concrete construction details.
3. An embedded nosing angle (supplied by others) is required around the top perimeter of the lift pits.
4. There shall be no embedded lift components in the lift pit. No lift components shall need to be shipped to the construction site until after the lift pit is constructed.
5. The lift shall be drop-in, bolt-in-place design and shall be fully removable by simply unbolting and disconnecting hydraulic lines.
6. Drains or a sump shall be provided to allow the lift pit to be washed down.
7. The containment pit floor shall be sloped to a gravity drain(s) or sump that will collect all fluids. If a sump is used, then a pump shall be provided and installed that will automatically evacuate all fluids collected in the sump and eject them into the trench drain or waste collection system.
8. There shall be no electrical motors mounted in the lift pits.
9. Hydraulic hose from the console to lift shall be installed in PVC conduit to allow easy removal or replacement.
10. The control console can be located anywhere within line of sight on either the left or right side of the lift.
11. The lift components, lift base inserts and coverplates shall be flush with the finished floor when fully retracted.

K. Adapters:
1. The lift superstructure shall include both flip-up adapters and single pin, stackable axle engaging height extensions as standard equipment.
2. Flip-up adapters shall be built into the carriage and it shall not be necessary to use additional pinned, stackable adapters for axle engagement unless the axle is obstructed by leaf springs, steering components or accessory equipment.
3. It shall not be necessary to remove the flip-up adapters in order to use the protective cover plates over exposed floor openings (for OSHA compliance).
4. The accessory height extensions shall be constructed of lightweight machined aluminum to allow for easy placement and removal while under the vehicle. Stackable height adapters shall be anodized for resistance to corrosion and electrolysis.
5. On low profile vehicles, axles engagement shall be accomplished through the permanently attached folding adapters which can raise the vehicle in the lowered or raised position.
6. The base adapter shall be infinitely adjustable within the carriage. Each base adapter shall have an adjustable range of 11.5 inches (292 mm) for a total range of adjustment of 23 inches (584 mm) per carriage.
7. The carriage shall allow for a narrow setting of 7.5 inches (190 mm) for raising vehicles with sway bars, plow frames and other undercarriage adjustments. The maximum adjustment setting of adapters shall be 52 inches (1321 mm). It shall not be necessary to remove adapters to adjust the lifting points by more than 11.5 inches (292 mm) per adapter.
8. Stackable adapters shall pivot 360 degrees to permit the cradling of vehicle axles or frames either latitudinal or longitudinal. Lifting saddles shall be capable of trapping either the axle or the longitudinal frame members of the vehicle in accordance with the vehicle manufacturer's lifting requirements.
9. Removal of the base adapters can be accomplished by removing the stop bolt and sliding adapter off bolster.
10. Base adapter shall be restrained to prevent over extension.

L. Pendant Controls:
1. Provide an ergonomic industrial pendant, rated and Certified as Explosion Proof for use in NEC Class 1, Div 2, hazardous locations, 0 inches (0 mm) to 18 inches (457 mm) Above Finished Floor.
2. Pendant shall be constructed of a lightweight, double insulated thermoplastic with NEMA 4 rated industrial push buttons.
3. Pendant shall be connected to the control console through a multi-conductor, SO cable, military-style DIN connector and wired though intrinsically safe explosion proof barrier protection.

4. Pendant shall allow operator full function control of the lift, with the following:
   a. Push/Pull E-Stop Button
   b. Push buttons for Lift Raise, Lower and Lock
   c. Selector switch for Synchronized, Front, or Rear lifting
   d. Push buttons for fore and aft movable carriage drive

5. The control system and optional pendant shall be equipped with an emergency E-Stop button that de-energizes power to all outputs of the PLC. Re-activation of the control system requires resetting the E-stop and re-setting the control system.

6. The control system shall be designed to prevent accidental use of the main operator controls when the pendant is connected. Any attempt to use main controls with pendant attached will result in an operator lock-out.

PART 3 EXECUTION

3.1 EXAMINATION
   A. Take field measurements prior to fabrication.
   B. Do not begin installation until supporting structures have been properly prepared.
   C. If supporting structure preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION
   A. Install in strict accordance with manufacturer instructions and in proper relationship with adjacent construction.
   B. Installing contractor shall provide all additional materials required for complete installation as indicated on manufacturer's installation drawings.
   C. Install oil supply and return piping from new power unit to new lifts. All underground must have secondary containment.
   D. Install wiring and conduit from disconnect switch to new power unit.

3.3 TESTING AND INSTRUCTION
   A. At completion of installation operate unit under full loading and make adjustments as required for trouble-free operation.
   B. Test for proper operation and retest if necessary until satisfactory results are achieved.
   C. Instruction: Arrange for manufacturer’s representative to instruct Owner’s personnel in operation and maintenance procedures. Provide a minimum of 2 hours training for lift operation

3.4 PROTECTION
   A. Protect installed products until completion of project.
   B. Touch-up, repair or replace damaged products before Substantial Completion.
PART 4 DETAILS OF CONSTRUCTION

4.1 DETAIL DRAWINGS

A. The following details are a part of these specifications and shall be referred to for design requirements:

1. Rotary Lift Series 3 EFX60 drawings SPEC0353 (dated 8.24.16).

END OF SECTION
CONCRETE

A.) CONCRETE USED FOR THE BASE AND SIDE WALLS OF THE TRENCH SHALL HAVE A MINIMUM STRENGTH OF FV=0.000 psi AND A MAXIMUM STRAIN STRENGTH OF FV=0.000 psi WITH HEAVY AGGREGATE.

B.) CONCRETE USED FOR THE BASE AND SIDE WALLS OF EACH TRENCH SHALL BEA REACH ITS 28 DAY STRENGTH OF FV=0.000 psi BEFORE THE HOLES ARE DRILLED AND THE ANCHOR BOLTS INSTALLED.

C.) THE CONCRETE REINFORCEMENT SIZES AND HOLLOW BLOCK SPECIFICATIONS FOR THE SIDE WALLS AND BASE OF THE TRENCHES, NORMAL AND SEISMIC CONDITIONS, SHALL BE DETERMINED BY AN ARCHITECT OR ENGINEER AND SHALL BE DETERMINED CONSIDERING THE SOIL CONDITIONS AT THE SITE AND THE APPLIED LOADING, AS A MINIMUM, ONE HUNDRED POLE FEET (200 M) LONG TRENCHES SHALL BE USED WITH A MINIMUM GRADE OF 1% TO ALLOW FOR SPACING AND SPACING SHOWN IN THE DRAWINGS SHALL BE USED. SEEDS AND SPACING SHOWN ARE FOR SOIL BEARING CAPACITY OF NOT LESS THAN 2000 PSI.


F.) THE CONCRETE NOZZLE ANGLES SHOWN ON THE EQUATION FOUNDATION REQUIREMENT DRAWINGS ARE NOT INCLUDED WITH THE LIFT; THESE ITEMS MUST BE PROVIDED BY OTHERS.

LEVELING AND ANCHORING

A.) THE LIFT UNIT(S) ARE SUPPLIED WITH PRE-DRILLED BASE PLATES FOR FIELD DRILLED WEDGE BOLT CONCRETE ANCHORS, THE PRESCRIBED NUMBER OF BOLTS MUST BE INSTALLED AS THE ANCHORAGE IS RECOMMENDED TO PREVENT THE BASE PLATE FROM MOVING HORIZONTALLY. THE ROTARY LIFT INSTALLATION GUIDE PROVIDES DETAILED INSTRUCTIONS FOR INSTALLING THE LIFT AND PROPER PROCEDURE TO ACCURATELY LOCATE THE MACHINES IN THE TRENCH.

B.) SPECIFIC ANCHOR BOLTS WHICH ARE APPROVED BY ROTARY LIFT FOR ANCHORING THE LIFT(S) ARE LISTED ON THE APPROVED ANCHOR BOLT DATA SHEET, ONLY APPROVED ANCHOR BOLTS SHALL BE USED AND NO OTHER SUBSTITUTIONS MAY BE USED UNLESS SPECIFICALLY APPROVED IN ADVANCE BY WRITING TO ROTARY LIFT. ENGINEERING SUPPORT GROUP. THIS APPROVAL SHALL BE ON A CASE BY CASE BASIS ONLY. NON-PRODUCT APPROVED MAY NOT HAVE THE DOCUMENTED CAPACITY TO WITHSTAND THE FORCES EXERTED ON THE ANCHORAGE AND THEREFORE MAY NOT MEET THE AUTOMOTIVE LIFT INSTITUTE CERTIFICATION REQUIREMENTS.

C.) THE LIFT TRAVEL BOXES MUST BE INSTALLED LEVEL, FRONT TO REAR AND SIDE TO SIDE, THIS ADJUSTMENT IS ACCOMPLISHED BY THE USE OF FINGER SHIMS AVAILABLE FROM ROTARY LIFT.


