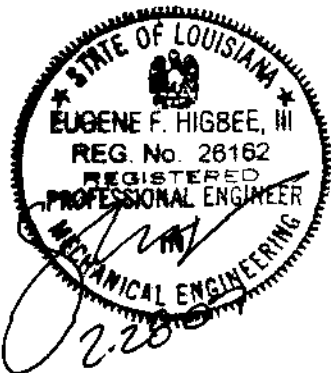
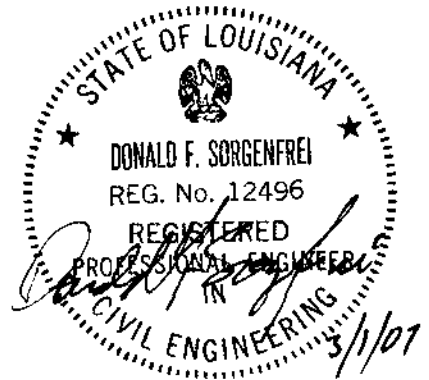


**STATE OF LOUISIANA**  
**DEPARTMENT OF TRANSPORTATION**  
**AND DEVELOPMENT**  
**CRESCENT CITY CONNECTION DIVISION**  
**TECHNICAL SPECIFICATIONS**



**STATE PROJECT NO. 610-01-0021**  
**PHASE ONE**  
**NEW VEHICLE MAINTENANCE FACILITY,**  
**& STORAGE YARD**  
**ORLEANS PARISH**

**FEBRUARY 28, 2007**



**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**00010 - TABLE OF CONTENTS**

**SPECIFICATION SECTIONS MAY APPLY TO PHASE ONE, PHASE TWO, OR TO BOTH PHASES OF WORK. REFER TO THE DRAWINGS FOR ADDITIONAL INFORMATION REGARDING THE WORK OF EACH PHASE.**

**ARCHITECTURAL**

00700	Supplementary General Conditions .....	1-4
01100	Summary .....	1-3
01400	Quality Requirements .....	1-2
01500	Temporary Facilities and Controls .....	1-2
01700	Execution Requirements .....	1
02200	Earthwork .....	1-6
02220	Supplementary Demolition .....	1-3
02230	Supplementary Site Clearing .....	1-2
02362	Composite Piling (Timber & Pipe) .....	1-5
02820	Special Fences and Gates .....	1-3
02821	Chain Link Fences and Gates .....	1
02900	Standard Sitework .....	1-2
03300	Concrete, Formwork & Reinforcing Steel .....	1-2
04800	Masonry Assemblies .....	1-4
05500	Metal Fabrications .....	1-2
05510	Metal Stairs .....	1-2
06100	Rough Carpentry .....	1-2
06400	Architectural Woodwork .....	1-3
07210	Building Insulation .....	1-2
07600	Flashing and Sheet Metal .....	1-2
07720	Roof Accessories .....	1-4
07900	Joint Sealers .....	1-3
08110	Steel Doors and Frames .....	1-3
08333	Overhead Coiling Doors & Operators .....	1-4
08520	Aluminum Windows .....	1-4
08710	Door Hardware .....	1-4
08900	Insulated Translucent Wall Light System .....	1-8
09260	Gypsum Board Assemblies .....	1-3
09300	Tile .....	1-3
09512	Acoustical Panel Ceilings .....	1-2
09650	Resilient Flooring .....	1-2
09651	Resilient Base and Accessories .....	1-2
09910	Painting .....	1-3
09963	Elastomeric Coatings .....	1-3
10440	Interior Signage .....	1-5
10523	Fire Extinguishers .....	1-2
10605	Wire Mesh Partitions .....	1-2

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

10810	Toilet Accessories.....	1-2
12490	Window Treatments.....	1-2
13129	Pre-Engineered Metal Building .....	1-10
13130	Pre-Engineered Fuel Canopy .....	1-5

**MECHANICAL**

15000	Mechanical - General Requirements.....	1-13
15050	Basic Materials And Methods.....	1-11
15060	Hangers And Supports .....	1-7
15075	Mechanical Identification .....	1-6
15081	Duct Insulation.....	1-4
15083	Pipe Insulation .....	1-6
15110	Valves .....	1-5
15140	Domestic Water Piping.....	1-8
15150	Sanitary Waste And Vent Piping .....	1-6
15183	Refrigerant Piping.....	1-8
15191	Lubrication System Equipment And Piping .....	1-4
15211	General-Service Compressed-Air Piping.....	1-6
15410	Plumbing Fixtures.....	1-5
15430	Plumbing Specialties.....	1-10
15485	Electric, Domestic Water Heaters.....	1-5
15738	Split System Air Conditioning Units .....	1-6
15766	Cabinet Unit Heaters.....	1-6
15815	Metal Ducts.....	1-8
15820	Duct Accessories.....	1-10
15838	Power Ventilators .....	1-6
15855	Diffusers, Registers, And Grills .....	1-4
15990	Testing, Balancing, & Adjusting .....	1-8

**ELECTRICAL**

16010	Electrical General Provisions.....	1-11
16050	Basic Electrical Materials and Methods .....	1-8
16051	Electrical Site Work.....	1-4
16060	Grounding & Bonding .....	1-9
16075	Electrical Identification.....	1-7
16120	Conductors & Cables .....	1-4
16130	Raceways & Boxes .....	1-8
16140	Wiring Devices .....	1-5
16145	Lighting Control Devices.....	1-7
16146	Lighting Controls.....	1-8
16410	Enclosed Switches & Circuit Breakers.....	1-6
16420	Enclosed Controllers.....	1-5
16442	Panelboards.....	1-8
16491	Fuses .....	1-4
16511	Interior Lighting.....	1-11

**STATE PROJECT NO. 610-01-0021**

**SPECIFICATIONS**

16722	Intercommunication Equipment.....	1-10
16724	Access Control System .....	1-5
16750	Voice And Data Communication Cabling .....	1-14

**END OF TABLE OF CONTENTS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**00700 – SUPPLEMENTARY GENERAL CONDITIONS**

**PART 1. GENERAL CONDITIONS**

- A. Refer to the *Louisiana Standard Specifications for Roads & Bridges*. The following are Supplementary General Conditions for application to Architectural portions of the work. In the event of any conflict between these two documents, the *Louisiana Standard Specifications for Roads & Bridges* shall govern.

**PART 2. SUPPLEMENTARY GENERAL CONDITIONS**

- A. Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.
- B. Unless otherwise stated or further defined in the Contract Documents, words which have well known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.
- C. In the interest of brevity the Contract Documents frequently omit modifying words such as “all” and “any” and articles such as “the” and “an,” but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.
- D. The Contractor shall supervise and direct the Work, using the Contractor’s best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Engineer and shall not proceed with that portion of the Work without further written instructions from the Engineer. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any resulting loss or damage.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- E. The Contractor may make substitutions only with the consent of the Owner, after evaluation by the Engineer and in accordance with a Change Order.
- F. Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.
  - 1. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.
  - 2. Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.
- G. Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required by the Contract Documents the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review by the Engineer is subject to the limitations stated herein. Informational submittals upon which the Engineer is not expected to take responsive action may be so identified in the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Engineer without action.
- H. The Contractor shall review for compliance with the Contract Documents, approve and submit to the Engineer Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Engineer without action.
- I. By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
- J. The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

or similar submittals until the respective submittal has been approved by the Engineer.

- K. The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Engineer's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Engineer in writing of such deviation at the time of submittal and the Engineer has given written approval to the specific deviation as a minor change in the Work, or a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Engineer's approval thereof.
- L. The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Engineer on previous submittals. In the absence of such written notice the Engineer's approval of a resubmission shall not apply to such revisions.
- M. The Contractor shall be required to provide professional services which constitute the practice of architecture or engineering where such services are specifically required by the Contract Documents for a portion of the Work and in instances where the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Engineer will specify the performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Engineer. The Owner, Engineer and Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided the Owner and Engineer have specified to the Contractor all performance and design criteria that such services must satisfy. The Engineer will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

- N. The Contractor shall provide the Owner, Engineer and Consulting Architect access to the Work in preparation and progress wherever located.
- O. Communications Facilitating Contract Administration: Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Engineer about matters arising out of or relating to the Contract. Communications by and with the Engineer's consultants shall be through the Engineer. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the LaDoTD Engineer.
- P. Requests for Information made by the Contractor shall be understood by all parties to constitute authorization of direct communications between the Engineer and his agents and the Sub-contractors, manufacturers and material suppliers concerned.

**END OF SECTION**

**00700-4**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**01100 - SUMMARY**

**PART 1 - GENERAL**

**1.01 SUMMARY**

**A. Project Identification:**

**Louisiana Department of Transportation & Development,  
Crescent City Connection Division  
New Vehicle Maintenance Facility and Storage Yard  
Orleans Parish, Louisiana**

- B. Project Summary:** Remove fencing, paving & obstructions and prepare site; Reconfigure storm drainage; Construct new Pre-Engineered Metal Vehicle Maintenance building; Transfer Data, Communications and Security connections from existing Garage and Fuel Canopy to New Vehicle Maintenance Facility; Verify interim fueling arrangements are in force; Remove and store existing fuel pump, Demolish Existing Vehicle Maintenance Garage & Fuel Canopy; Remove existing Fueling Islands; Place new Fuel Canopy foundations and new single concrete Fueling Island; Erect new Pre-Engineered Metal Fuel Canopy; Reinstall Fuel pump, Construct new site paving, fencing and access control systems.

**C. Standard Specifications**

1. The Louisiana Standard Specification for Roads and Bridges shall govern the work.
2. The Pay Items in the Summary of Estimated Quantities include some items for which there are no special supplementary Technical Specifications. For information and specifications regarding these items, refer to The Louisiana Standard Specification for Roads and Bridges.

**D. Particular Project Requirements:**

1. Existing Site Conditions and Restrictions: Undocumented subsurface conditions exist. Existing fuel tanks and associated piping shall not be altered or disturbed. Demolition of adjacent structures must be performed with great caution.
2. Requirements for Sequencing, Scheduling and Completion: The Contractor shall prepare a Plan of Work for review and acceptance by the Owner prior to the beginning of work. The Plan of Work shall be in general conformance with the project phasing diagrams, and shall address the other requirements of the project stated herein.
3. Concurrent Operations: The work shall be performed in coordination and cooperation with the Owner's operations on the site. Vehicle maintenance, vehicle storage, fueling, trash handling and materials storage operations shall continue on the site throughout the production of the work.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

4. **Prior Hazardous Waste or Asbestos Work by Owner or Others:** Sewer clean-out and hazardous materials investigations of site by DOTD personnel has been scheduled as of the date of this writing. It is anticipated that this work will be completed prior to bidding.
  5. **Owner-provided, Owner-installed items:** The DOTD will furnish, move and install various equipment, items & tools not shown in these plans prior to the demolition of the Existing Garage Building.
  6. **Owner's Early or Partial Occupancy:** The DOTD will occupy portions of the project site in accordance with the approved Contractor's Plan of Work.
  7. **Occupancy of Adjacent Facilities:** The DOTD will continually occupy and operate adjacent facilities.
  8. **Contractor's use of new and existing facilities:** In accordance with the approved Contractor's Plan of Work.
  9. **Separate Prime Contracts:** The DOTD reserves the right to let other prime contracts on this or adjacent sites.
- E. **Permits and Fees:** Apply for, obtain, and pay for permits, fees, and utility company backcharges required to perform the work. Submit copies to Engineer.
- F. **Codes:** Comply with applicable codes and regulations of authorities having jurisdiction. Submit copies of inspection reports, notices and similar communications to Engineer.
- G. **Dimensions:** Verify dimensions indicated on drawings with field dimensions before fabrication or ordering of materials. Do not scale drawings.
- H. **Existing Conditions:** Notify Engineer of existing conditions differing from those indicated on the drawings. Do not remove or alter structural components without prior written approval.
- I. **Coordination:**
1. Coordinate the work of all trades.
  2. Prepare coordination drawings for areas above ceilings and where close tolerances are required between building elements and mechanical and electrical work.
  3. Verify location of utilities and existing conditions.
- J. **Installation Requirements, General:**
1. Inspect substrates and report unsatisfactory conditions in writing.
  2. Do not proceed until unsatisfactory conditions have been corrected.
  3. Take field measurements prior to fabrication. Form to required shapes and sizes with true edges, lines and angles. Provide inserts and templates as needed for work of other trades.
  4. Install materials in exact accordance with manufacturer's instructions and approved submittals.
  5. Install materials in proper relation with adjacent construction and with proper appearance.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

6. Restore units damaged during installation. Replace units which cannot be restored at no additional expense to the Owner.
7. Refer to additional installation requirements and tolerances specified under individual specification sections.