F.) CARE MUST BE TAKEN TO ENSURE THE PROPER ELEVATION OF THE TRENCH BASE(S) ALONG THE LENGTH OF THE TRENCHES, FROM END TO END AND ACROSS THE LENGTHS OF THE TRENCHES. A MAXIMUM OF ONE INCH ADJUSTMENT IS PROVIDED IN THE MOBILE AND STATIONARY LIFTS TO ENSURE A FLUSH INSTALLATION. ADJUSTMENT IS ALSO PROVIDED TO ACCURATELY LEVEL THE MOBILE AND STATIONARY LIFTS FROM END TO END. ADJUSTMENT IS ACCOMPLISHED BY THE USE OF FINGER SHIMS AVAILABLE FROM ROTARY LIFT.

G.) CARE MUST BE TAKEN TO ENSURE THE PROPER WIDTH OF THE CONCRETE FOUNDATION FOR THE MOBILE LIFT(S), A MAXIMUM OF 10 INCH ADJUSTMENT IS PROVIDED BETWEEN THE MOBILE LIFT FRAME AND THE CONCRETE WALL, THE LATERAL POSITION OF THE MOBILE LIFT(S) IS ALSO ACCOMPANIED WITH FINGER SHIMS.

CONTROL PANEL AND SERVICE ROUTING

A.) THE CONTROL PANEL MUST BE LOCATED IN THE IMMEDIATE VICINITY OF THE LIFT, IT SHOULD BE PLACED FAR ENOUGH AWAY TO ALLOW APPROPRIATE SPACE AROUND THE LIFT AND TO PERMIT USE OF THE LIFT PLATFORM AND OTHER ACTIVITIES. THE CONTROL PANEL MAY BE ON ANY SIDE ON A CIRCULAR END OF THE LIFT.

B.) INSTALL ONE 1/4 INCH SCD 40 PVC PIPE AS HYDRAULIC LEVELING CONDUIT RUNNING FROM THE CONTROL PANEL TO THE SCAFFORDS ACROSS OPENINGS FROM THE MOBILE AND STATIONARY LIFT TRENCHES. A MAXIMUM OF TWO 50 GALLONS EMBOS MAY BE USED. THE EMBO TANKS SHOULD BE LIFT EMBOS WITH SIDE ENDS HABITUAL TO ALLOW THE FILLING HYDRAULIC HOSES. ADDITIONAL TO THE HYDRAULIC HOSES, LOCK ACTUATION AIR LINES AND LOCK SIGNAL AIR LINES ARE CARRIED IN THIS CONTROL. TEMPORARY PLUGS OR CAPS FOR ALL SERVICE CONDUIT OPENINGS MUST BE PROVIDED.

C.) TWO CONDUITS MAY BE PROVIDED UNDER THE FLOOR RUNNING FROM THE BUILDING POWER SUPPLY TO THE CONTROL PANEL. ONE CONDUIT MAY BE USED FOR POWER SUPPLY AND ONE MAY BE USED FOR SHOP AIR SUPPLY. ALTERNATIVELY, THESE SUPPLY CONDUITS MAY BE BROUGHT TO THE CONTROL PANEL LOCATED OVERHEAD, THESE CONDUITS SHOULD BE INSTALLED ACCORDING TO ALL LOCAL AND NATIONAL CODES. ANY REAR FOR THE LIFT SHALL HAVE A MINIMUM PRESSURE OF 150 PSI AND A MAXIMUM OF 130 PSI. AIR CONSUMPTION IS LESS THAN 100 PSI FOR THE LIFT UNIT. LOCK ACTUATION AND LOCK SIGNAL, THE AIR LINE MAY BE PROVIDED WITH SOLID PIPE ON PLASTIC TURNING TUBE A 200 CHASE CONDUIT.

D.) AN ELECTRICAL DISCONNECT ALONG WITH FUSES IS PROVIDED IN THE CONTROL CONSOLE.

E.) THE CONTROL SYSTEM REQUIRE A SEPARATE 200-2 200-4 GIVE THREE PHASE CIRCUIT. THEI CIRCUIT BREAKER SHALL BE USED TO HANDLE THE SYSTEM LOAD OF 28-30.1 AMPS WITH AN APPROPRIATE SAFETY FACTOR.

NOVAL BOXES

A.) THE MOBILE LIFT TRENCH BOXES ARE DELIVERED COMPLETELY ASSEMBLED, THIS ASSEMBLY INCLUDES THE TRENCH TRAVEL BOXES, THE LIFT SUPPORT CARRIAGE(S), THE LIFT CARRIAGE DRIVE(S) AND THE LIFT UNITS; THE ONLY COMPONENT NOT SHIPPED FULLY ASSEMBLED ARE THE TRENCH COVER, THESE ALUMINUM COVERS ARE NOT ASSEMBLED AND DELIVERED ASSEMBLY. THE FIXED LIFT BOX IS DELIVERED FULLY ASSEMBLED AND READY TO ANCHOR TO THE CONCRETE. THE CONTROL CONSOLE IS DESIGNED FULLY ASSEMBLED AND READY FOR FIELD SERVICE ATTACHMENTS.

FACTORY CONTACT INFORMATION

A.) CONTACT ROTARY LIFT, ENGINEERING SUPPORT GROUP FOR APPRAISAL PRIOR TO INSTALLATION OF ANY DEVIATIONS FROM THE REQUIREMENTS LISTED IN THIS DOCUMENT. INSTALLATIONS NOT IN ACCORDANCE WITH THE REQUIREMENTS OF THIS DOCUMENT MAY VOID LIFT WARRANTY, THE ROTARY LIFT, HEAVY DUTY ENGINEERING SUPPORT GROUP MAY BE REACHED BY A TOLL FREE NUMBER AT 1-855-465-4655 (1-855-465-4655).
HILTI HCA COIL TYPE
ANCHOR BOLT DESCRIPTION

THE HILTI HCA COIL ANCHOR IS A BOLT TYPE EXPANSION ANCHOR FOR USE IN CONCRETE.

PRODUCT FEATURES:
- REUSABLE TYPE ANCHORS
- THE NOMINAL DIAMETER OF THE ANCHOR IS THE SAME AS THE HOLE SIZE.
- BOLT TYPE ANCHOR ENABLES LOW PROFILE FASTENINGS
- PREASSEMBLED UNIT ALLOW QUICK PRODUCTION FASTENING
- UTILIZES A DISPOSABLE, LOW COST EXPANSION COIL WHICH MINIMIZES REUSE COSTS
- HEAT TREATED TO GRADE 5 SPECIFICATIONS, WHICH PROVIDES HIGH SHEAR LOAD CAPACITY
- BOLT TYPE ANCHORS WHICH MEET THE MECHANICAL PROPERTIES OF A GRADE 5 BOLT
- ANCHORS ARE ZINC PLACED IN ACCORDANCE WITH ASTM B833, SC1, TYPE III.

INSTALLATION:
- INSTALL BOLT TYPE ANCHORS IN HOLES DRILLED WITH HILTI CARBIDE TIPPED DRILL BITS OR DD-8 OR DD-C DIAMOND CORE BITS. INSTALL ANCHORS AS PER MANUFACTURER’S RECOMMENDATION.

NO OTHER ANCHOR BOLT TYPE OR MANUFACTURER SHALL BE USED UNLESS SPECIFICALLY APPROVED BY ROTARY LIFT IN WRITING PRIOR TO INSTALLATION. OTHER ANCHORS MAY NOT HAVE THE DOCUMENTED LOAD CARRYING CAPACITY TO MEET THE ALI CERTIFICATION REQUIREMENTS.

HILTI HCA COIL DIMENSIONS AND SPECIFICATIONS
MOVABLE BOX(Es)

<table>
<thead>
<tr>
<th>CATALOG NUMBER</th>
<th>SIZE</th>
<th>DRILL DIAMETER</th>
<th>MINIMUM DEPTH</th>
<th>TIGHTENING TORQUE</th>
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<tr>
<td>252017</td>
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<td>3 1/4</td>
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<tr>
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<td>3/4</td>
<td>3 1/4</td>
<td>185</td>
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</table>

WALL MOUNTED COVER SUPPORT BRACKETS, CONTROL CONSOLE, AND HOST BRACKET

<table>
<thead>
<tr>
<th>CATALOG NUMBER</th>
<th>SIZE</th>
<th>MINIMUM DEPTH</th>
<th>TIGHTENING TORQUE</th>
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</thead>
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<tr>
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<td>1 5/8</td>
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COIL ANCHORS REQUIRED

<table>
<thead>
<tr>
<th>TRAVEL BOX</th>
<th>EA.</th>
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</thead>
<tbody>
<tr>
<td>10' TRAVEL BOX</td>
<td>40</td>
</tr>
<tr>
<td>12' TRAVEL BOX</td>
<td>44</td>
</tr>
<tr>
<td>17' TRAVEL BOX</td>
<td>48</td>
</tr>
<tr>
<td>TANDEM</td>
<td>40</td>
</tr>
</tbody>
</table>

8 REQUIRED PER STATIONARY SCISSOR
NOTE 1:
PLACE REINFORCING BARS SUCH THAT THEY WILL NOT INTERFERE WITH THE PLACEMENT OF THE LIFT ANCHOR BOLTS.

NOTE 2:
EACH SHIM PACK FOR BOTH THE MOVABLE LIFT AND THE FIXED LIFT WILL BE FROM 3/8 TO 1 INCH THICK.