**K. Definitions:**

1. Provide: Furnish and install, complete with all necessary accessories, ready for intended use. Pay for all related costs.
2. Approved: Acceptance of item submitted for approval. Not a limitation or release for compliance with the Contract Documents or regulatory requirements. Refer to limitations of 'Approved' in General and Supplementary Conditions.
3. Match Existing: Match existing as acceptable to the Owner.

**L. Intent:** Drawings and specifications are intended to provide the basis for proper completion of the work suitable for the intended use of the Owner. Anything not expressly set forth but which is reasonable, implied or necessary for proper performance of the project shall be included.

**M. Writing style:** Specifications are written in the imperative mode. Except where specifically intended otherwise, the subject of all imperative statements is the Contractor. For example, 'Provide tile' means 'Contractor shall provide tile.'

PART 2 - PRODUCTS - Not Applicable To This Section

PART 3 - EXECUTION - Not Applicable To This Section

PART 4 – MEASUREMENT AND PAYMENT

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

**Item S-01000 – General Requirements**, per lump sum.

END OF SECTION

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**01400 - QUALITY REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 QUALITY CONTROL**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. 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.

**1.02 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate. Comply with manufacturers' tolerances.

**1.03 REFERENCES**

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

**1.04 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to perform the following as applicable, and to initiate instructions when necessary.
  - 1. Observe site conditions.
  - 2. Conditions of surfaces and installation.
  - 3. Quality of workmanship.
  - 4. Start-up of equipment.
  - 5. Test, adjust and balance of equipment.

**1.05 CONTRACTOR'S QUALITY CONTROL**

- A. Perform quality control during installation.

**1.06 MOCK-UP REQUIREMENTS**

- A. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes. Accepted mock-ups shall be a comparison standard for the remaining Work.
- B. Where mock-up has been accepted by Engineer and no longer needed, remove mock-up and clear area when directed to do so.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

PART 2 - PRODUCTS - Not Applicable To This Section

PART 3 - EXECUTION - Not Applicable To This Section

PART 4 – MEASUREMENT AND PAYMENT - Not Applicable To This Section

END OF SECTION

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**01500 - TEMPORARY FACILITIES AND CONTROLS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide temporary services and utilities, including utility costs, to enable the of work:
  - 1. Water.
  - 2. Lighting and power.
  - 3. Metering.
  - 4. Telephone.
  - 5. Toilet facilities.
  - 6. Materials storage.
- B. Provide construction facilities, including utility costs:
  - 1. Construction equipment.
  - 2. Dewatering and pumping.
  - 3. Enclosures.
  - 4. Heating.
  - 5. Lighting.
  - 6. Access.
  - 7. Temporary Roads.
- C. Provide security and protection requirements:
  - 1. Fire extinguishers.
  - 2. Site enclosure fence, barricades, warning signs, and lights.
  - 3. Building enclosure and lock-up.
  - 4. Environmental protection.
  - 5. Pest control during and at the end of construction.
- D. Provide personnel support facilities:
  - 1. Contractor's field office.
  - 2. Sanitary facilities.
  - 3. Drinking water.
  - 4. Project identification sign.
  - 5. Cleaning, trash removal and legal disposal of materials.

**PART 2 - PRODUCTS - Not Applicable To This Section**

**PART 3 - EXECUTION - Not Applicable To This Section**

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

**Item S-01000 – General Requirements, per lump sum.**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

END OF SECTION

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**01700 - EXECUTION REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Refer to the LaDoTD *Standard Specification for Roads & Bridges* and provide the following prerequisites to substantial completion:
  - 1. Punch list prepared by Contractor and subcontractors as applicable.
  - 2. Supporting documentation.
  - 3. Warranties.
  - 4. Certifications.
  - 5. Occupancy permit.
  - 6. Start-up and testing of building systems.
  - 7. Change over of locks.
  - 8. Meter readings.
- B. Provide the following prerequisites to final acceptance:
  - 1. Final payment request with supporting affidavits.
  - 2. Completed punch list.
- C. Provide as-built documentation in accordance with the LaDoTD *Standard Specification for Roads & Bridges*.
- D. Provide the following during project closeout:
  - 1. Submission of record documents.
  - 2. Submission of maintenance manuals.
  - 3. Training and turnover to Owner's personnel.
  - 4. Final cleaning and touch-up.
  - 5. Removal of temporary facilities.

**PART 2 - PRODUCTS - Not Applicable To This Section**

**PART 3 - EXECUTION - Not Applicable To This Section**

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

**Item S-01000 – General Requirements, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**02200-EARTHWORK**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS:**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division I - General Requirements, apply to work specified in this section.
- B. Except as modified or supplemented by these specifications, the "2006 Standard Specification for Roads and Bridges" shall govern all work in this section. The contractor must have a copy of these specifications in the project's field office at all times.

**1.02 DESCRIPTION OF WORK:**

- A. This section includes all materials, labor, equipment and other items required to provide all of the work as shown on the drawings and described herein. Performance shall meet the requirements of the specifications.
- B. The work covered by this section of specifications includes, but is not necessarily limited to, the following:
  - 1. Site clearing and all earthwork required to complete the work.
  - 2. Stripping of ground surface.
  - 3. Excavation and filling.
  - 4. Grading.

**PART 2 - PRODUCTS**

**2.01 FILL AND BACKFILL**

- A. In areas that will be paved, the fill and backfill material shall be obtained from off-site and shall be Mississippi River sand having a maximum of 10% of the material passing the #200 sieve.
- B. The material shall be free from stones larger than 3" in diameter, clay lumps, debris, or other deleterious matter.
- C. Contractor shall be responsible for locating a source for the material and transporting

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**02200-EARTHWORK**

it to the site.

- D. For fill areas that will be seeded or receive future landscaping, the top 3 inches shall be topsoil conforming to Section 715.

**2.02 GEOTEXTILE FABRIC**

- A. Fabric shall be Mirafi 600x or equal conforming to the following requirements or to all requirements of LADOTD Standard Specifications, Section 1019. The more stringent criteria shall govern.

Equivalent Opening Size .....	100 < EOS > 20	
Permeability .....	0.01 cm/sec	
UV Radiation Resistance .....	30 days uncovered exposure	
Tensile Strength/Elongation .....	180 lb/in @ 20%	(ASTM D4595)
Puncture Resistance .....	115 lb.	(ASTM D3787)
Mullen Burst Strength .....	600 psi	(ASTM D3786)

**2.03 LIMESTONE BASE**

- A. Material shall be crushed limestone meeting all material, durability, and compaction requirements of the LADOTD Standard Specifications, Section 1003.

**PART 3 - EXECUTION**

**3.01 CLEARING**

- A. Areas of the site on which fill is to be placed shall be stripped of all live and dead vegetation, rubbish, debris, and other unsatisfactory material.
- B. Grub out stumps and roots to a depth of 24 inches in areas to be occupied by pavement or building slabs or foundations. In other areas, remove stumps and roots to a depth of 6 inches. Backfill resulting holes to level of adjacent ground.

**3.02 SITE FILL**

- A. The site shall be filled as required to achieve the required finish grades.
- B. After site clearing any remaining subgrade under buildings, foundations, or paving that are not pile supported shall be undisturbed or uniformly re-compacted by approved methods to the satisfaction of the engineer.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**02200-EARTHWORK**

- C. Do not place fill on surfaces that are muddy or frozen or that contain frost or ice.
- D. Place fill in successive horizontal layers of not more than 9 inches loose depth and compact areas under structural elements or paving to a minimum of 95% of maximum density ASTM D698 (Standard Proctor).
- E. Stabilize fill at property lines in an approved manner to prevent fill from washing onto adjacent land areas.

**3.03 EXCAVATION**

- A. Excavate for new construction to the depth, elevations, lines and levels required for executing work. Excavation shall include the removal of all materials encountered. If excavation is carried below the required grade, backfill to grade with compacted material.
- B. Excavate utility trenches along straight lines or to uniform curves to provide minimum cover as specified. Pipe shall have its bottom quadrant, for the full length of the barrel, embedded in undisturbed earth or on at least 4" of thoroughly compacted fill, unless specifically noted otherwise.

**3.04 BACKFILL**

- A. Backfill excavations as promptly as work permits, but not until completion of the following:
  - 1. Acceptance by Project Engineer on construction below finish grade.
  - 2. Review, testing, and recording locations of underground utilities.
  - 3. Removal of shoring or bracing, and backfilling of voids with satisfactory materials.
  - 4. Removal of trash and debris.
- B. Place backfill materials in successive horizontal layers of not more than 9 inches thick loose depth and compact areas under structural elements or paving to a minimum of 95% of maximum density ASTM D698 (Standard Proctor).

**3.05 FINISHING**

- A. The surface of all excavations, fills, backfills, and raw subgrade shall be finished to a

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**02200-EARTHWORK**

reasonably smooth and compact surface in accordance with the lines, grades and cross

sections or elevations shown. All graded areas shall be within 0.05 foot of the grades and elevations indicated, unless noted otherwise.

**3.06 PUMPING AND WATER CONTROL**

- A. Control excavated materials, and fill and backfill materials, so that excavations are protected from surface water and to assure free drainage of the site. Provide temporary ditching and earthwork to divert surface water from the construction area.
- B. Do not allow water to accumulate in excavations. Remove water to prevent softening and soil changes detrimental to the stability of subgrades. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations and fill areas.

**3.07 SPECIAL REQUIREMENTS**

- A. Protect excavations, including utilities' trenches, against caving and settling of banks. The Contractor shall assume responsibility for the means and extent of protection and for security of excavations and surrounding areas. Employ sheathing, bracing and other means as necessary.

**3.08 EXISTING UTILITIES**

- A. Locate existing underground utilities in the area of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
- B. Should uncharted or incorrectly charted, piping or other utilities be encountered during excavation, consult the Utility Owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of Utility Owner.
- C. Do not interrupt service of existing utilities except when permitted in writing by Project Engineer and then only after acceptable temporary utility services have been provided.

**3.09 USE OF EXPLOSIVES**

- A. The use of explosives is not permitted.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**02200-EARTHWORK**

**3.10 GEOTEXTILE FABRIC**

- A. The geotextile fabric shall be placed without folds or wrinkles. Adjacent panels shall be overlapped a minimum of 12 inches.

**3.11 CLEANUP**

- A. At completion of the work and prior to acceptance inspection, temporary ditches shall be filled, excess earthen materials shall be removed, and ground surfaces disturbed by construction operations shall be restored by grading to eliminate holes, ruts and mounds, and to provide natural surface drainage, away from new construction within the site limits, and those areas between the property line and street curbs.
- B. Unacceptable, defective and surplus materials, including debris from clearing and grubbing, excess fill and base course materials, shall become the property of the Contractor and shall be removed by him and disposed of away from the Owner's property.

**PART 4 - TESTING LABORATORY: (SEE DIVISION 1)**

**4.01 The Owner shall perform the following work in conjunction with this section of the specifications:**

- A. Verify that all unsuitable materials have been removed prior to placement of fill.
- B. Determine maximum density and optimum moisture content for fill, backfill, and surface preparation for areas under buildings, foundations, or paving. Maximum density shall be determined by ASTM D698 (Standard Proctor).
- C. Determine in-place density of subgrade, fill, and backfill under paving, buildings, and foundations. In-place density shall be determined by ASTM D 1556 or D 2922. Number and locations of in-place density tests will be determined by the Project Engineer.
- D. Report test results to the Architect and the Structural Engineer.
- E. The Contractor shall be responsible for notifying the Project Engineer and ensuring that compaction tests are made on each lift of fill or backfill and on any other compacted soil.
- F. Testing services will be performed by the Owner or will be contracted for by the

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**02200-EARTHWORK**

Owner.

**PART 5 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

**Item No. S-02000 – Site Construction**, per lump sum.

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**02220 – SUPPLEMENTARY DEMOLITION**

**PART 1 - GENERAL**

- 1.01 SUMMARY – Perform Building & Site Demolition in accordance with LaDOTD *Standard Specification for Roads & Bridges* and in accordance with the approved Contractor's Plan of Work. The demolition work shall include but shall not be limited to the following:
- A. Building and Site Demolition:
    - 1. Demolition of the existing Vehicle Maintenance Garage & Fuel Canopy.
    - 2. Demolition of site improvements including paving, curbing, fencing, and utility structures.
    - 3. Demolition of below-grade foundations and site improvements to depth to avoid conflict with new construction or site work. This depth shall be a minimum of 1 foot below the bottom of the required base course or 1 foot below finish grade.
    - 4. Removal of hollow items or items which could collapse.
    - 5. Protection of site work and adjacent structures.
    - 6. Disconnection, capping, and removal of utilities.
    - 7. Pollution control during building demolition, including noise control.
    - 8. Removal and legal disposal of materials.
  - B. Selective Demolition:
    - 1. Existing Fuel Canopy & related construction in the area of the existing operating Fuel Pump. Do not disturb lines, and underground fuel storage tank.
    - 2. Protection of portions of the facilities adjacent to or affected by selective demolition, including fuel tank, lines and pump.
    - 3. Removal of abandoned utilities and wiring systems.
    - 4. Notification to Owner of schedule of shut-off of utilities which serve occupied spaces in accordance with the approved Contractor's Plan of Work..
    - 5. Pollution control during selective demolition, including noise control.
    - 6. Removal and legal disposal of materials.
  - C. Work of Prior Separate Contract or Contracts:
    - 1. Cleanout of existing sewer main below Access Drive "A" by LaDOTD personnel.
  - D. Asbestos and Hazardous Materials Demolition or Removal Work
    - 1. The Architect is not aware of the existence of Hazardous Materials at the Project Site.
    - 2. Portions of the drawings and specifications prepared by the architect do not specify operations involving hazardous materials.
    - 3. The Louisiana *Standard Specification for Roads and Bridges* specifies the responsibilities of the Contractor and the procedures to be followed, if the contractor encounters or suspect that he has encountered hazardous materials at the project site.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

4. If hazardous materials are encountered at the project site, the contractor shall notify the Owner, and shall proceed at the sole direction of the Owner in accordance with the Owner's requirements and in accordance with LaDOTD Standard Specification for Roads & Bridges

1.02 SUBMITTALS

- A. Submittals shall be as required by the LaDOTD *Standard Specification for Roads & Bridges*. In addition, the Contractor shall submit for approval a selective demolition schedule, including schedule and methods for capping utilities to be abandoned and maintaining existing utility service.

1.03 QUALITY ASSURANCE

- A. Comply with the LaDOTD *Standard Specification for Roads & Bridges* Comply with governing codes and regulations. Use experienced workers.

1.04 PROJECT CONDITIONS

- A. Immediate areas of work will not be occupied during selective demolition. Adjacent areas may be occupied by the public.

PART 2 - PRODUCTS - Not Applicable To This Section

PART 3 - EXECUTION

3.01 DEMOLITION

- A. Perform in accordance with LaDOTD *Standard Specification for Roads & Bridges* and as follows:
  1. Do not damage building elements and improvements indicated to remain. Items of salvage value, not included on schedule of salvage items to be returned to Owner, shall be removed from structure. Storage or sale of items at project site is prohibited.
  2. Do not close or obstruct streets, walks, drives or other occupied or used spaces or facilities without the written permission of the Owner and the authorities having jurisdiction. Do not interrupt utilities serving occupied or used facilities without the written permission of the Owner and authorities having jurisdiction. If necessary, provide temporary utilities.
  3. Cease operations if public safety or remaining structures are endangered. Perform temporary corrective measures until operations can be continued properly.
  4. Provide adequate protection against accidental trespassing. Secure project after work hours.

3.02 SCHEDULE

- A. Items for Protection During Demolition and Construction shall include:
  1. All construction indicated to remain.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

2. Existing underground utilities.
  3. Existing underground fuel tanks.
  4. Existing Fuel pump and lines.
- B. Items to be Salvaged for Reuse or Reinstallation:
1. Fuel monitoring system, wiring and readout panel.
  2. Fiberoptic communication lines
  3. Closed circuit television camera, and line at fuel canopy.
- C. Items to be Salvaged for Delivery to Owner:
1. Items bearing a LaDOTD identification number or tag.
  2. Door lock hardware
- D. Utilities Requiring Interruption, Temporary Capping, Reconfiguration and Reconnection (Refer to the Plumbing, Mechanical and Electrical Specifications):
1. Electric.
  2. Heat.
  3. Water.
  4. Closed Circuit Cable television.

**PART 4 – MEASUREMENT AND PAYMENT**

- E. Work under this section will not be measured for payment.
- F. Payment for work under this section will be made under:

**Item S-02000 – Site Construction**, per lump sum.

END OF SECTION

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**02230 – SUPPLEMENTARY SITE CLEARING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide site clearing in accordance with LaDOTD *Standard Specification for Roads & Bridges* and the following:

**1.02 SUBMITTALS**

- A. Clearing Plan: Submit list of proposed operations, and identify site improvements and features to remain. Include proposed location for stockpiles.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Use experienced workers.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Tree protection, erosion control, siltation control, and dust control materials suitable for site conditions.

**PART 3 - EXECUTION**

**3.01 SITE CLEARING OPERATIONS**

- A. Protection of existing trees, vegetation, landscaping, and site improvements not scheduled for clearing which might be damaged by construction activities.
- B. Trimming of existing trees and vegetation for protection during construction activities.
- C. Clearing and grubbing of stumps and vegetation, and removal and disposal of debris, rubbish, designated trees, and site improvements.
- D. Topsoil stripping and stockpiling.
- E. Temporary erosion control, siltation control, and dust control.
- F. Temporary protection of adjacent property structures, benchmarks, and monuments.
- G. Temporary relocation of fencing, and site improvements for reuse or reconfiguration and reuse during phased construction.
- H. Watering of trees and vegetation during construction activities.
- I. Removal and legal disposal of cleared materials.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**3.02 CLEARING**

- A. Prevent damage to existing improvements indicated to remain, including improvements on and off site. Protect existing trees and vegetation indicated to remain. Do not stockpile materials and restrict traffic within drip line of existing trees to remain. Provide and maintain temporary guards to encircle trees or groups of trees to remain; obtain approval before beginning work.
- B. Water vegetation as required to maintain health. Cover temporarily exposed roots with wet burlap and backfill as soon as possible. Coat cut plant surfaces with approved emulsified asphalt plant coating.
- C. Repair or replace vegetation which has been damaged or pay damages. Remove heavy growths of grass before stripping. Stockpile satisfactory topsoil containing no large stones, foreign matter and weeds on site for reuse.
- D. Completely remove all improvements including stumps and debris except for those indicated to remain. Remove below grade improvements at least 12" below finish grade and to the extent necessary so as not to interfere with new construction. Remove abandoned mechanical and electrical work as required.
- E. Prevent erosion and siltation of streets, catch basins and piping. Control windblown dust. Remove waste materials and unsuitable soil from site and dispose of in a legal manner.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

**Item S-02000 – Site Construction, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**02362-COMPOSITE PILING (TIMBER & PIPE)**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division I - General Requirements, apply to work in this section.

**1.02 DESCRIPTION OF WORK**

- A. This section includes all materials, labor, tools, equipment, and services required to provide all proper completion of all piling as required by the drawings or herein specified.

**1.03 SUBSOIL INVESTIGATION**

- A. A copy of a subsoil investigation report is on file and may be viewed at the office of the Architect or Structural Engineer.

**PART 2 - PRODUCTS**

**2.01 MATERIALS:**

- A. Composite piles shall consist of an untreated timber lower section and a steel pipe, concrete filled upper section. See the general notes on the drawings for pile length, size and design load.
- B. Timber section shall be clean-peeled pine in accordance with ASTM D25.
- C. The pipe section shall be steel in accordance with ASTM A252 having a minimum outside diameter and a minimum wall thickness as noted in the general notes on the drawings.
- D. The pipe shall be filled with concrete either before or after driving. If the concrete is placed prior to driving it must be fully cured before handling and driving. If the pipe is driven empty, the concrete shall be placed so as to avoid segregation. In either case, the pipe shall have an approved attachment to the wood section and shall be driven by an approved method.
- E. All structural concrete shall be LADOTD Class A.
- F. All concrete and concrete work shall be in accordance with Section 03300.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**02362-COMPOSITE PILING (TIMBER & PIPE)**

**PART 3 - EXECUTION:**

**3.01 EXISTING FACILITIES**

- A. The Contractor shall carefully examine all elements of adjoining or adjacent buildings, streets, sidewalks, driveways, utilities, or other facilities in order to establish the condition of the structure and finishes prior to pile driving.
- B. The Contractor shall see that adjacent or adjoining facilities are properly covered or braced if required to withstand the pile-driving operations.
- C. All damages to existing facilities or any other damage resulting from the piling operation shall be repaired or renewed by the Contractor without cost to any other party.

**3.02 QUALITY CONTROL**

- A. The Contractor shall notify the Project Engineer a minimum of 24 hours before pile driving begins. The Project Engineer shall be present at start of driving. At this time the Project Engineer will establish the maximum number of blows per foot (refusal).

**3.03 INSTALLATION**

- A. Prior to driving each pile the soil at the pile location shall be predrilled to a depth of 8' below existing grade using the dry rotary method and a maximum 6" diameter bit.
- B. A hammer with a maximum energy of 7,500 ft. lb. shall be used, and driving shall progress continuously until the specified tip elevation has been reached or until refusal is reached. The Project Engineer shall be notified immediately if the specified tip elevation is not reached.
- C. Piles shall be driven plumb and accurately into the positions shown on the drawings with a maximum variation not exceeding 3 inches from plan location and a maximum deviation from plumb of 1 in 48. Should the variation from plan location or from plumb exceed the above, additional piles shall be driven at locations determined by the Project Engineer. The Contractor shall, at his own cost, furnish and drive such additional piles as may be required to compensate for or to rectify conditions brought about by failure to observe proper tolerances, regardless of when these defects are discovered.
- D. Any piles which after having been driven to their final position, are forced up by the driving of adjacent piles, shall be redriven to their former position without additional

**02362-2**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**02362-COMPOSITE PILING (TIMBER & PIPE)**

cost to the Owner.

- E. The tops of all piles shall be driven to or cut off at right angles to their axes at the elevation indicated on the drawings. Any pile not driven or cut off at the proper elevation shall be pointed out to the Project Engineer.
- F. The Contractor shall be held responsible for any pile omitted, and missing piles, at whatever stage of work discovered, shall be provided without extra charge.
- G. Any discrepancies or unexpected conditions encountered during the work shall immediately be brought to the attention of the Project Engineer.
- H. Should any obstructions be encountered which make it impossible to drive certain piles in the locations shown on the plans or to the required penetration, additional piles must be driven in such locations as directed by the Project Engineer. The Contractor will be paid for any such additional piles at a price agreed upon with the Owner.
- I. Care shall be taken during the performance of all work on this project so as not to damage piles in place. The Contractor shall be responsible for any pile knocked out of place or damaged and if necessary shall replace each pile at no cost to the Owner.
- J. The Project Engineer will reject piles that do not conform to these documents, are driven out of position or below elevation, or are damaged.
- K. The Contractor shall replace rejected piles with the number of new piles required with no additional cost to the Owner.
- L. No pile shall be driven within thirty feet (30') of a pile or pile cap filled with concrete less than 24 hours old.
- M. The butts of all timber sections shall be square prior to driving. Any portions of the butt that are not square or are damaged during driving shall be recut before placing the steel section.
- N. After driving and cutting of the timber section square, the pipe section shall be carefully placed and aligned making sure that it is centered on the timber butt and is square and plumb.
- O. Care shall be taken to avoid damage to all components of the piles. Any damaged piles shall be replaced by the Contractor at no cost to the Owner.
- P. Any piles whose connectors become unseated during driving shall be replaced by the Contractor at no cost to the Owner.