NOTE 3:
FINGER SHIMS ARE AVAILABLE FROM ROTARY LIFT IN THE THICKNESS OF 1/8 INCH, 1/4 INCH, 1/8 INCH, AND 1/8 OA, (.065) INCH. FINGER SHIMS ARE NOT INCLUDED WITH THE LIFT AND MUST BE ORDERED SEPARATELY.

SHIM LOCATION PLAN - CONTACT ROTARY LIFT FOR THE TRAVEL LENGTH SPECIFIC DRAWING.
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Nameplates.
   B. Tags.
   C. Pipe markers.

1.2 RELATED REQUIREMENTS
   A. Section 09 91 23 - Interior Painting: Identification painting.

1.3 REFERENCE STANDARDS

1.4 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
   C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
   D. Operation and Maintenance, O&M, Manual Data: Record actual locations of tagged valves, and provide laminated valve chart which includes valve tag numbers, location and function in chart form for placement into Operations and Maintenance Manual.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS
   A. Piping: Pipe markers.
   B. Backflow Prevention Device: Nameplates.
   C. Valves: Tags.

2.2 NAMEPLATES
   A. Description: Laminated three-layer plastic with engraved letters.
      2. Letter Height: 1/4 inch.
2.3 TAGS
   A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
   B. Valve Tag Chart: Typewritten letter sized list, plastic laminated. Typewritten letter size list to include applied tag function description, valve tag number and location.

2.4 PIPE MARKERS (EXPOSED PIPING)
   A. Comply with ASME A13.1.
   B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
   C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

PART 3 EXECUTION

3.1 PREPARATION
   A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION
   A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
   B. Install tags with corrosion resistant chain.
   C. Identify Backflow Prevention devices with plastic nameplates.
   D. Install plastic pipe markers in accordance with manufacturer's instructions.
      1. Identify service, flow direction, and pressure.
      2. Install in clear view and align with axis of piping.
      3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
   E. Identify valves in main and branch piping with tags.

   END OF SECTION
SECTION 22 07 19
PLUMBING PIPING INSULATION

PART 1  GENERAL

1.1  SECTION INCLUDES
A. Piping insulation.
B. Jackets and accessories.

1.2  RELATED REQUIREMENTS
A. Section 07 84 00 - Firestopping.
B. Section 22 10 05 - Plumbing Piping and Specialties: Placement of hangers and hanger inserts.
C. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

1.3  REFERENCE STANDARDS

1.4  SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

1.7 FIELD CONDITIONS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Maintain ambient conditions required by manufacturers of each product.

C. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER

A. Manufacturers:
   1. Armstrong

B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
   1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 850 degrees F.
   3. Maximum moisture absorption: 0.1 percent by volume.

C. Vapor Retarder Jacket: ASTM C1136 Flexible, Low Permeance Vapor Retarders for Thermal Insulation, Type II. Facing: 1 inch galvanized steel hexagonal wire mesh stitched on one face of insulation.

D. Vapor Barrier Lap Adhesive: Compatible with insulation.

E. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
2.3 EXPANDED POLYSTYRENE

A. Manufacturers:
   1. Armstrong.
   2. Certainteed Company.
   3. Manville Products
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C578; rigid closed cell.
   1. 'K' Value: 0.23 at 75 degrees F.
   2. Maximum Service Temperature: 165 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.
   4. Maximum Water Vapor Permeance: 5.0 perms.

2.4 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   1. Armstrong
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.

2.5 JACKETS

   1. Thickness: 0.020 inch sheet.
   2. Finish: Embossed.
   4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections and expansion joints.

E. Glass fiber insulated pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

F. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert Location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

G. Pipe Exposed in Wash Bay spaces (less than 10 feet above finished floor): Finish with aluminum jacket.

3.3 SCHEDULES

A. Plumbing Systems:
   1. All sizes of Domestic Cold Water Piping:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: As Noted.
         2) Thickness: 1 inch.
      b. Cellular Glass Insulation:
         1) Pipe Size Range: As Noted.
         2) Thickness: 1 inch.
      c. Expanded Polystyrene Insulation:
         1) Pipe Size Range: As Noted.
         2) Thickness: 1 inch.
      d. Cellular Foam Insulation:
         1) Pipe Size Range: As Noted.
         2) Thickness: 1 inch.
   2. Plumbing Vents Within 10 Feet of the Exterior:
      a. Fiber Glass Insulation with integral vapor retarder. All pipe sizes, 1 inch thick.
      b. Elastomeric Cellular Foam Insulation all pipe sizes, 1 inch thick.
      c. Cellular Glass Insulation. All pipe sizes, 1 inch thick.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe, pipe fittings, valves, connections and specialties for:
   1. Sanitary sewer systems.
   2. Domestic water systems.
   3. Flanges, unions, and couplings.
   4. Pipe hangers and supports.
   5. Valves.

1.2 RELATED REQUIREMENTS

A. Section 33 1300 - Disinfecting of Water Utility Distribution.
B. Section 07 84 00 - Firestopping.
C. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
D. Section 22 07 19 - Plumbing Piping Insulation.
E. Section 33 13 00 - Disinfecting of Water Utility Distribution.

1.3 REFERENCE STANDARDS

A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
C. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2013.
D. ASME B31.9 - Building Services Piping; 2014.
I. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
J. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2013.


Q. AWWA C651 - Disinfecting Water Mains; 2005.


U. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.


Y. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.


AA. National Sanitation Foundation: NSF 61 - Low lead pipe, Fittings and Valves.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, hangers, supports and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

C. Project Record Documents: Record actual locations of valves.

D. Hangers and Supports: Submit manufacturers catalog information including load capacity.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Valve Repacking Kits: One for each type and size of valve.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with State of New York, standards.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.6 REGULATORY REQUIREMENTS

A. Perform Work in accordance with State of New York plumbing code.

B. Conform to applicable code for installation of backflow prevention devices.
C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.8 FIELD CONDITIONS
A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

2.2
A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.3 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING
A. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
   2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
B. PVC Pipe: ASTM D2665 or ASTM D3034
   1. Fittings: PVC.

2.4 DRAIN PIPING, ABOVE GRADE
A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
B. Copper Tube: ASTM B306, DWV, Type L.
   2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.
C. PVC Pipe: ASTM D2665.
   1. Fittings: PVC.

2.5 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING
A. Ductile Iron Pipe: AWWA C151/A21.51, 3 inches and larger.
   1. Fittings: AWWA C110, ductile iron, standard thickness. Cement Mortar lining in conformance with AWWA C-104.

2.6 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tubing for pipe 2 1/2 inches and smaller: ASTM B 88 (ASTM B 88M), Type L (B), Drawn (H)
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.

B. Copper Tubing for pipe 3 inches and larger: ASTM B88, Type L (B), hard drawn, rolled grooved ends
   1. Fittings: ASTM B584 bronze sand castings, grooved ends.
   2. Joints: Grooved mechanical couplings meeting ASTM F1476.
      a. Housing Clamps: ASTM A395/A395M and ASTM A536 ductile iron, enamel coated, compatible with copper tubing sizes, to engage and lock designed to permit some angular deflection, contraction, and expansion.
      b. Gasket: Elastomer composition for operating temperature range from -30 degrees F to 180 degrees F.
      c. Accessories: Stainless steel bolts, nuts, and washers.
   3. Mechanically pressed fitting are allowed for this application.

2.7 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes [2] inches and Under:
   1. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Flanges for Pipe Size Over 2 inches:
   1. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
   2. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
   3. Gaskets: 1/16 inch thick preformed neoprene gaskets

2.8 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.

B. Plumbing Piping - Vent:
   2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:
   2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   3. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
   4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
7. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.

E. INSERTS
1. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

F. FLASHING
1. Metal Flashing: 26 gage thick galvanized steel.
2. Metal Counterflashing: 22 gage thick galvanized steel.
3. Lead Flashing:
   a. Waterproofing: 5 lb./sq. ft sheet lead.
   b. Soundproofing: 1 lb./sq. ft sheet lead.
5. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

G. FIRESTOPPING
1. Refer to Specification Section 07 84 00.

2.9 BALL VALVES
A. Manufacturers:
   1. Substitutions: See Section 01 60 00 - Product Requirements.
B. Construction, [3] inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, solder or threaded ends with union. Lead free.

2.10 WATER METER
A. Obtain meter from water service provider. If not possible, obtain approval of proposed meter from Director of Utility of Water Service Provider prior to water meter purchase.
B. Provide Lead Free water meter and remote reader as recommended by water service provider. Meter to register flow in Gallons. Contractor to install meter and reader. Install meter in accordance with AWWA M6, with isolating valves on inlet and outlet.

2.11 HYDRANT
A. Wall Hydrant, HYD-1: Non-freeze, self-draining type, hose thread spout and integral backflow preventer.

2.12 BACKFLOW PREVENTERS
A. Reduced Pressure Backflow Preventers, RPZ-1 (Domestic):
   2. Bronze body, with bronze internal parts and stainless steel springs.
3. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

4. Air gap per manufacturer's recommendation.

5. Provide testing and document of Certification.

B. BACKFLOW PREVENTERS

1. Reduced Pressure Backflow Preventers, RPZ-2 (Bus Wash):
   b. Bronze body, with bronze internal parts and stainless steel springs.
   c. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.
   d. Air gap per manufacturer's recommendation.
   e. Provide testing and document of Certification.