**02362-3**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**02362-COMPOSITE PILING (TIMBER & PIPE)**

- Q. Before pipes are filled with concrete they shall be inspected by the Project Engineer and shall be free of water, dirt or other foreign matter. The Contractor shall provide a lighting arrangement which allows visual inspection throughout the entire length of the pipe.
- R. Pour concrete through a funnel to center the concrete in the pipe.

**PART 4 - TESTING LABORATORY (SEE DIVISION 1)**

**4.01 DUTIES**

- A. The Owner shall perform the following inspections and tests:
  - 1. Inspect all pile components for compliance with Specifications before delivered to job site (including fabrication and placement of steel/concrete elements).
  - 2. Perform concrete tests in accordance with Section 3300.
  - 3. Log the driving of all piles.
  - 4. Provide vibration monitoring during pile driving when required.
  - 5. Furnish reports to the Architect, Structural Engineer and Contractor on the items listed above. The report on logging of piling shall include the following:
    - a. Type of hammer used.
    - b. Location of each pile.
    - c. Pile dimensions.
    - d. Penetration under hammer weight, number of blows required for each foot thereafter to final penetration.
- B. The Contractor shall conduct a pile load test (See Part 5).

**PART 5 - TEST PILE PROGRAM**

**5.01 PROCEDURE**

- A. Prior to driving any other piles, the probe piling shown on the drawings shall be driven. Probe piles shall be the same as the job piles with length to suit the test procedure.
- B. The Project Engineer shall select one of the probe piles to be tested.
- C. The Contractor shall drive reaction piles at the test pile location. Reaction piles shall provide adequate capacity to fail the test pile.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**02362-COMPOSITE PILING (TIMBER & PIPE)**

- D. The Contractor shall provide all beams and frames required for the load test.
- E. The Contractor shall employ and pay an independent Testing Laboratory to provide the load jack and perform the required services to load test the pile to failure in accordance with ASTM D1143 except that loading increments and the waiting period before testing the pile will be established by the Project Engineer and the Testing Laboratory at the time the probe piles are driven.

**PART 6 - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

<b>ITEM NO.</b>	<b>PAY ITEM</b>	<b>PAY UNIT</b>
<b>S- 02362</b>	<b>COMPOSITE PILING (TIMBER &amp; PIPE)</b>	<b>LUMP SUM</b>

**END OF SECTION**

**02362-5**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**02820 – SPECIAL FENCES AND GATES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide Opaque formed metal fencing, Operable chain-link Pedestrian and Vehicular Access Gates for portions of site and for areas requiring separation as indicated on the Site Plan. Refer to the Access Gate Schedule, Sheet 5.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

**2.02 OPAQUE FENCE PANELS AND TRIM**

- A. Opaque Fences shall consist of prefinished Metal Wall Panels as available from the Pre-Engineered, Metal Building Manufacturer, their attachments and trim or flashings adapted for use on exterior fence posts.
  - 1. Ribbed Fence Panels shall be made of ribbed siding panels equal to Reverse Rolled, USA “R” Ribbed Profile as described in the following:
    - a. Fence Panels consisting of reverse rolled, rib style profile “R” shall provide a 36” net coverage having 1-1/4” deep major ribs at 12” on center and two minor ribs between major ribs. Sidelaps shall be on major ribs. Panels shall be oriented horizontally, and mounted to vertical Hot Dip Galvanized fence posts. Panels shall be finished so that (due to Reverse Rolling) Ribs shall project to the Public side of the fence.
    - b. Material used in the fabrication of wall panels shall be a minimum of 24 gauge having a minimum yield strength of 50,000 psi. Exterior finish shall be Silicon Polyester coating at both sides. Colors shall be as selected by the Architect from the manufacturer’s standard colors.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

2. Material used in the fabrication of trim for the cap, corners and openings, etc. shall be of the same thickness and finish as the fence/wall panel. Colors shall be selected by the Architect from the manufacturer's standard colors.
3. Framework: Hot Dip Galvanized Steel posts

**B. Gates:**

1. Swinging type Pedestrian Gate: Jamieson Series 8000, Pedestrian Swing Gate Housing Unit, Pre-hung Pedestrian Gate Unit with Mechanical Lock & Hydraulic closer, or approved equal
2. Sliding Vehicular Access Gate 31'-6" X 7'-0": Aluminum Fortress Structural Slide Gate, as manufactured by the Tymetal Corporation., Inc., or approved equal.
3. Sliding Vehicular Access Gates 21'-8" X 7'-0" and 14'-0" X 7'-0": Aluminum Fortress Heavy-Duty Slide Gate, as manufactured by the Tymetal Corporation, Inc., or approved equal

**C. Framing and Fittings:**

1. Post Foundations per manufacturer's recommendations
2. End, intermediate and corner posts.
3. Line and intermediate posts.
4. Gate posts.
5. Top rails and cap.
6. Intermediate rail.
7. Bottom rail.
8. Chain Link Panel Infill
9. Post and caps.
10. Track Systems
11. Drive Rails
12. Surge Arrestor Kits
13. Mounting Hardware
14. Vehicle Detectors & Harnesses

**D. Finish: Natural Aluminum Finish**

**E. Operators:**

1. B&B model LXL-15vp, hydraulic slide gate operator with programmable controller, 1.5 HP, dual hydraulic drive motors, rugged, solid-state design, approved for use by a nationally recognized testing laboratory (NRTL) in accordance with the requirements of UL325 – 991, or approved equal. Programmed for specific gate hand, for auto close timer, maximum run timer, and for intermediate-open operation.
  - a. Capacity: 1,250lbs
  - b. Speed: Gates under 20 feet: 1.2 feet/second  
Gates over 20 feet: 2.2 feet/second (high speed model)

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install Vehicular Access Gates, Operators and associated materials in accordance with manufacturer's instructions and approved submittals. The gate and installation shall conform to ASTM F1184 standards for aluminum cantilever slide gates, Type II Class 2.
- B. Install materials in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- C. Install Fence Posts to depth indicated in the drawings. Concrete post foundations shall be sized as shown in the drawings. Refer also to 03300 Concrete, Formwork and Reinforcing Steel.
- D. Install Opaque Metal Fence Panels in horizontal orientation over vertical fence posts using manufacturers recommended fasteners. Fasteners shall be at the bottom of major rib depressions. Install Prefinished metal cap flashing as shown in the drawings
- E. Top of fence cap shall be level.
- F. Cut materials with appropriate tools.
- G. Restore or replace damaged components. Clean and protect work from damage.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

**Item S-02000 – Site Construction, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**02821 – CHAIN LINK FENCES AND GATES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide 6 foot tall chain link fence with one pedestrian gate and one 24 ft cantilever vehicle gate. The fence shall tie into the west and north sides of the existing facility fence as indicated on sheet 4, detail 1B. The location of the gates shall be the same as the opaque gates constructed under phase two, gates A, and B/C, shown on sheet 5 of the plans. The fence shall be constructed according to LADOTD Standard Plan FN-04.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

**PART 2 - STANDARD SPECIFICATIONS**

**2.01 DOCUMENTS**

- A. Except as modified or supplemented by these specifications, the "2006 Standard Specification for Roads and Bridges" shall govern all work in this section. The material and installation of chain link fences and gates shall be constructed to the requirements of section 705 of the Standard Specifications and LADOTD Standard Plan FN-04.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item No. S-02000 – Site Construction, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**  
**02900 - STANDARD SITE WORK**

**PART 1**

**1.01 RELATED DOCUMENTS:**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division I – General Requirements, apply to work specified in this section.

**1.02 DESCRIPTION OF WORK:**

- A. All materials, labor, equipment and other items required to provide all of the work shown on the drawings and described herein shall meet the requirements of the “2006 Standard Specification for Roads and Bridges”.

**PART 2 - STANDARD SPECIFICATIONS**

**2.01 DOCUMENTS**

- A. Except as modified or supplemented by these specifications, the "2006 Standard Specification for Roads and Bridges" shall govern all work in this section. The contractor must have a copy of these specifications in the project's field office at all times. The work under this section shall be constructed to the requirements of the following sections of the Standard Specifications:

ITEM	Specification Section
Pipe & associated bedding	701, 726
Drainage structures and associated bedding	702, 726

**PART 3 – MEASUREMENT AND PAYMENT**

- A. The cost of bedding material is to be included in the bid price for pipe, 701(05)(E) & 701(05)(F) .
- B. Payment for work under this section will be made under:

**STATE PROJECT NO. 610-01-0021**

**SPECIFICATIONS**

<b>ITEM NO.</b>	<b>PAY ITEM</b>	<b>PAY UNIT</b>
<b>701-05-E</b>	<b>SIDE DRAIN PIPE (12")</b>	<b>Linear foot</b>
<b>701-05-F</b>	<b>SIDE DRAIN PIPE (15")</b>	<b>Linear foot</b>
<b>702-03-A</b>	<b>CATCH BASINS (CB-01)</b>	<b>Each</b>
<b>702-04-A</b>	<b>ADJUSTING MANHOLES</b>	<b>Each</b>
<b>702-04-B</b>	<b>ADJUSTING CATCH BASINS</b>	<b>Each</b>
<b>702-04-D</b>	<b>CONVERTING CATCH BASIN TO CB-01</b>	<b>Each</b>

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**03300-CONCRETE, FORMWORK AND REINFORCING STEEL**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions and Division I - General Requirements, apply to work in this section.

- 1.02 This section includes all structural concrete, concrete curb, sidewalk with all formwork, reinforcing steel and incidental items required to complete the work indicated on the drawings and specified.

**PART 2 - STANDARD SPECIFICATIONS**

**2.01 DOCUMENTS**

- A. Except as modified or supplemented by these specifications, the "2006 Standard Specification for Roads and Bridges" shall govern all work in this section. The contractor must have a copy of these specifications in the project's field office at all times. The concrete work under this section shall be constructed to the requirements of the following sections of the Standard Specifications:

ITEM	Specification Section
Sidewalk	706
Curb	707
Pavement	601
Building Foundation	801, 805, & 806
Mezzanine Slab	801, 805, & 806

**2.02 SUPPLEMENTS AND MODIFICATIONS TO THE STANDARD SPECIFICATIONS**

- A. The following sections of the standard specifications shall be modified and/or supplemented as follows:
  - 1. Inspection and testing shall be performed by DOTD.
  - 2. Earth cuts may be used as forms for footings or grade beams providing dimensions are controlled. The contractor shall be responsible for providing any dewatering or dry bottoms necessary to place concrete to the dimensions and elevations shown on the drawings.
  - 3. The finished floors in all areas inside the building shall be sealed in accordance with the paint specification. Refer to Section 09910.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**03300-CONCRETE, FORMWORK AND REINFORCING STEEL**

**PART 3 – MEASUREMENT AND PAYMENT**

The cost of Item No. 805-14 shall include all excavation, backfill, forms, reinforcing steel, and incidentals necessary to construct all of the required concrete structures on the project.

A. Payment for work under this section will be made under:

<b>ITEM NO.</b>	<b>PAY ITEM</b>	<b>PAY UNIT</b>
<b>601-01-G</b>	<b>PORTLAND CEMENT CON- CRETE PAVEMENT (8" Thick)</b>	<b>Square Yard</b>
<b>601-05</b>	<b>MEZZANINE SLAB</b>	<b>Lump Sum</b>
<b>706-01-A</b>	<b>CONCRETE WALK (4" THICK)</b>	<b>Square Yard</b>
<b>707-01</b>	<b>CONCRETE CURB</b>	<b>Linear Foot</b>
<b>805-14</b>	<b>CLASS A CONCRETE</b>	<b>Lump Sum</b>

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**04800 - MASONRY ASSEMBLIES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide unit masonry construction as indicated in the drawings and specifications and as follows:
  - 1. Concrete masonry bearing walls at perimeter of one story Office Wing and Lube Oil Shed portions of the New Vehicle Maintenance Facility.
  - 2. Concrete masonry non-bearing walls at perimeter of Maintenance Garage.
  - 3. Glass block units inset into exterior walls.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
  - 1. Shop drawings shall be prepared and stamped by a qualified engineer licensed in the jurisdiction of the project.
- C. Samples: Submit one (1) representative sample of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

**1.03 QUALITY ASSURANCE**

- A. Fire Performance for Fire-Rated Brick and Concrete Block Assemblies: ASTM E 119.
- B. Fire Performance for Fire-Rated Glass Block Assemblies: ASTM E 163.
- C. Testing: Independent Testing Laboratory.
- D. Mock-Ups: Provide mock-up as required to demonstrate quality of workmanship.
- E. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Concrete Masonry Units:
  - 1. Concrete Masonry Units: ASTM C 90, 1500 f'm compressive strength:
    - a. Lightweight Block

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

2. Size: Face dimension of 7-5/8 inches high by 15-5/8 inches long by width required for application.
  3. Special Finish: Standard aggregate, split face finish.
  4. Special Shapes: As required by building configuration including corner, sill, jamb and U-blocks and as drawn.
  5. Bond Pattern: Running Bond.
- B. Hollow Glass Block: Non-loadbearing glass block with partial vacuum interior shall be Mistique, as manufactured by Pittsburg Corning, or approved equal.
1. Acceptable Manufacturer's: Pittsburgh Corning, Saint Gobain, Euroglass, Westerwald AG, WeckGlass Block/Glasshaus, or approved equal.
  2. Pattern: Translucent, light-diffusing even-etch design.
  3. Shape: Square, nominal 8 inches square.
  4. Joint Width: 3/8 inch.
- C. Glass Unit Masonry Accessories:
1. Panel (Joint) Reinforcement: Galvanized steel ladder-type welded wire units, ASTM A 951 for wire, and ASTM A 153 for galvanizing.
  2. Panel Anchors: Perforated steel strips, hot-dip galvanized.
- D. Mortar and Grout for Concrete Masonry Unit Assemblies:
1. Mortar Mix: ASTM C 270, Type S, for reinforced masonry, masonry below grade and masonry in contact with earth and ASTM C 270, Type N, for above-grade loadbearing and nonloadbearing walls and parapet walls and for interior loadbearing and nonloadbearing partitions.
  2. Mortar Materials: Ready mixed, ASTM C 207, Type S.
  3. Mortar Aggregate: Natural color, ASTM C 144.
  4. Grout Aggregate: ASTM C 404.
  5. Hydrated Lime: ASTM C 207, Type S.
  6. Color: Natural color.
  7. Integral Water Repellent: Liquid polymeric admixture.
- E. Mortar Materials for Glass Block Assemblies:
1. Pre-mix Glass Block Mortar Mix, ASTM C 150, Type I.
  2. Hydrated Lime: ASTM C 207, Type S.
  3. Aggregate for Mortar: ASTM C 144.
  4. Colored Mortar Pigments: Iron oxides and chromium oxides to match adjacent mortar in CMU wall.
  5. Water Repellent Admixture at Exterior: Stearic water-repellent compound.
- F. Reinforcing Steel: Refer to the Architectural & Structural Drawings
1. Reinforcing Bars: ASTM A 615, Grade 60.
  2. Deformed Reinforcing Wire: ASTM A 496.
- G. Reinforcing: Dur-O-Wall Truss or approved equal: Welded wire with deformed side rods.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

1. Steel Wire: 9 gauge (.1875 inch) hot-dipped, galvanized steel, ASTM 153, class B-2
2. Type: Truss type.

H. Ties and Anchors:

1. Bent Wire Ties: Galvanized steel.
2. Rigid Anchors: Galvanized steel straps.
3. Masonry to Steel Frame: Anchor with crimped wire anchor section for welding to steel.
4. Anchor Bolts: ASTM A 307, Grade A, galvanized.

I. Masonry Accessories:

1. Nonmetallic expansion joint strips.
2. Preformed control joint gaskets.
3. Bond breaker strips.
4. Plastic tubing for weeps.
5. Open head-joint weeps.
6. Cavity vents.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

A. Installation of Masonry Assemblies:

1. Comply with PCA Recommended Practices for Laying Concrete Block, Brick Institute of America BIA Tech Notes, and NCMA TEK Bulletins.
2. Comply with cold weather and warm weather protection procedures as recommended in BIA Tech Notes.
3. Provide fire-rated assemblies complying with ASTM E 119.
4. Saw-cut units when required. Maintain uniform joint width. Provide full bed, head and collar joints except at weepholes. Saw-cut units shall not be allowed as substitutes for special shapes shown in plans.
5. Install lintels, U-blocks and accessories in masonry construction.
6. Install horizontal reinforcing in accordance with Manufacturer's recommendations.
7. Provide weeps in accordance with current NCMA TEK Bulletins.
8. Provide Control Joints in accordance with NCMA recommendations.
9. Coordinate installation of flashings.
10. Comply with applicable codes and regulations for spacing of ties and horizontal reinforcing.
11. Provide expansion and control joints in accordance with BIA and National Concrete Masonry Association recommendations.
12. Remove and replace damaged units.
13. Clean concrete masonry by dry brushing, NCMA TEK No. 28.

B. Installation of Glass Block Assemblies:

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

1. Install materials and systems in accordance with manufacturer's instructions. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
2. Tolerances: From dimensions and locations in Contract Documents for plumb, level and alignment, plus or minus 1/8" in 20'.
3. Bond: Lay glass block in, patterns and bonding as indicated on Drawings.
4. Joints: Maintain uniform 3/8" width; tool concave. Provide full bed, head and collar joints.
5. Coordinate installation of flashings; prepare masonry surfaces smooth and bed flashings in mortar.
6. Horizontal Reinforcing: Comply with codes; space ladder type reinforcing at every other horizontal joint, (16" o.c. vertically).
7. Provide expansion joints at spacing recommended by manufacturer and as approved.
8. Remove and replace damaged units. Enlarge holes in mortar and re-point. Prepare joints to receive sealants where applicable. Clean and protect work from damage.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

**Item S-04800 – Masonry, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**05500 - METAL FABRICATIONS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide the following metal fabrications:
  - 1. Ladders and associated mounting plates & fasteners..
  - 2. Loose bearing and leveling plates.
  - 3. Miscellaneous framing and supports for overhead doors and grilles.
  - 4. Miscellaneous steel trim.
  - 5. Steel angle corner guards.
  - 6. Pipe bollards.
  - 7. Prefabricated building columns and other components – Refer to Pre-Engineered Metal Building

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
  - 1. Shop drawings shall be prepared and stamped by a qualified engineer licensed in the jurisdiction of the project. The Jurisdiction of the project is the State of Louisiana.
- C. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Ferrous Materials:
  - 1. Steel Plates, Shapes and Bars: ASTM A 36.
  - 2. Steel Tubing: ASTM A 500 or A 501.
  - 3. Reinforcing Bars: ASTM A 615, Grade 60.
  - 4. Brackets, Flanges, and Anchors: Cast or formed metal.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

5. Concrete Inserts: Threaded or wedge type.
6. Zinc-Coating: Hot-dip galvanized coating for materials in exterior assemblies or exterior walls.

**B. Fasteners:**

1. Bolts and Nuts: Hexagon head type, ASTM A 307, Grade A.
2. Machine Screws: Cadmium plated steel, FS FF-S-92.
3. Plain Washers: Round carbon steel, FS FF-W-92.
4. Drilled-In Expansion Anchors: FS FF-S-325.
5. Toggle Bolts: Tumble-wing type, FS FF-B-588.
6. Lock Washers: Spring type carbon steel, FS FF-W-84.
7. Zinc-Coating: Fasteners in exterior assemblies or exterior walls.

**C. Auxiliary Materials:**

1. Nonshrink Metallic Grout: CE CRD-C621.
2. Nonshrink Nonmetallic Grout: CE CRD-C621.
3. Interior Anchoring Cement: Hydraulic expansion cement.
4. Exterior/Interior Anchoring Cement: Erosion-resistant hydraulic expansion cement.
5. Shop Primer: Alkyd primer, FS TT-P-645, compatible with topcoats.
6. Galvanizing Repair Paint: SSPC - Paint 20.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Take field measurements prior to preparation of shop drawings and fabrication. Do not delay job; allow for cutting and fitting if field measurement not practical.
- B. Form work true to line with sharp angles and edges. Weld continuously, grind flush and make smooth on exposed surfaces.
- C. Install work plumb and level with hairline joints and ground flush welds.
- D. Lintels: Provide sizes indicated with 8" bearing at each end.
- E. Touch-up damaged coatings with shop primer and galvanize repair paint.
- F. Paint items scheduled in accordance with painting section.

**PART 4 – MEASUREMENT AND PAYMENT**

- G. Work under this section will not be measured for payment.
- H. Payment for work under this section will be made under:

**Item S-05000 – Metals, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**05510 - METAL STAIRS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide steel-framed stairs and handrails to Mezzanine as indicated in the drawings and specifications.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
  - 1. Shop drawings shall be prepared and stamped by a qualified engineer licensed in the jurisdiction of the project.
  - 2. Shop Drawings shall incorporate field-verified dimensions.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Handrail and Railing Structural Performance: ASTM E 985.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Materials:
  - 1. Steel Plates, Shapes, and Bars: ASTM A 36.
  - 2. Hot-Formed Steel Tubing: ASTM A 501.
  - 3. Steel Pipe: ASTM A 53, standard weight (Schedule 40).
  - 4. Cold-Rolled Steel Sheet: ASTM A 366.
  - 5. Hot-Rolled Steel Sheet: ASTM A 569.
  - 6. Galvanized Steel Sheet: ASTM A 653, G 90; Grade A coating designation.
  - 7. Fasteners: Plated fasteners, ASTM B 633, zinc-coated.
- B. Abrasive Nosings:
  - 1. Cast units with an integral abrasive grit.
- C. Grout: Factory-packaged, nonshrink, nonmetallic, ASTM C 1107.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- A. Take field measurements prior to fabrication.. Form to required shapes and sizes with true, straight edges, lines and angles. Provide light-tight, hairline joints.
- B. Coordinate with work of other sections; provide inserts and templates as needed. Install work plumb and level with uniform appearance.
- C. Stairs: Control access to and use of stair systems. Do not permit use of stairs until stairs and railing systems are complete and ready to assume design loading. Do not permit overloading of stair systems. Make connections light-proof tight by welding or bolting; conceal fastenings as much as possible. Grind flush and smooth all exposed welds. Fill pans with 3000 psi concrete with welded wire fabric and provide broom finish.
- D. Railings: provide sizes, profiles and dimensions indicated. Provide mitered joints at 90 degree turns and smooth sweeps at bends. Provide wall returns, end caps, brackets, fittings, and toe boards.
- E. Restore damaged finishes and protect work.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-05000 – Metals, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**06100 - ROUGH CARPENTRY**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide rough carpentry for miscellaneous items indicated in the drawings and specifications and as indicated below:
  - 1. Rooftop equipment base shims and support curbs.
  - 2. Wood grounds, nailers, and blocking at stud walls and window perimeters.
  - 3. Backing panels for Electrical and Telephone boards.
  - 4. Air infiltration barrier. (Refer also to Gypsum Board Assemblies)
  - 5. Cementitious Tile Backer Board (Refer also to Tile and to Gypsum Board Assemblies)

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Lumber Standards and Grade Stamps: U.S. Product Standard PS 20, American Softwood Lumber Standard and inspection agency grade stamps.
- C. Construction Panel Standards: PS 1, U.S. Product Standard for Construction and Industrial Plywood; APA PRP-108.
- D. Preservative Treatment: AWPAC C2 for lumber and AWPAC C9 for plywood; waterborne pressure treatment. Provide for wood in contact with soil, concrete, masonry, roofing, flashing, dampproofing and waterproofing.
- E. Fire-Retardant Treatment: AWPAC C20 for lumber and AWPAC C27 for plywood; noncorrosive type. Provide at building interior where required by code.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Miscellaneous Lumber:
  - 1. Moisture Content: 19 percent.
  - 2. Grade: Standard grade light framing.
  - 3. Pressure-treated material for curbs or curb shims.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

B. Construction Panels:

1. Plywood Backing Panels: APA C-D Plugged Exposure 1 with exterior glue, fire-retardant treated for telephone and data backer-boards
2. Window Opening Liners: Pressure-treated, ripped to size, to form sub-sills, jambs and header liners on metal stud framing to enable attachment of painted wood interior trim.