2.13 FLOOR SINK

A. Floor Sink, FS-1: 12 inch x 12 inch x 4 inch floor receptor, full grate, stainless steel interior and top, interior bottom dome strainer.

2.14 CLEANOUT

A. Cleanout, Interior Finished Floor Area, CO-1: cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round polished bronze scoriated cover.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly. Protect open ends with temporary plugs or caps.

C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.
F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

G. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.

H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

I. Provide support for utility meters in accordance with requirements of utility companies.

J. Install bell and spigot pipe with bell end upstream.

K. Install valves with stems upright or horizontal, not inverted. Refer to Section 22 05 23.

L. Install water piping to ASME B31.9.

M. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

N. Sleeve pipes passing through floors.

O. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

P. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping.

Q. Inserts:
   1. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   2. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   3. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   4. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

R. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Support horizontal piping as scheduled.
   3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   4. Place hangers within 12 inches of each horizontal elbow.
   5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   7. Provide copper plated hangers and supports for copper piping.
   8. Prime coat exposed steel hangers and supports.
   9. Support cast iron drainage piping at every joint.

S. Flashing
   1. Provide flexible flashing and metal counterflashing where piping penetrates roof.
   2. Flash vent pipe projecting 3 inches minimum above finished roof surface with lead worked 1 inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size.
   3. Flash floor sink in floor with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.

T. Sleeves
   1. Set sleeves in position in forms. Provide reinforcing around sleeves.
   2. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
3. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
4. Where piping penetrates floor, close off space between pipe and adjacent work with fire stopping, insulation and caulk airtight.

3.4 APPLICATION
A. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

3.5 TOLERANCES
A. Sanitary Drainage Piping: Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum on mains 4 inches and larger.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM
A. Disinfect water distribution system in accordance with Section 33 13 00.
B. Final water samples shall be sent to a New York State Department of Health approved testing lab and sample test results shall be submitted to A/E of record.
C. Prior to starting work, verify system is complete, flushed and clean.
D. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
E. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
F. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
G. Maintain disinfectant in system for 24 hours.
H. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
I. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
J. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.7 SERVICE CONNECTIONS
A. Provide new water service complete with approved reduced pressure backflow preventer and water meter.
B. Test drain waste and vent piping system in accordance with Plumbing Code of New York State.
C. Test backflow prevention device in accordance with ASSE 5013.
D. Test domestic water piping system in accordance with Plumbing Code of New York State.

3.8 SCHEDULES
A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe Size: 1/2 inches to 1-1/4 inches:
         1) Maximum Hanger Spacing: 6.5 ft.
         2) Hanger Rod Diameter: 3/8 inches.
      b. Pipe Size: 1-1/2 inches to 2 inches:
1) Maximum Hanger Spacing: 10 ft.
2) Hanger Rod Diameter: 3/8 inch.

c. Pipe Size: 2-1/2 inches to 3 inches:
1) Maximum Hanger Spacing: 10 ft.
2) Hanger Rod Diameter: 1/2 inch.

d. Pipe Size: 4 inches to 6 inches:
1) Maximum Hanger Spacing: 10 ft.
2) Hanger Rod Diameter: 5/8 inch.

2. Copper Tube, 1-1/4 inches and smaller
   b. Hanger rod diameter: 1/2 inch

3. Copper Tube, 1-1/2 inches and larger
   a. Maximum hanger Spacing: 10 ft.
   b. Hanger rod diameter: 1/2 inch

END OF SECTION
SECTION 22 15 00
GENERAL-SERVICE COMPRESSED-AIR SYSTEMS

PART 1  GENERAL

1.1  SECTION INCLUDES
A. Pipe and pipe fittings.

1.2  RELATED REQUIREMENTS
A. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Identification of piping system.

1.3  REFERENCE STANDARDS
B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
C. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2013.
H. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
I. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.

1.4  SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Project Record Documents: Operation and Maintenance, O&M, Manual Data: Record actual locations of tagged valves and equipment; include valve tag numbers in chart format.

1.5  QUALITY ASSURANCE
A. Perform Work in accordance with ASME B31.1 code for installation of piping systems and ASME Section IX for welding materials and procedures.
B. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.
C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
D. Installer: Company specializing in performing work of this section with minimum three years documented experience approved by manufacturer.
1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect piping from weather and construction traffic. Maintain factory packaging and caps in place until installation.

B. Deliver each length of piping with manufacturer's plugged or capped ends and keep sealed until installation.

C. Deliver fittings, valves, and other components in sealed containers and keep sealed until installation.

PART 2 PRODUCTS

2.1 PIPE AND PIPE FITTINGS

A. Steel Pipe: ASTM A53/A53M, Schedule 40 black.

B. Steel Pipe: ASTM A53/A53M Schedule 40, black, [cut] [rolled] grooved ends.
   2. Joints: Grooved mechanical couplings meeting ASTM F1476.
      b. Gasket: Elastomer composition for operating temperature range from 40 degrees F to 180 degrees F.
      c. Accessories: Stainless steel bolts, nuts, and washers.

C. Copper Tubing: ASTM B88, Type M, drawn.
   1. Fittings: ASME B16.18 cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
   3. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting temperature range 430 to 535 degrees F.

D. Copper Tubing: ASTM B88, Type M, drawn.
   2. Joints: Compression type made with manufacturer’s tool.

E. Copper Tubing: ASTM B88, Type K, annealed.

F. Copper Tubing: ASTM B88, Type M, hard drawn, rolled grooved ends.
   1. Fittings: ASME B16.18 cast copper alloy, or ASME B16.22 wrought copper and bronze.
   2. Joints: Grooved mechanical couplings meeting ASTM F1476.
      a. Housing Clamps: ASTM A395/A395M and ASTM A536 ductile iron, enamel coated, compatible with copper tubing sizes, to engage and lock designed to permit some angular deflection, contraction, and expansion.
      b. Gasket: Elastomer composition for operating temperature range from 40 degrees F to 180 degrees F.
      c. Accessories: Stainless steel bolts, nuts, and washers.

G. Stainless Steel Pipe: ASTM A312/A312M, 0.049 Wall, Type 304/304L, certified for use with compression joint system.
1. Fittings: Press type, precision cold drawn austenitic stainless steel fittings and couplings, with Nitrile O-ring seals. O-rings UL classified in accordance with NSF 61 for potable water service.

2. Joints: Compression type made with manufacturer’s tool.

2.2 VALVES

A. Ball Valves:
   1. Manufacturers:
      a. Crane Valve, North America.
      b. Milwaukee Valve Company Model.
      c. NIBCO, Inc.
      d. 2 inches and Smaller: MSS SP 110, Class 150, bronze, two piece body, type 316 stainless steel ball, full port, teflon seats, blow-out proof stem, solder or threaded ends with union, lever handle with balancing stops.

2.3 UNIONS AND COUPLINGS

A. Unions for Pipe 2 inches and Smaller:
   1. Ferrous Pipe: 150 psi malleable iron threaded unions.
   2. Copper Tube and Pipe: 150 psi bronze unions with soldered joints.
   3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
   4. Stainless Steel Piping: 300 psig, threaded type with compression type ends.

PART 3 EXECUTION

3.1 INSTALLATION - ABOVE GROUND PIPING - COMPRESSED AIR SYSTEMS

A. Make air cock and drain connection on horizontal casing.

B. Install valved drip connections at low points of piping system. Refer to Section 22 05 23.

C. Install takeoffs to outlets from top of main, with shut off valve after take off. Slope take off piping to outlets.

D. Install compressed air couplings, female quick connectors, and pressure gages.

E. Install tees instead of elbows at changes in direction of piping. Fit open end of each tee with plug.

F. Cut pipe and tubing accurately and install without springing or forcing.

G. Slope piping in direction of flow.

H. Install manual shut off valves with stem vertical and accessible for operation and maintenance.

I. Identify piping system and components. Refer to Section 22 05 53.

J. Stainless Steel Pipe with press-type Joints: Square cut ends to plus or minus 0.030 inches tolerance. Remove burrs and clean ends. Fully insert tubing into fitting and mark pipe ends to ensure full insertion into coupling or fitting during assembly. Press joint using manufacturer’s tool with proper sized jaw.

K. Copper Pipe with press-type Joints: Remove burrs and clean ends. Fully insert tubing into fitting and mark pipe ends to ensure full insertion into coupling or fitting. Check alignment against mark to assure tubing is fully inserted. Press joint using manufacturer’s tool.
3.2 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Compressed Air Piping Leak Test: Prior to initial operation, clean and test compressed air piping in accordance with ASME B31.1.