C. Gypsum Sheathing

D. Auxiliary Materials:

1. Air Infiltration Barrier: Woven polyolefin sheet.
2. Sill Sealer Gaskets: Glass fiber strip resilient insulation.
3. Framing Anchors and Fasteners: Non-corrosive, suitable for load and exposure. Drywall screws are not acceptable.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Plywood: Comply with recommendations of APA Design and Construction Guide - Commercial.
- B. Provide nailers, blocking and grounds where required to set toilet accessories, cabinets, interior wood window trim, and miscellaneous equipment and accessories.
- C. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with other work.
- D. Comply with manufacturer's requirements for cutting, handling, fastening and working treated materials.
- E. Restore damaged components. Protect work from damage.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-06000 – Wood & Plastics, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**06400 - ARCHITECTURAL WOODWORK**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide interior architectural woodwork:
  - 1. Casework and countertop at Lunchroom.
  - 2. Wood paneling and wainscots where laminate-covered wall panels are indicated in the plans, including Maintenance Garage side of metal-stud wall partitions and demising wall between Storage and Office. Refer to the Plans & to Partitions
  - 3. Painted Wood interior window jamb-liners, stool, head and casing at aluminum windows in metal-stud furred, masonry walls.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings of Casework and of Laminate Covered Wall Panels indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
- C. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Standards: Architectural Woodwork Institute (AWI) "Architectural Woodwork Quality Standards."
- C. Preservative Treatment: Nonpressure method, exterior type, NWWDA I.S. 4.
- D. Fire-Retardant Treatment:
  - 1. Lumber: AWPAC20, non-corrosive type.
  - 2. Plywood: AWPAC27, non-corrosive type.
  - 3. Particleboard: ASTM E 84, flame spread 20 or less.
- E. Formaldehyde Emission Levels:
  - 1. Particleboard: NPA 8 compliance.
  - 2. Medium Density Fiberboard: NPA 9 compliance.
  - 3. Hardwood Plywood: HPMA FE compliance.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- F. Mock-Ups: Provide mock-up as required to demonstrate quality of workmanship of each type of architectural woodwork.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Interior Plastic Laminate Clad Casework:
1. Laminate: High-pressure decorative laminate, NEMA LD-3. from Manufacturer's full range, by Nevamar or approved equal.
  2. Grade: Custom.
  3. Face Style: Flush overlay.
  4. Frame Fabrication: Face frame.
- B. Casework Hardware and Auxiliary Materials:
1. Hardware Standard: ANSI/BHMA A156.9.
  2. Hardware Pulls: Lansa Stainless Steel Bar Pulls, as available through IKEA: 6 1/4" center to center mount, , brushed finish or approved equal.
  3. Hinges: Adjustable European style, self-closing, cabinet door hinges for flush-cabinet doors as manufactured by Amerock, or approved equal.
- C. Interior Plastic Laminate Clad Countertops:
1. Laminate: High pressure decorative laminate, NEMA LD-3., from Manufacturer's full range, by Nevamar or approved equal.
  2. Grade: Custom.
  3. Core: Plywood.
  4. Edge: Laminate.
- D. Laminate Covered Paneling System: Fiberlite, F3P500 as manufactured by NUDO Products, Inc., Springfield, ILL., or approved equal:
1. Type: Composite panel.
  2. Face: Fiberglass-reinforced plastic.
  3. Core: 1/2 inch exterior fir plywood.
  4. Trim: Manufacturer's standard accessory trim.
- E. Wood Trim & Casing:
1. Painted Clear Fir, in sizes and shapes per drawings.
- F. Auxiliary Materials:
1. Screws: FS FF-S-111.
  2. Nails: FS FF-N-105.
  3. Anchors: Type required for secure anchorage.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Provide work to sizes, shapes, and profiles indicated. Install work to comply with quality standards referenced. Back prime work and install plumb, level and straight with tight joints; scribe work to fit.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Use non-corrosive fasteners for exterior work.
- C. Coordinate with work of other sections, including without limitation:
  - 1. Steel Doors & Frames
  - 2. Plumbing
  - 3. Electrical
  - 4. Aluminum Windows
  - 5. Joint Sealers
- D. Comply with manufacturer's requirements for cutting, handling, fastening and working treated materials.
- E. Repair minor damage, clean and protect.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-06000 – Wood and Plastics**, per lump sum.

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**07210 - BUILDING INSULATION**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide building insulation and vapor retarders as indicated in the drawings and specifications. Refer also to the Pre-Engineered Metal Building Specification. The Contractor shall coordinate the work of all trades and sub-contractors.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Submit for approval test reports.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Blanket/Batt Insulation:
  - 1. Application: Thermal insulation in studs in exterior walls and at interior face of metal wall panels of the Pre-Engineered Metal Building.
  - 2. Application: Thermal insulation at underside of the roof of the Maintenance Garage, over heated spaces and over soffits.
  - 3. Type A at Main Roof & Upper Metal Walls: Glass fiber or mineral slag fiber, ASTM C 665, Type III (vinyl vapor-retarder membrane).
  - 4. Type B Over Suspended Ceilings & in Partitions: Glass fiber or mineral slag fiber, ASTM C 665, Type III (kraft vapor-retarder membrane).
  - 5. Application: Acoustic insulation – refer to Gypsum Board Assemblies – 09260.
- B. Loose Fill Insulation: Zonolite Masonry Insulation as manufactured by Grace Construction Products or approved equal.
  - 1. Application: Thermal insulation in masonry cells.
  - 2. Type: Loose granular vermiculite, ASTM C 516-80, Type II.
- C. Vapor Retarder (Not Integral with Insulation):
  - 1. Application: Exterior walls.
  - 2. Type: Polyethylene, ASTM D 4397, 6 mils, 0.13 perm vapor transmission rating.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

D. Accessories:

1. Adhesives and mechanical anchors and clips.
2. Protection board.
3. Crack sealers and tapes.
4. Glass Fiber or Rope at CMU weeps to prevent loose fill insulation leakage

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections. Provide full thickness in one layer over entire area, tightly fitting around penetrations.
- B. Pour loose insulation into cavities indicated; provide uniform coverage at correct density and thickness.
- C. Verify that a vapor retarder is installed over entire area of inside face of exterior walls and elsewhere as indicated. Note the change in wall construction between upper and lower walls of the garage. Seal all seams and around perimeter and penetrations with duct tape to form a continuous vapor retarder free of holes.
- D. Protect installed insulation and vapor retarder.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

**Item S-07000 – Thermal & Moisture Protection, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**07600 - FLASHING AND SHEET METAL**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide flashing and sheet metal as indicated in the drawings and specifications. Refer to the Pre-Engineered Metal Building Specifications for flashing between Pre-Engineered Metal Building Components and for prefinished metal flashing components to be provided by the Pre-Engineered Metal Building Manufacturer to match other building flashing. This section is intended to address other flashing which the Pre-Engineered Metal Building Manufacturer may not be able to furnish. The Contractor shall note that the Pre-Engineered Metal Building Manufacturer may not be able to furnish all flashing required by the project
  - 1. The Pre-Engineered Metal Building Manufacturer is hereinafter referred to using the abbreviation P.E.M.B.M.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
- C. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Applications:
  - 1. Exterior wall flashing and expansion joints.
  - 2. Exposed metal trim and fascia units
  - 3. Metal counterflashing and base flashing by P.E.M.B.
  - 4. Built-in metal valleys, gutters, and scuppers by P.E.M.B.
  - 5. Gutters and downspouts by P.E.M.B.
  - 6. Sheet metal accessories by P.E.M.B.
  - 7. Ridge and soffit vents by P.E.M.B.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- B. Sheet Metal Flashing and Trim:
  - 1. Pefinished Metal to match Pre-Engineered Metal Building Flashing
  - 2. Zinc-Coated Steel: ASTM A 653, G90 hot-dip galvanized, 20 gauge (.0359 inch).
  - 3. Stainless Steel: AISI Type 302/304, ASTM A 666, 2D annealed finish, 28 gauge (.0156 inch).
  - 4. Sheet Aluminum sill flashing at windows: ASTM B 209, alloy 3003, clear anodized, 20 gauge (.0359 inch). Minimum.
- C. Flexible Sheet Membrane Flashing: Nonreinforced flexible black elastic sheet, 50 to 65 mils thick, EPDM synthetic rubber.
- D. Fabricated Units: Compliance with SMACNA Sheet Metal Manual.
- E. Elastic Expansion Joints: Factory-fabricated metal-flanged edges to fit curbs and curb substrate.
- F. Auxiliary Materials:
  - 1. Solder compatible with metal.
  - 2. Bituminous isolation coating.
  - 3. Mastic and elastomeric sealants.
  - 4. Epoxy seam sealer.
  - 5. Rosin-sized building paper slip sheet.
  - 6. Polyethylene underlayment.
  - 7. Reglets and metal accessories.
  - 8. Gutter and conductor head guards.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Follow recommendations of SMACNA Sheet Metal Manual. Allow for expansion. Isolate dissimilar materials.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- C. Restore damaged components and finishes. Clean and protect work from damage.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-07000 – Thermal and Moisture Protection**, per lump sum.

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**07720 - ROOF ACCESSORIES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide roof accessories for roof penetrations, openings and roof-mounted equipment shown in the drawings, including without limitation Carbon Monoxide Exhaust System, Toilet Room Exhaust Fan, and Plumbing Vent Penetrations. Coordinate with scope items available through the Pre-Engineered Metal Building Designer & Manufacturer.
- B. Provide curb shims, blocking or adjustable mounting angles and fasteners to enable alignment and coordination with the Pre-Engineered Metal Building roof and flashing assemblies.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Heat and Smoke Vent Insurance Requirements: UL and FM approval or acceptance.
- C. Manufacturer's standard warranty: Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Prefabricated Curb and Equipment Support Units for Carbon Monoxide Discharge System and for Toilet Room exhaust fan:
  - 1. Type: Designed for and compatible with Pre-Engineered Metal Building roof type and equipment.
- B. Pipe Boots: Flexible Neoprene, sized to fit pipe, with stainless steel clamping ring

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

C. Auxiliary Materials:

1. Supplemental Steel curb framing to support equipment.
2. Curb Blocking and Shims.
3. Curb flashing for installation in Metal Roof.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Comply with accessory manufacturers' instructions and recommendations. Coordinate installation with roofing system to ensure weathertight performance. Anchor securely to structure to withstand inward and outward loads.
- B. Mounting surfaces shall be straight and secure; substrates shall be of proper width.
- C. Refer to the construction documents, shop drawings, and manufacturer's installation instructions.
- D. Coordinate installations with curb framing positions, roof system and roof insulation manufacturer's instructions before starting.
- E. Anchor securely to structure to withstand inward and outward loads in accordance with the design criteria.
- F. Observe all appropriate OSHA safety guidelines for this work.
- G. Isolate dissimilar metals to prevent galvanic corrosion.

**PART 4 – MEASUREMENT AND PAYMENT**

- H. Work under this section will not be measured for payment.
- I. Payment for work under this section will be made under:  
**Item S-07000 – Thermal and Moisture Protection**, per lump sum.