C. Repair or replace compressed air piping as required to eliminate leaks, and retest to demonstrate compliance.

D. Verify for atmospheric pressure in piping systems, other than system under test.

E. Test system with dry compressed air or dry nitrogen with test pressure in piping system at 50 psi.

F. Cap and seal ends of piping when not connected to mechanical equipment.

G. CLEANING
   1. Blow systems clear of free moisture and foreign matter.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. General requirements applicable to all components and systems included in Electric Work Prime Contract
   B. Circuit Breakers
   C. Disconnects

1.2 RELATED REQUIREMENTS
   A. Section 01 30 00 - Administrative Requirements:
   B. Section 01 70 00 - Execution and Closeout Requirements: Additional requirements for alterations work.
   C. Section 08 31 00 - Access Doors and Panels

1.3 QUALITY ASSURANCE
   A. Codes and Standards: Comply with all applicable Federal, State and Local Building and Electrical Codes, Laws, Ordinances, and Regulations, and comply with all applicable NFPA, National Electrical Code and Utility Company requirements and regulations. Provide Underwriter’s Laboratory Seal on all materials.
   B. Permits and Inspections: Obtain all approvals, tests, and inspections required by Architect, Engineer, Local Electrical Inspector, agent or agency specified in Project Manual, or National, State, or Local Codes and Ordinances.
   C. Schedule electrical inspection by an agency acceptable to the local authority having jurisdiction and submit final inspection certificate to Architect.
   D. Electrical Components, Devices, and Accessories: UL Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

1.4 SUBMITTALS
   A. Comply with requirements of SECTION 01 30 00 - Submittal Procedures and as modified below. Refer to submittal listing in each section for specific items required.
   B. Shop Drawings
   C. Electric Layouts: Submit detailed drawings showing exact sizes and locations for approval before beginning work.
   D. Samples
   E. Factory-Finished Surfaces: On all submittals, indicate standard factory color. Where more than one color is available, selection made by Architect from manufacturer’s full range of colors.
F. Contract Closeout Submittals: Comply with requirements of SECTION 01 78 00, including submission of operating and maintenance instructions as item in "Electric Work Instructions" manual described in that section.

PART 2 PRODUCTS

2.1 CIRCUIT BREAKERS ADDED TO PANELBOARD SHALL BE BOLT ON TYPE, UL LISTED FOR THE PANELBOARD INSTALLED WITHIN. AIC SHALL MATCH EXISTING BREAKERS.

PART 3 EXECUTION

3.1 CUTTING AND PATCHING
   A. Furnish and install all sleeves, inserts, panels, raceways, boxes, etc., ahead of general construction work and maintain Contractor personnel at Site during installation of general construction work to be responsible for and to maintain these items in position.
   B. Do not cut waterproofed floors or walls for admission of any equipment or materials and do not pierce any structural members without written permission.

3.2 CLEANING AND REPAIR
   A. Clean and repair existing materials and equipment that remain or that are to be reused.
   B. Provide full inspection of exposed finishes.
   C. Remove burrs, dirt, and construction debris.
   D. Repair damaged surfaces including chips, scratches, and abrasions. Damp Rag clean all electrical equipment, panels, boxes, and accessories.

END OF SECTION
SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Single conductor building wire.

1.2 RELATED REQUIREMENTS

1.3 REFERENCE STANDARDS
C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
E. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

1.4 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.1 CONDUCTOR AND CABLE APPLICATIONS
A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
C. All Locations: Use only building wire with Type THHN/THWN insulation in raceway.
D. 600V insulation
E. Use stranded copper conductors.

2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS
A. Provide products that comply with requirements of NFPA 70.
B. Provide products listed, classified, and labeled as suitable for the purpose intended.
C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
D. Comply with NEMA WC 70.
E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
      a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
   3. Color Code:

2.3 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
   1. Feeders and Branch Circuits:
      b. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
   1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

E. Conductor: Copper.

F. Insulation Voltage Rating: 600 volts.

G. Insulation: NFPA 70, Type THHN/THWN.

2.4 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

2.5 WIRING ACCESSORIES

A. Electrical Tape:
   1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
   2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

C. Cable Ties: Material and tensile strength rating suitable for application.

D. Split Bolt Connectors:

E. Solderless Pressure Connectors:

F. Spring Wire Connectors:

G. Compression Connectors:
PART 3  EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that raceway installation is complete and supported.

E. Verify that field measurements are as shown on the drawings.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.3 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

C. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

D. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

E. Install conductors with a minimum of 12 inches of slack at each outlet.

F. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

G. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

H. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminants. Do not use wire brush on plated connector surfaces.
I. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

J. Insulate ends of spare conductors using vinyl insulating electrical tape.

K. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

L. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

M. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

N. Install wire and cable securely, in a neat and workmanlike manner, as specified in NECA 1.

O. Route wire and cable as required to meet project conditions.
   1. Wire and cable routing indicated is approximate unless dimensioned.
   2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
   3. Include wire and cable of lengths required to install connected devices within 10 ft of location shown.

P. Use wiring methods indicated.

Q. Pull all conductors into raceway at same time.

R. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

S. Protect exposed cable from damage.

T. Support cables above accessible ceiling, using spring metal clips or metal or plastic cable ties to support cables from structure. Do not rest cable on ceiling panels.

U. Use suitable cable fittings and connectors.

V. Neatly train and lace wiring inside boxes, equipment, and panelboards.

W. Clean conductor surfaces before installing lugs and connectors.

X. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

Y. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

Z. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

AA. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

AB. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).
B. Aluminum rigid metal conduit (RMC).
C. Liquidtight flexible metal conduit (LFMC).
D. Electrical metallic tubing (EMT).
E. Conduit fittings.
F. Conduit, fittings and conduit bodies.

1.2 RELATED REQUIREMENTS

A. Section 26 05 37 - Boxes.

1.3 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.
B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.
C. ANSI C80.5 - American National Standard for Electrical Rigid Aluminum Conduit (ERAC); 2005.
D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
I. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
L. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
M. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

1.4 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.
B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.
C. Materials and equipment shall be listed and labeled by a nationally recognized testing laboratory such as UL. Work shall be performed in accordance with NFPA 70 and be inspected by a local Authority Having Jurisdiction (AHJ). Contractor shall provide certificate of inspection prior to final payment request.

PART 2 PRODUCTS

2.1 CONDUIT APPLICATIONS

A. Conduit applications:
   1. Within Slab on Grade for stub ups to lift controllers: Galvanized Rigid Conduit.
   2. Up to 10 ft AFF in maintenance garage: Galvanized rigid conduit.
   3. Above 10 ft AFF in garage and in electric room: EMT
   4. In wash bay: Rigid Aluminum Conduit
   5. Final Connections to vibrating equipment in wash bay: LFMC

2.2 CONDUIT REQUIREMENTS

A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
B. Provide products listed, classified, and labeled as suitable for the purpose intended.
C. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.4 ALUMINUM RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.
B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted. Use stainless steel screws on aluminum pipe straps.

2.5 LIQUID TIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.

C. Description: Interlocked steel construction with PVC jacket.

D. Fittings: NEMA FB 1.

2.6 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use compression (gland) or set-screw type.
      a. Do not use indenter type connectors and couplings.
   4. Connectors and Couplings: Use compression (gland) or set-screw type.

C. Description: ANSI C80.3; galvanized tubing.

D. Fittings and Conduit Bodies: NEMA FB 1; steel set screw type.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.

E. Conduit Support:
   1. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

F. Connections and Terminations:
   1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
   2. Use suitable adapters where required to transition from one type of conduit to another.
   3. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
   4. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
   5. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

G. Penetrations:
   1. Make penetrations perpendicular to surfaces unless otherwise indicated.
   2. Conceal bends for conduit risers emerging above ground.

H. Provide grounding and bonding in accordance with Section 26 05 26.
3.2 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

B. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.

C. Install steel conduit as specified in NECA 101.

D. Arrange supports to prevent misalignment during wiring installation.

E. Arrange conduit to maintain headroom and present neat appearance.

F. Route exposed conduit parallel and perpendicular to walls.

G. Maintain adequate clearance between conduit and piping.

H. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.

I. Cut conduit square using saw or pipecutter; de-burr cut ends.

J. Bring conduit to shoulder of fittings; fasten securely.

END OF SECTION
SECTION 26 05 37
BOXES

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
B. Pull and junction boxes.

1.2 REFERENCE STANDARDS
A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
B. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
C. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
E. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.1 BOXES
A. General Requirements:
1. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
2. Provide products listed, classified, and labeled as suitable for the purpose intended.
3. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
4. Provide grounding terminals within boxes where equipment grounding conductors terminate.
B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use cast aluminum boxes where aluminum rigid metal conduit is used.
4. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
5. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.

2.2 PULL AND JUNCTION BOXES
A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
B. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
   1. Material: Cast aluminum.

PART 3 EXECUTION

3.1 INSTALLATION
   A. Install products in accordance with manufacturer's instructions.
   B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
   C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
   D. Box Supports:
   E. Install boxes plumb and level.
   F. Install boxes as required to preserve insulation integrity.
   G. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
   H. Provide grounding for all boxes
   I. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.
   J. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
   K. Use cast outlet box in exterior locations exposed to the weather and wet locations.

3.2 ADJUSTING
   A. Adjust flush-mounting outlets to make front flush with finished wall material.
   B. Install knockout closures in unused box openings.

3.3 PROTECTION
   A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.
   B. Clean exposed surfaces and restore finish.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

1.2 RELATED REQUIREMENTS:
   A. Section 31 23 23 - Fill.
   B. Section 32 92 19 - Seeding.

1.3 REFERENCE STANDARDS
   B. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
   C. ASTM D 1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).
   D. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.4 SUBMITTALS
   A. Section 01 30 00 - Administrative Requirements: Submittal Procedures
   B. Samples: Submit, in air-tight containers, 10 lbs sample of each type of fill to testing laboratory.
   C. Materials Source: Submit name of imported materials source.
   D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE
   A. Furnish each subsoil and topsoil material from a single source throughout the Work.

PART 2 PRODUCTS

2.1 SUBSOIL MATERIALS
   A. Excavated and re-used material or imported select borrow.
   B. Graded.
   C. Free of lumps larger than 3 inch, rocks larger than 2 inch, and debris.
   D. Conforming to ASTM D 2487.

2.2 TOPSOIL MATERIALS
   A. On-site Topsoil:
1. Excavated and re-used material.
2. Graded.
3. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds, and foreign matter.
   a. Screening: Single screened.

B. Imported Topsoil
1. Imported borrow.
2. Friable loam.
3. Reasonably free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds, and foreign matter.
   a. Screening: Double screened.
4. Acidity range (pH) of 5.5 to 7.5
5. Containing minimum of 4 percent and maximum of 25 percent inorganic matter.
6. Conforming to ASTM D 2487.
7. Limit decaying matter to 5 percent of total content by volume.

2.3 SOURCE QUALITY CONTROL
A. Section 01 40 00 - Quality Requirements: Testing and analysis of soil material.
D. When tests indicate materials do not meet specified requirements, change material and retest.
E. Furnish materials of each type from the same source throughout the Work.

PART 3 EXECUTION

3.1 EXCAVATION
A. Excavate subsoil and topsoil from areas designated. Strip topsoil to full depth of topsoil in designated areas.
B. Stockpile excavated material meeting requirements for subsoil and topsoil materials.
C. Remove excess excavated materials, subsoil, and topsoil not intended for reuse from site.
D. Remove excavated materials not meeting requirements for subsoil and topsoil materials from site.

3.2 STOCKPILING
A. Stockpile materials on site as designated by Architect.
B. Stockpile in sufficient quantities to meet Project schedule and requirements.
C. Separate differing materials with dividers or stockpile apart to prevent mixing.
D. Stockpile topsoil 8 feet high maximum.
E. Prevent intermixing of soil types or contamination.
F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
G. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching until disposed of.

3.3 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

B. When borrow area is indicated, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION
SECTION 31 05 16
AGGREGATES FOR EARTHWORK

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Coarse aggregate materials.
B. Fine aggregate materials.
C. Blended aggregate materials.

1.2 RELATED SECTIONS:
A. Section 31 05 13 - Soils for Earthwork.
B. Section 31 22 00 - Grading.
C. Section 31 23 16 - Excavation.
D. Section 31 23 23 - Fill.

1.3 REFERENCES
A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54kg (10 lb) Rammer and a 457 mm (18 in) Drop.
D. ASTM D 1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lb/ft3).
E. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.4 SUBMITTALS
A. Section 01 30 00 - Administrative Requirements: Submittal Procedures.
B. Samples: Submit, in air-tight containers, 10 lb sample of each type of fill to testing laboratory.
C. Materials Source: Submit name of imported materials suppliers.
D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE
A. Furnish each aggregate material from a single source throughout the Work.
B. Perform Work in accordance with NYSDOT standards.
2.1 COURSE AGGREGATE MATERIALS

A. CRUSHED STONE
   Crushed stone shall be a mixture of 50% No. 1 & 2 crushed stone meeting all requirements in Section 703-02 of the NYSDOT Standard Specification or conform to AASHTO No. 57 coarse stone aggregate meeting all requirements in Section 703.3 of PennDOT Form 408 Specifications.

B. GRANULAR FILL
   Granular fill shall meet all requirements specified for Type 4 Subbase in Section 304-2.02 of the NYSDOT Standard Specification or No. 2RC aggregate in Section 703.3 of PennDOT Form 408 Specification.

C. GRAVEL (STRUCTURAL) FILL
   Gravel fill shall meet all requirements for Type 3 Subbase in Section 304-2.02 of the NYSDOT Standard Specification or Item 2A in Section 703.3 of PennDOT Form 408 Specification.

2.2 FINE AGGREGATE MATERIALS

A. CUSHION SAND
   Cushion sand shall consist of clean, hard, durable, uncoated particles, free from lumps of clay and all deleterious substances. It shall meet the following gradation requirements and shall be approved by the Engineer before use.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 50</td>
<td>0-35</td>
</tr>
<tr>
<td>No. 100</td>
<td>0-10</td>
</tr>
</tbody>
</table>

B. PEA STONE
   Stone meeting all requirements in Section 605-2.02 of the NYSDOT Standard Specification; free of shale, clay, friable material and debris. Pea stone shall consist of clean, durable rock of uniform quality.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch</td>
<td>100</td>
</tr>
<tr>
<td>1/2 inch</td>
<td>30-100</td>
</tr>
<tr>
<td>1/4 inch</td>
<td>0-30</td>
</tr>
<tr>
<td>No. 10</td>
<td>0-10</td>
</tr>
<tr>
<td>No. 20</td>
<td>0-5</td>
</tr>
</tbody>
</table>

2.3 BLENDED AGGREGATE MATERIAL

A. CRUSHER RUN
   Crusher run shall meet all requirements for Type 2 subbase in Section 304-2.02 of the NYSDOT Standard Specification or crushed No. 2A coarse aggregate in Section 703.3 of PennDOT Form 408 Specification.

B. SELECT NATIVE FILL
General: On-site material shall be considered select fill if it is free from organic materials and debris, meets the following gradation and soundness requirements, and is approved by the Architect.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 40</td>
<td>0-70</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-15</td>
</tr>
</tbody>
</table>

Soundness: Less than 30 percent magnesium sulfate soundness loss.

C. UNCLASSIFIED FILL
On-site material used as unclassified fill shall be free of stones larger than 8 inches in the largest dimension, shall be free of organic materials and debris, and shall be approved by the Architect.

2.4 SOURCE QUALITY CONTROL
A. Section 01 40 00 - Quality Requirements: Testing and inspection services.
D. When tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.1 EXCAVATION
A. Excavate aggregate materials from on-site locations as indicated on drawings or designated by Architect as specified in Section 31 23 16 - Excavation.
B. Stockpile excavated material meeting requirements for coarse aggregate and fine aggregate materials.
C. Remove excess excavated, coarse aggregate, and fine aggregate materials not intended for reuse from site.
D. Remove excavated materials not meeting requirements for coarse aggregate and fine aggregate materials from site.

3.2 STOCKPILING
A. Stockpile materials on site at locations indicated or designated by Architect.
B. Stockpile in sufficient quantities to meet Project schedule and requirements.
C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.
D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
E. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching until disposed of.
3.3 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

B. When borrow area is indicated, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION
P1 GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Dewatering system.
   2. System operation and maintenance.
   3. Water disposal.
B. Related Sections:
   1. Section 31 05 16 - Aggregates for Earthwork: Filter sand.
   2. Section 31 23 16 - Excavation: Excavation for structures below ground water table.

1.2 REFERENCES
A. ASTM International:

1.3 DEFINITIONS
A. Dewatering includes the following:
   1. Lowering of ground water table and intercepting horizontal water seepage to prevent ground water from entering excavations trenches.
   2. Disposing of removed water.

1.4 SYSTEM DESCRIPTION
A. Provide dewatering system to permit Work to be completed on dry and stable subgrade.
   1. Install wells to dewater and relieve hydrostatic pressure within strata.
B. Furnish standby equipment stored at Project site and ready for immediate use upon failure of dewatering equipment. Provide the following standby equipment, but not less than one of each type:
   1. Dewatering Centrifugal Pumps: 50 percent.
   2. Dewatering Turbine Pumps: One for every 5 installed pumps.
   3. Pump Power Units: 50 percent.
   4. Dewatering Jet Eductor Pressure Pumps: 50 percent.
   5. Portable Electric Generators: 50 percent.
   6. Commercial Electric Power: 100 percent standby electric generating equipment.

1.5 PERFORMANCE REQUIREMENTS
A. Design dewatering systems to:
   1. Lower water table within areas of excavation to elevation minimum 4 feet below bottom of excavation to permit Work to be completed on dry and stable subgrade.
   2. Relieve hydrostatic pressures in confined water bearing strata below excavation to eliminate risk of uplift or other instability of excavation.
   3. Prevent damage to adjacent properties, buildings, structures, utilities, and facilities from construction operations.
   4. Prevent loss of fines, quick condition, or softening of foundation subgrade.
   5. Maintain stability of sides and bottoms of excavations and trenches.
1.6 SUBMITTALS
A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
B. Shop Drawings: Signed and sealed by professional engineer.
   1. Indicate dewatering system layout, well depths, well screen lengths, dewatering pump locations, pipe sizes and capacities, grades, filter sand gradations, surface water control devices, valves, and water disposal method and location.
   2. Indicate primary and standby power system location and capacity.
   3. Indicate layout and depth of monitoring wells and flow measuring devices for system performance measurement.
   4. Include detailed description of dewatering and monitoring system installation procedures and maintenance of equipment.
   5. Include description of emergency procedures to follow when problems arise.
C. Product Data: Submit data for each of the following:
   1. Dewatering Pumps: Indicate sizes, capacities, priming method, motor characteristics.
D. Design Data: Signed and sealed by professional engineer.
   1. Indicate design values, analyses, and calculations to support design.
   2. Include description and profile of geology, soil, and groundwater conditions.
E. Field Reports: Test and monitoring reports as specified in Field Quality Control article.