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**07900 - JOINT SEALERS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide joint sealers at interior and exterior vertical and horizontal joints. Coordinate with the scope of work of the Pre-Engineered Metal Building Manufacturer.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
  - 1. Include manufacturer's full range of color and finish options if additional selection is required.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Field-Constructed Mock-Ups: Each joint type.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Urethane Elastomeric Joint Sealants:
  - 1. Manufacturers: Bostik, Pecora Corp., Sika Corp., Tremco or approved equal.
  - 2. Type and Application: Multi-part nonsag urethane sealant, ASTM C 920
    - a. Approved: ChemCalk 500 by Bostik or Approved Equal
    - b. Application: For joints in vertical surfaces.
    - c. Application: For joints in vertical and horizontal surfaces.
    - d. Application: For joints in horizontal. surfaces.
    - e. Exterior and interior use.
- B. Latex Joint Sealants:
  - 1. Manufacturers: Pecora Corporation, Polymeric Systems, Inc., Sonneborn Building Products, Tremco, or approved equal.
    - a. Type: Acrylic-emulsion, ASTM C 834.
    - b. Type: Silicone emulsion, ASTM C 834, and ASTM C 920.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- c. Application: Interior joints in vertical and overhead surfaces with limited movement.
- C. Solvent-Release-Curing Joint Sealants:
  - 1. Manufacturers: Bostik, H.B. Fuller Company, Pecora Corporation, Polymeric Systems, Inc., Sonneborn Building Products, Tremco, or approved equal.
    - a. Approved: ChenCaulk by Bostik or Apprved Equal
    - b. Type: Acrylic, ASTM C 920.
    - c. Type: Butyl, FS TT-S-001657.
    - d. Application: Exterior vertical surfaces with limited movement, concealed sealant bead in sheet metal work
- D. Compression Seals:
  - 1. Type: Preformed foam sealant.
  - 2. Type: Preformed hollow neoprene gasket, ASTM D 2628.
  - 3. Application: Wide exterior joints in vertical surfaces.
- E. Fire-Resistive Joint Sealers:
  - 1. Type: Foamed-in-place fire-stopping sealants.
  - 2. Type: One part fire-stopping sealant.
  - 3. Application: Penetrations in fire-rated floor and wall assemblies.
- F. Acoustical Sealants:
  - 1. Type and Application: Synthetic rubber for acoustical sealant for concealed joints at Partitions between Toilet, Lunch, Office, Storage & Mechanical Spaces. at the south wing of Vehicle Maintenance Facility.
- G. Paving Joint Fillers: Refer to the *Louisiana Standard Specification for Roads and Bridges*.
- H. Auxiliary Materials:
  - 1. Plastic foam joint fillers.
  - 2. Elastomeric tubing backer rods.
  - 3. Bond breaker tape.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Examine substrate; report unsatisfactory conditions in writing. Beginning work means acceptance of substrates.
- B. Provide sealants in colors as selected from manufacturer's standards.
- C. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections. Clean and prime joints, and install bond breakers, backer rods and sealant as recommended by manufacturers.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- D. Depth shall equal width up to 1/2" wide. For all other joints, the depth to width ratio of the sealant joint shall be in strict conformance with the manufacturer's recommendations for the specific product and application.
- E. Cure and protect sealants as directed by manufacturers. Replace or restore damaged sealants. Clean adjacent surfaces to remove spillage.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-07000 – Thermal and Moisture Protection**, per lump sum.

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**08110 - STEEL DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide steel doors and frames where indicated in the drawings and specifications. Refer to Door Schedule.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Standards: ANSI/SDI-100, Recommended Specifications for Standard Steel Doors and Frames.
- C. Performance Standards:
  - 1. Fire-Rated Assemblies: NFPA 80, and acceptable testing agency listing.
  - 2. Insured, Thermal-Rated Assemblies at Exterior and Interior doors as indicted in the Door Schedule. ASTM C 236 or ASTM C 976.
  - 3. Sound-Rated Assemblies at Mechanical Rooms: ASTM E 1408, and ASTM E 413.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Manufacturers: Amweld Building Products, Ceco Door Products, Curries Co., Mesker Door, Steelcraft Manufacturing, or approved equal.
- B. Steel Doors:
  - 1. Door Type: Standard steel doors with composite construction consisting of Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.
  - 2. Interior Doors: ANSI/SDI-100, Grade II, extra heavy-duty, minimum 16 gauge (.0598 inch) galvanized steel, 1-3/4 inches thick.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

3. Exterior Doors: ANSI/SDI-100, Grade III, extra-heavy-duty, minimum 16 gauge (.0598 inch) galvanized sheet steel, 1-3/4 inches thick.
4. Accessories:
  - a. Glazing stops.
5. Finish: Factory primed and field painted.

C. Steel Frames:

1. Interior Frames:
  - a. Material: Galvanized sheet steel.
  - b. Corners: Mitered or coped.
  - c. Type: Welded – Knock-down frames will not be accepted.
  - d. Thickness: 14 gauge
2. Exterior Frames:
  - a. Material: Galvanized sheet steel.
  - b. Corners: Mitered or coped.
  - c. Type: Welded - Knock-down frames will not be accepted.
  - d. Thickness: 14 gauge.
3. Accessories:
  - a. Door silencers.
4. Finish: Factory primed and field painted. Refer to 09910 Painting

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Fabricate work to be rigid, neat and free from seams, defects, dents, warp, buckle, and exposed fasteners. Install doors and frames in compliance with SDI-100, NFPA 80, and requirements of authorities having jurisdiction.
- B. Provide thermally improved doors with maximum U-value of 0.24 BTU/hr./sq. ft. degree F (ASTM C 236) for all exterior and interior doors as indicated in the Door Schedule.
- C. Provide acoustically improved doors with minimum STC of 33 (ASTM E 90 and ASTM E 413) at all doors.
- D. Hardware: Prepare doors and frames to receive hardware on final schedule. Preparations shall be shop performed. Provide for 3 silencers on single door frames; 2 on double door frames.
- E. Shop Finish: Clean, treat and prime paint all work with rust-inhibiting primer comparable with finish paint specified in Division 9 section. Provide asphalt emulsion sound deadening coating on concealed frame interiors.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

F. Touch-up damaged coatings and leave ready to receive finish painting.

**PART 4 – MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section will be made under:

**Item S-08000 – Doors and Windows**, per lump sum.

END OF SECTION

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**08333 - OVERHEAD COILING DOORS & OPERATORS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. All of the Contract Documents, including General and Supplementary Conditions, and General Requirements, apply to the work of this Section

**1.02 SUMMARY**

- A. Provide Overhead Coiling Doors and Electric Operators of size and capacity recommended for doors, at each Service Bay entrance to the Maintenance Garage as indicated in the drawings and specifications.
- B. Related Sections: Other specification sections which directly relate to the work of this Section include, but are not limited to, the following:
  - 1. Section 08710 – Door Hardware; key cylinders for locks.
  - 2. Section 13129 – Pre-Engineered Metal Building; Structural steel header and framing to support Doors and Operators.
  - 3. Section 16140 - Electrical; wiring.

**1.03 1.03 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each type of rolling door. Include both published data and any specific data prepared for this project.
- B. Shop Drawings: Submit shop drawing for approval prior to fabrication. Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent materials.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer: Rolling doors shall be manufactured by a firm with a minimum of five years experience in the fabrication and installation of rolling doors. Manufacturers proposed for use, which are not named in these specifications, shall submit evidence of ability to meet performance and fabrication requirements specified, and include a list of five projects of similar design and complexity completed within the past five years.
- B. Installer: Installation of rolling doors shall be performed by the authorized representative of the manufacturer.
- C. Single-Source Responsibility: Provide doors, operators, guides, motors, and related primary components from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
- D. Pre-Installation Conference: Schedule and convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

optimum working conditions and to coordinate this work with related and adjacent work.

- E. Warranty: Provide warranty against defects in material or workmanship for a period of two years from the date of substantial completion.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials and products in labeled protective packages. Store and handle in strict compliance with manufacturers instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations.

**PART 2 - PRODUCTS**

**2.01 ACCEPTABLE MANUFACTURERS**

- A. Manufacturers: Atlas Door Corp., Cookson Co., Cornell Iron Works, Overhead Door Corp., Wayne Dalton, or approved equal
- B. Approved: Provide rolling doors by Overhead Door Corporation, Dallas, Texas, or approved equal.
  - 1. Overhead Door Corporation: Telephone 800-887-3667 or 972-233-6611; Fax 972-233-0367.

**2.02 ROLLING DOORS**

- A. Trade Reference: 616 Series Service Doors by Overhead Door Corporation.
- B. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
  - 1. Flat profile type F-265 for doors up to 16'4" wide, fabricated of 22 gauge galvanized steel.
- C. Finish: Slats and hood shall be galvanized steel in accordance with ASTM A 525 and receive rust-inhibitive, roll coating process, including bonderizing, 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat. Non-galvanized exposed ferrous surfaces shall receive one coat of rust- inhibitive primer.
- D. Color: Manufacturer's standard Gray or Tan polyester top coat. Color to be selected by the project engineer from manufacturer's samples.
- E. Windload Design: 20 PSF.
- F. Weatherseals: Vinyl bottom seal, exterior guide, and internal hood seals.
- G. Bottom Bar: Extruded aluminum.
- H. Guides: Three galvanized steel angles.
- I. Brackets: Painted hot rolled steel plate.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- J. Counterbalance: Helical torsion spring type designed for 20,000 cycle life design. Counterbalance shall be housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 per foot of span. Counterbalance shall be adjustable by means of an adjusting tension wheel.
- K. Hood: 24 gauge galvanized steel with intermediate supports as required. Provide with internal hood baffle weatherseal.
- L. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
  - 1. Sensing Edge Protection: Pneumatic sensing edge.
  - 2. Operator Controls: Push-button operated control stations with open, close, and stop buttons for surface mounting, for interior location. Provide one ON-OFF key switch for all doors. Key Switch shall be keyed alike with general building door keying system.
- M. Wall Mounting Condition: Face-of-wall mounting.

**2.03 OPERATORS**

- A. Trade Reference: Model RG electric door operator by Overhead Door Corporation and suitable for size of door specified, or approved equal.
- B. Motor: 1/3 horsepower, continuous duty, with instant reverse and automatic reset thermal overload. Motor shall be UL listed. Motor frame shall comply with NEMA 56, open drip-proof construction.
- C. Reduction: Primary reduction shall be poly J-belt and pulley. Secondary reduction shall be by chain and sprocket. All moving shafts shall incorporate ball bearings.
- D. Duty Cycle: Standard Usage up to 60 cycles per hour during peak usage periods.
- E. Clutch: Adjustable disc type.
- F. Brake: Solenoid actuated, drum and shoe type.
- G. Limit System: Rotary Type with vernier adjustment, synchronized with door during release operation.
- H. Control System: Heavy duty reversing contactor, electrically and mechanically interlocked with 24 VAC three-button open/close/stop control that allows for constant or momentary contact door open and door close functions. System shall also accommodate connection of a sensing edge and connection of single button control stations; and connection of three-wire radio controls.
- I. Mounting: Jackshaft that is front-of-hood mount, having a chain/sprocket coupling to the door.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- J. Release: Pull and hold type mechanism with an emergency release function to permit door to mechanically lift off of floor in power-loss situations. Release shall incorporate an integrated interlock switch.
- K. Hoist: Chain Hoist shall consist of chain pocket wheel, chain guard and smooth hand chain.

**PART 3 - EXECUTION**

**3.02 3.01 PREPARATION**

- A. Take field dimension and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

**3.03 INSTALLATION**

- A. Comply with manufacturer's installation instructions and recommendations. Installation of the Doors and Operators shall be performed by authorized representatives of the Door and Operator manufacturer. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- B. Instruct Owners personnel in proper operating procedures and maintenance schedule.

**3.04 ADJUSTING AND CLEANING**

- A. Test rolling doors for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Touch-up damaged coatings and finishes and repair minor damage. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned.
- C. Clean and protect work from damage.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-08000 – Doors and Windows, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**08520 ALUMINUM WINDOWS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Furnish and install Aluminum Architectural Windows complete with hardware and related components, as shown on drawings and specified in this section. Refer to the Window Schedule.
- B. Glass and Glazing
  - 1. All units shall be factory glazed.
- C. Single Source Requirement
  - 1. Glazing shall be by the same manufacturer.