1.7 CLOSEOUT SUBMITTALS
A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
B. Project Record Documents: Record actual locations and depths of capped wells and piping abandoned in place.

1.8 QUALITY ASSURANCE
A. Comply with authorities having jurisdiction for the following:
   1. Drilling and abandoning of wells used for dewatering systems.
   2. Water discharge and disposal from pumping operations.
B. Obtain permit from EPA under National Pollutant Discharge Elimination System (NPDES), for storm water discharge from construction sites.
C. Perform Work in accordance with NYSDOT standards.

1.9 QUALIFICATIONS
A. Installer: Company specializing in performing work of this section documented experience and responsible for design, operation, and maintenance of dewatering system.
   1. Assume sole responsibility for dewatering and surface water control systems and for loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by ground water control operations.
B. Design, install, and monitor operation of dewatering under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of New York.

1.10 PRE-INSTALLATION MEETINGS
A. Section 01 30 00 - Administrative Requirements.
B. Convene minimum one week prior to commencing work of this section.
1.11 COORDINATION
A. Section 01 30 00 - Administrative Requirements.
B. Coordinate work to permit the following construction operations to be completed on dry stable substrate.
   1. Excavation for structures specified in Section 31 23 16.

1.12 P2 PRODUCTS

1.13 DEWATERING EQUIPMENT
A. Select dewatering equipment to meet specified performance requirements.

1.14 MONITORING EQUIPMENT
A. Flow Measurement: Furnish devices as follows:
   1. Pitometer installed on discharge of pipe of from each well.
   2. Pitometer installed to measure flow from entire dewatering system.

1.15 ACCESSORIES
A. Valves and Fittings: Furnish valves and fittings to isolate each well from header pipe and to prevent loss of pump prime.
B. Grout: Mixture of portland cement and bentonite clay or sand suitable for sealing abandoned wells and piping.

1.16 P3 EXECUTION

1.17 EXAMINATION
A. Section 01 30 00 - Administrative Requirements.
B. Call Local Utility Line Information service (UFPO) at (800) 962-7962 not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

1.18 PREPARATION
A. Protect existing adjacent buildings, structures, and improvements from damage caused by dewatering operations.

1.19 DEWATERING SYSTEM
A. Install dewatering system in accordance with shop drawings.
B. Locate system components to allow continuous dewatering operations without interfering with installation of permanent Work and existing public rights-of-way, sidewalks, and adjacent buildings, structures, and improvements.
C. Install self jetting well points in sizes indicated by driving and jetting to depth indicated.
D. While drilling and installing well keep bore hole filled with natural or organic drilling fluid. Bentonite clay drilling fluid is not permitted.
E. Attach well screen to riser pipe. Attach centralizers to riser pipe at maximum 20 feet spacing to keep screen and riser centered in bore hole. Insert well screen and riser pipe into well to elevation indicated.

F. Install sand filter surrounding well screen and to minimum 2 feet above top of well screen.

G. Develop wells by over pumping to remove clay, silt, and sand from well screen and immediate vicinity of bore hole.

H. Test well for proper water flow through well screen and pumping rate for dewatering system operation. Repeat development until well meets performance requirements.

I. Cover and seal top of well until pump is installed.

J. Install pumps in accordance with manufacturer’s instructions.

K. Install Work in accordance with NYSDOT standards.

1.20 SYSTEM OPERATION AND MAINTENANCE

A. Operate dewatering system continuously until backfilling is complete.

B. Provide 24-hour supervision of dewatering system by personnel skilled in operation, maintenance, and replacement of system components.

C. Conduct daily observation of dewatering system and monitoring system. Make required repairs and perform scheduled maintenance.

D. Fill fuel tanks before tanks reach 25 percent capacity.

E. Start emergency generators at least twice each week to check operating condition.

F. When dewatering system cannot control water within excavation, notify Architect/Engineer and stop excavation work.
   1. Supplement or modify dewatering system and provide other remedial measures to control water within excavation.
   2. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.

G. Modify dewatering and surface water control systems when operation causes or threatens to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells.

H. Correct unanticipated pressure conditions affecting dewatering system performance.

I. Do not discontinue dewatering operations without Architect/Engineer’s approval.

1.21 WATER DISPOSAL

A. Discharge water into drainage channels and settling basins.

1.22 SYSTEM REMOVAL

A. Remove dewatering system after dewatering operations are discontinued.

B. Cut off and cap abandoned wells minimum 36 inches below completed subgrade elevation.

C. Fill abandoned piping with grout.

D. Repair damage caused by dewatering and surface water control systems or resulting from failure of systems to protect property.
1.23 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements and 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Monitor ground water discharge for contamination while performing pumping in vicinity of potentially contaminated sites. Sample and test water weekly for contaminants.

C. Survey existing adjacent buildings, structures, and improvements weekly to detect movement in comparison to original elevations during dewatering operations.
   1. Notify Architect/Engineer immediately of measured movement.

D. Submit initial installation reports including the following:
   1. Installation and development reports and pumps.
   2. Initial dewatering flow rates.

E. Submit weekly monitoring reports including the following:
   1. Dewatering flow rates.
   2. Test reports of discharge water analysis.
   3. Maintenance records for dewatering and surface water control systems.

END OF SECTION
SECTION 31 23 23
FILL

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Filling, backfilling, and compacting for footings, slabs-on-grade, paving, and site structures.
B. Proof Rolling of filled and excavated roadways.
C. Backfilling and compacting for utilities outside the building to utility main connections.
D. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.2 RELATED REQUIREMENTS
A. Section 03 30 00 - Cast-in-Place Concrete.
B. Section 31 05 13 - Soils for Earthwork: Soils for fill
C. Section 31 05 16 - Aggregated for Earthwork: Aggregate for fill
D. Section 31 22 00 - Grading: Site grading.
E. Section 31 23 16 - Excavation: Removal and handling of soil to be re-used.
F. Section 31 23 16.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

1.3 DEFINITIONS
A. Finish Grade Elevations: Indicated on drawings.
B. Subgrade Elevations: 6 inches below finish grade elevations indicated on drawings, unless otherwise indicated.

1.4 REFERENCE STANDARDS
B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2012.
D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN/m³)); 2012.
F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.
1.5 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Samples: 10 pounds sample of each type of fill; submit in air-tight containers to testing laboratory.
   C. Materials Sources: Submit name of imported materials source.
   D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.
   E. Compaction Density Test Reports.
   G. Manufacturer’s Certificate: Certify Products meet or exceed specified requirements.

PART 2 PRODUCTS

2.1 FILL MATERIALS
   A. General Fill - Fill Type on site soil: If it conforming to State of New York DOT type 4 standard.
   B. Concrete for Fill: As specified in Section 03 30 00.
   C. Topsoil: See Section 31 05 13.
   D. Satisfactory soil materials are defined as those complying with ASTM D 2487 soil classification groups GW, GP, GM, SM, SW, and SP.
   E. Unsatisfactory soil materials are defined as those complying with ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.
   F. Subsoil Fill: as specified in Section 31 05 13.
   G. Structural Fill: as specified in Section 31 05 13 and 31 05 16.
   H. Granular Fill: as specified in Section 31 05 16.
   I. Drainage Fill: Material shall consist of crushed stone, sand, gravel or screened gravel. The soundness of the material shall be tested and shall have a loss not exceeding 20 percent by weight after four (4) cycles of Magnesium Sulphate Soundness Test (NYS DOT 605-202, Under drain Filter Type 1 as follows:

<table>
<thead>
<tr>
<th>U.S. Sieve No.</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch</td>
<td>100</td>
</tr>
<tr>
<td>1/2 inch</td>
<td>30-100</td>
</tr>
<tr>
<td>1/4 inch</td>
<td>0-30</td>
</tr>
<tr>
<td>No. 10</td>
<td>0-10</td>
</tr>
<tr>
<td>No. 20</td>
<td>0-5</td>
</tr>
</tbody>
</table>

J. Backfill Material: Naturally or artificially graded mixture of sand, natural or crushed stone or gravel conforming to NYS DOT Item 304-2.02, Type 4 as follows:

<table>
<thead>
<tr>
<th>U.S. Sieve No.</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 inch</td>
<td>100</td>
</tr>
</tbody>
</table>
2.2 ACCESSORIES
   A. Geotextile Fabric: Non-biodegradable, woven, fabric; 600X manufactured by Mirafi. Filter fabric shall be Mirafi 140N or approved equal.
   B. Geotextile Fabric for Perforated Drain Pipe: Non-biodegradable, non-woven, fabric, four (4) ounces per square yard.

2.3 SOURCE QUALITY CONTROL
   A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of soil material.
   B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
   C. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.1 EXAMINATION
   A. Verify that survey bench marks and intended elevations for the Work are as indicated.
   B. Identify required lines, levels, contours, and datum locations.
   C. See Section 31 22 00 for additional requirements.
   D. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
   E. Verify structural ability of unsupported walls to support imposed loads by the fill.
   F. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.

3.2 PREPARATION
   A. Scarify subgrade surface to a depth of 8 inches.
   B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill and compact to density equal to or greater than requirements for subsequent fill material.
   C. Compact subgrade to density requirements for subsequent fill material.
   D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.
   E. The subgrade and subbase shall be proof rolled. Contact engineer or owners representative 24 hours before testing. If subgrade stabilization or undercutting is designed for the project, then proof rolling shall be used to verify the undercut replacement material stability.
   F. Proof rolling deflections and soil conditions that are observed during construction determine if the plan subgrade treatment must be adjusted. Adjustment of subgrade treatment to fit field conditions is essential and is the responsibility of the contractor.
   G. Provide subgrade corrections prior to proof rolling
H. When rutting and deflection occur under wheels of 10-wheel dump truck engineer or representative will require corrective action

I. Improve subbase or subgrade by undercutting wet material, aeration of wet soil or use of additional subbase material. Compact material and proof roll again.

J. If needed, make the correction by excavating and disposing of soft grade, and replacing it with NYSDOT type 4 subbase material.

K. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

L. The proof rolling should be done immediately after the subgrade compaction operation, when the moisture content of the subgrade soil is near optimum or at the moisture content that achieved compaction. This minimizes the chances of the subgrade becoming too wet or too dry for an effective proof rolling evaluation. If the subgrade is too wet, the material will displace and rut. If the subgrade is too dry, a dry hard surface crust may carry the proof roller over an undesirable soft wet underlying material without rutting or deflection, and the soft subgrade may not be detected.

M. Proof rolling may be done either before or after pipe underdrains are installed. If done after underdrains are installed, rolling should not be done directly over the underdrains. Proof rolling must be performed at least 1-½ feet (0.5 meters) away from the underdrains because of the potential damage to the underdrains.

3.3 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

G. Subsoil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

H. Structural Fill: Place and compact material in equal continuous layers not exceeding 6 inches compacted depth.

I. Slope grade away from building minimum 2 percent slope for minimum distance of 5 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

J. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.

K. Backfill simultaneously on each side of unsupported foundation walls until supports are in place

L. Correct areas that are over-excavated.
   1. Load-bearing foundation surfaces: Use structural fill, flush to required elevation, compacted to 100 percent of maximum dry density.
   2. Other areas: Use structural fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.
M. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under paving, slabs-on-grade, and similar construction: 95 percent of maximum dry density.

N. Reshape and re-compact fills subjected to vehicular traffic.

O. Remove surplus backfill materials from site.

P. Leave fill material stockpile areas free of excess fill materials.

3.4 TOLERANCES
A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.
B. Top Surface of Filling Under Paved Areas: Plus or minus 1 inch from required elevations.
C. Top Surface of Filling Within Building Areas: Plus or minus 1/2 inch from required elevations.

3.5 FIELD QUALITY CONTROL
A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.
B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D3017, or ASTM D6938. Contractor shall be responsible for providing compaction testing as part of their base bid contract. Slab testing shall be every 100 square feet of area or every 50-ft of trench excavation.
C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor"), ASTM D 1557 ("modified Proctor"), or AASHTO T 180.
D. If tests indicate work does not meet specified requirements, remove work, replace and retest.
E. Frequency of Tests: 1 test for every truck load of material delivered.
F. Proof roll compacted fill at surfaces that will be under slabs-on-grade, pavers, and paving.

3.6 CLEANING
A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.
C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

3.7 PROTECTION OF FINISHED WORK
A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.
B. Reshape and re-compact fills subjected to vehicular traffic.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Sanitary sewerage drainage piping, fittings, and accessories.
   B. Connection of building sanitary drainage system to municipal sewers.

1.2 RELATED REQUIREMENTS
   A. Section 31 23 16 - Excavation: Excavating of trenches.
   B. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.
   C. Section 31 23 23 - Fill: Bedding and backfilling.

1.3 DEFINITIONS
   A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.4 REFERENCE STANDARDS

1.5 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data indicating pipe and pipe accessories.
   C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
   D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
   E. Project Record Documents:
      1. Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.
      2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
PART 2 PRODUCTS

2.1 SEWER PIPE MATERIALS
A. Provide products that comply with applicable code(s).
B. Plastic Pipe: ASTM D2729, Poly(Vinyl Chloride) (PVC) material; inside nominal diameter of 4-15 inches, bell and spigot style solvent sealed joint end.
C. Plastic Pipe: ASTM D3034, Type PSM, Poly(Vinyl Chloride) (PVC) material; inside nominal diameter of 4-15 inches, bell and spigot style solvent sealed joint end.
D. Plastic Pipe: ASTM D1785, Schedule 40, Poly(Vinyl Chloride) (PVC) material; inside nominal diameter of 4-18 inches, bell and spigot style solvent sealed joint end.
E. Joint Seals: Mechanical clamp ring type, stainless steel expanding and contracting sleeve, neoprene ribbed gasket for positive seal.
F. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.2 PIPE ACCESSORIES
A. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Sewer Service" in large letters. Tracer wire shall be a minimum of 10 gauge copper wire with UF insulation.

2.3 CLEANOUT
A. Lid and Frame: Cast iron construction, hinged lid.
   1. Lid Design: solid cover imprinted with "SEWER".
   2. Cleanout lid shall be a minimum of 12 inches or unless otherwise shown on the engineering drawings.

2.4 BEDDING AND COVER MATERIALS

PART 3 EXECUTION

3.1 GENERAL
A. Perform work in accordance with applicable code(s).

3.2 TRENCHING
A. See Section 31 23 16.13 for additional requirements.
B. Hand trim excavation for accurate placement of pipe to elevations indicated.
C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.
3.3 INSTALLATION - PIPE

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
   1. Plastic Pipe: Also comply with ASTM D2321.

C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

D. Connect to building sanitary sewer outlet and municipal sewer system, through installed sleeves.

E. Install trace wire 6 inches above top of pipe; coordinate with Section 31 23 16.13.

3.4 INSTALLATION - CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.

C. Establish elevations and pipe inverts for inlets and outlets as indicated.

D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.5 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 40 00.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

C. Pressure Test
   1. Low-pressure Air Test (applies to all piping materials):
      a. Test each section of gravity sewer piping between manholes.
      b. Where customer service connections are installed under the Contract, test connections and service lines concurrently with the main, unless directed otherwise by the Engineer.
      c. Introduce air pressure slowly to approximately 4 psig.
         1) Determine ground water elevation above spring line of pipe for every foot of ground water above spring line of pipe, increase starting air test pressure by 0.43 psig; do not increase pressure above 10 psig.
      d. Allow pressure to stabilize for at least five minutes. Adjust pressure to 3.5 psig or increased test pressure as determined above when ground water is present. Start test.
      e. Test:
         1) Determine test duration for sewer section with single pipe size from the following table. Do not make allowance for laterals.
AIR TEST TABLE

Minimum Test Time for Various Pipe Sizes

<table>
<thead>
<tr>
<th>Nominal Pipe Size, Inches</th>
<th>T(time), min/100 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.2</td>
</tr>
<tr>
<td>4</td>
<td>0.3</td>
</tr>
<tr>
<td>6</td>
<td>0.7</td>
</tr>
<tr>
<td>8</td>
<td>1.2</td>
</tr>
<tr>
<td>10</td>
<td>1.5</td>
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<td>12</td>
<td>1.8</td>
</tr>
<tr>
<td>15</td>
<td>2.1</td>
</tr>
<tr>
<td>18</td>
<td>2.4</td>
</tr>
<tr>
<td>21</td>
<td>3.0</td>
</tr>
<tr>
<td>24</td>
<td>3.6</td>
</tr>
</tbody>
</table>

2) Record drop in pressure during test period; when air pressure has dropped more than 1.0 psig during test period, piping has failed; when 1.0 psig air pressure drop has not occurred during test period, discontinue test and piping is accepted.

3) When piping fails, determine source of air leakage, make corrections and retest; test section in incremental stages until leaks are isolated; after leaks are repaired, retest entire section between manholes.

D. Deflection Test (Applies to Plastic Sewer Pipe)
1. Perform vertical ring deflection testing after backfilling has been in place for at least 30 days but not longer than 12 months.
2. Allowable maximum deflection for installed plastic sewer pipe limited to 5 percent of original vertical internal diameter.
3. Perform deflection testing using properly sized rigid ball or 'Go, No-Go' mandrel.
4. Furnish rigid ball or mandrel with diameter not less than 95 percent of base or average inside diameter of pipe as determined by ASTM standard to which pipe is manufactured. Measure pipe in compliance with ASTM D2122.
5. Perform test without mechanical pulling devices.

E. Lamp Test
1. Lamp gravity piping after flushing and cleaning.
2. Perform lamping operation by shining light at one end of each pipe section between manholes; observe light at other end; reject pipe not installed with uniform line and grade; remove and reinstall rejected pipe sections; re-clean and lamp until pipe section achieves uniform line and grade.

END OF SECTION