**1.02 SUBMITTALS**

- A. Contractor shall submit shop drawings; finish samples, test reports, and warranties. Demonstrate Compliance with International Building Code, 2006.
- B. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.
- C. Test reports documenting compliance with requirements stated herein.
  - 1. Condensation Resistance Factor (CRF) shall not be less than 68 (frame).
  - 2. Thermal Transmittance Test (Conductive U-Value)
  - 3. Test unit in accordance with AAMA 1503.1.
  - 4. Conductive thermal transmittance (U-Value) shall not be more than 0.61 BTU/hr/ft<sup>2</sup>/°F.
- D. Warranties
  - 1. Total Window System: The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total window installation which includes that of the windows, hardware, glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water, and structural adequacy as called for in the specifications and approved shop drawings.
  - 2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at his expense during the warranty periods
    - a. Materials & Workmanship: Two Years
    - b. Metal Finishes: Ten Years
    - c. Glass: Five Years

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations, including International Building Code, 2006

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- B. Exterior Glazing shall comply with ASTM E 1996-02 for the applicable hurricane zone.
- C. Comply with governing codes and regulations, including International Building Code, 2006. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- D. Provide test reports from AAMA accredited laboratories certifying the performance as specified in 1.05.
- E. Test reports shall be accompanied by the window manufacturer's letter of certification, stating the tested window meets or exceeds the referenced criteria for the appropriate AAMA/NWWDA 101/I.S.2 - 97 window type.
  - 1. Testing and Performance Requirements
  - 2. Test Units
    - a. Air, water, and structural test unit shall conform to requirements set forth in AAMA/NWWDA 101/I.S.2 - 97.
    - b. Thermal test unit sizes shall be 4'-0" x 6'-0". Unit shall consist of a single typical fixed window.
  - 3. Test Procedures and Performances
    - a. Windows shall conform to all AAMA/NWWDA 101/I.S.2 - 97 requirements for the window type referenced in 1.01.B. In addition, the following specific performance requirements shall be met.
    - b. Air Infiltration Test
    - c. Test unit in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf.
    - d. Air infiltration shall not exceed .06 cfm per sq. ft. of unit.
    - e. Water Resistance Test
    - f. Test unit in accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 12.0 psf.
    - g. There shall be no uncontrolled water leakage.
    - h. Uniform Load Structural Test
    - i. Test unit in accordance with ASTM E 330 at a static air pressure difference of 120 psf, both positive and negative.
    - j. At conclusion of test there shall be no glass breakage or permanent damage.
    - k. Condensation Resistance Test (CRF)
    - l. Test unit in accordance with AAMA 1503.1.

**PART 2 PRODUCTS**

- A. MANUFACTURERS
  - 1. Acorn Window Systems.
  - 2. All Seasons Commercial Division, Inc.
  - 3. Boyd Aluminum Manufacturing.
  - 4. Custom Window Company.
  - 5. DesCo Windows.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

6. EFCO Corporation.
7. EXTECH/Exterior Technologies, Inc.
8. Fleetwood Aluminum Products, Inc.
9. Graham Architectural Products Corp.
10. Kawneer Company, Inc.
11. Mannix; a Division of Interstate Window Corp.
12. Peerless Products, Inc.
13. Reynolds Architectural Systems; Ramco Mfg. Co.
14. Thermal Windows, Inc.
15. TRACO.
16. Winco Manufacturing Co.
17. Window Technologies, Inc.
18. YKK AP America Inc.
19. OR APPROVED EQUAL

B. :Approved: EFCO® Series 6750 Thermal F-AW80 Fixed or approved equal.

**2.02 MATERIALS**

**A. Aluminum**

1. Extruded aluminum shall be 6063-T5 or T6 alloy and tempered.

**B. Glass**

1. Insulated glass shall be provided by Manufacturer, consisting of 3/16" exterior, 1" air spacer, and 3/16" interior.

**C. Thermal Barrier**

1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
2. Barrier material shall be poured-in-place, two-part polyurethane. A nonstructural thermal barrier is unacceptable.

**2.03 FABRICATION**

**A. General:**

1. All aluminum frame extrusions shall have a minimum wall thickness of .125".
2. Depth of frame shall not be less than 4 1/2".

**B. Frame**

1. Frame components shall be mechanically fastened.

**C. Glazing:**

1. All units shall be glazed with the manufacturer's standard sealant process provided the glass is held in place by a removable, extruded aluminum, glazing bead. The glazing bead must be isolated from the glazing material by a gasket.

**D. Finish:**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

1. Anodic
  - a. Finish all exposed areas of aluminum windows and components with electrolytically deposited color in accordance with Aluminum Association Designation
  - b. AA-M10-C22-A41. Color shall be Clear Anodized.

**PART 3 EXECUTION**

**3.01 INSPECTION**

- A. Job Conditions
  1. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface, and are in accordance with approved shop drawings.

**3.02 INSTALLATION**

- A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.
- B. Plumb and align window faces in a single plane for each wall plane, and erect windows and materials square and true. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.
- C. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

**3.03 ANCHORAGE**

- A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and required wind loads per International Building Code, 2006.

**3.04 PROTECTION AND CLEANING**

- A. After completion of window installation, windows shall be inspected, adjusted, put into working order and left clean, free of labels, dirt, etc. Protection from this point shall be the responsibility of the general contractor.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

**Item S-08000 – Doors and Windows, per lump sum**

**END OF SECTION**

**08520-4**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**08710 - DOOR HARDWARE**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide door hardware.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
- C. Submit for approval hardware schedule proposed for use based on Owner's requirements and the Hardware Schedule contained herein.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Hardware for Fire-Rated Openings: NFPA 80, and local requirements.
- C. Materials and Application: ANSI A156 series standards.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Manufacturers: Best, Corbin Russwin Architectural Hardware, Sargent Manufacturing, Schlage Lock Co., Yale Locks and Hardware, or approved equals.
- B. Approved: Hardware and Manufacturer's as indicated in the Door Hardware Schedule herein, or approved equals. Refer to General Description and to Door Hardware Schedule below.
- C. Door Hardware General:
  - 1. Quality Level: Heavy duty commercial.
  - 2. Locksets and Latchsets: Mortise type.
  - 3. Lock Cylinders: Seven Pin Interchangeable type.
  - 4. Keying: Match existing multiple building keying and key control system.
  - 5. Hinges and Butts: Full-mortise type with nonremovable pins at exterior doors.
  - 6. Closers, Door Control, and Exit Devices: High frequency.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

7. Closers, Door Control, and Exit Devices: Barrier-free.
8. Push/Pull Units: Through-bolted type.
9. Hardware Finishes: Satin stainless finish on exposed surfaces.

D. Door Hardware Schedule:

**DOOR HARDWARE SCHEDULE**

**HARDWARE SET: 01**

**DOOR NUMBERS: 1 & 2**

**EACH TO HAVE:**

3	EA	HINGES	BB5002 4.5 X 4.5 NRP	630	BOM
1	EA	EXIT DEVICE	98L-F	626	VON
1	EA	RIM CYLINDER	1E-72-RP	626	BES
1	EA	DOOR CLOSER	1461 EDA	689	LCN
1	EA	DOOR STOP	466	BLK	ROC
1	EA	THRESHOLD	R0125	628	NGP
1	SET	WEATHERSTRIPPING	2525	BRN	NGP
1	EA	DOOR SWEEP	C627	628	NGP

Card reader and electric strike by others (Refer to Electrical)

**HARDWARE SET: 02**

**DOOR NUMBERS: 3, 4 & 5**

**EACH TO HAVE:**

1	EA	CYLINDER AS REQUIRED	626	BES
BALANCE OF HARDWARE BY DOOR MFG.				

**HARDWARE SET: 03**

**DOOR NUMBER: 6**

**EACH TO HAVE:**

3	EA	HINGES	BB5000 4.5 X 4.5	652	BOM
1	EA	PRIVACY	93K-OL-15D-S3	626	BES
1	EA	DOOR CLOSER	1461	689	LCN
1	EA	FLOOR STOP	440	626	ROC
1	EA	DOOR SWEEP	600A	628	NGP
1	SET	WEATHERSTRIPPING	2525	BRN	NGP

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**HW SET: 04**

**DOOR NUMBER: 7**

EACH TO HAVE:

3	EA	HINGES	BB5000 4.5 X 4.5	652	BOM
1	EA	PASSAGE SET	93K-ON-15D-S3	626	BES
1	EA	DOOR CLOSER	1461	689	LCN
1	EA	FLOOR STOP	440	626	ROC
1	EA	DOOR SWEEP	600A	628	NGP
1	SET	WEATHERSTRIPPING	2525	BRN	NGP
1	EA	THRESHOLD	424	628	NGP

**HW SET: 05**

**DOOR NUMBER: 8**

EACH TO HAVE:

6	EA	HINGES	BB5000 4.5 X 4.5	652	BOM
2	EA	FLUSH BOLTS	555	626	ROC
1	EA	DUSTPROOF STRIKE	570	626	ROC
1	EA	STOREROOM LOCK	93K-7D-15D-S3	626	BES
1	EA	ASTRAGAL	139SP	600	NGP
2	EA	OVERHEAD STOPS	450S	630	GLY
4	EA	DOOR MUTES	608	GRY	ROC

**HW SET: 06**

**DOOR NUMBER: 9**

EACH TO HAVE:

3	EA	HINGES	BB5000 4.5 X 4.5	652	BOM
1	EA	OFFICE LOCK	93K-7AB-15D-S3	626	BES
1	EA	DOOR CLOSER	1461	689	LCN
1	EA	FLOOR STOP	440	626	ROC
1	EA	DOOR SWEEP	600A	628	NGP
1	SET	WEATHERSTRIPPING	2525	BRN	NGP

**HW SET: 07**

**DOOR NUMBERS: 10 & 11**

EACH TO HAVE:

3	EA	HINGES	BB5000 4.5 X 4.5	652	BOM
1	EA	STOREROOM LOCK	93K-7D-15D-S3	626	BES
1	EA	DOOR CLOSER	1461	689	LCN
1	EA	FLOOR STOP	440	626	ROC
1	EA	DOOR SWEEP	600A	628	NGP
1	SET	WEATHERSTRIPPING	2525	BRN	NGP
1	EA	THRESHOLD	424	628	NGP

E. Auxiliary Materials:

- Card-operated opening devices. Refer to the Electrical Specifications.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Follow guidelines of DHI "Recommended Locations for Builder's Hardware and hardware manufacturers' instructions.
- B. Follow DOTD procedure for handling of lock cylinders
  - 1. Contractor shall provide the lock cylinders to the DOTD.
  - 2. The DOTD shall key the locks and return the cylinders to the Contractor.
  - 3. The Contractor shall install the lock cylinders
  - 4. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- C. Adjust operation, clean and protect.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-08000 – Doors and Windows, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**TECHNICAL SPECIFICATIONS**

**08900– INSULATED TRANSLUCENT WALL-LIGHT SYSTEM**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS:**

- A. The General Conditions of the Contract, including Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

**1.02 WORK INCLUDED:**

- A. Design, manufacture and installation of translucent insulating glazing system. A complete assembly of extruded tight-cell polycarbonate glazing panels incorporated into a complete system tested and warranted by the manufacturer as a single source system.
- B. Anchors, brackets, and hardware attachments necessary to complete the specified structural assembly, weatherability and water-tightness performance requirements. All flashing up to but not penetrating adjoining work are also required as part of the system and shall be included.
- C. Trained and factory authorized labor with supervision to complete the entire panel installation.

**1.03 RELATED WORK SPECIFIED ELSEWHERE:**

- A. Section 13129 - Structural Steel/Pre-Engineered Metal Building.
- B. Section 07600 - Sheet Flashing & Sheet Metal.
- C. Section 07900 - Joint Sealers.

**1.04 QUALITY ASSURANCE**

- A. Wall light system must be evaluated and listed by recognized building code authorities: International Council Evaluation Service Inc (ICC-ES) and SBCCI - Public Safety Testing and Evaluation Services Inc.
- B. Materials and Products shall be manufactured by a company continuously and regularly employed in the manufacture of skylights using polycarbonate (not glass) panel systems for a period of at least ten (10) years. Manufacturers shall provide a list of at least ten (10) projects having been in place a minimum of ten (10) years, with similar size, scope, climate and type.
- C. Erection shall be by a factory-approved installer which has been in the business of erecting similar material for at least five (5) consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type.

**STATE PROJECT NO. 610-01-0021**  
**TECHNICAL SPECIFICATIONS**

D. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system, and will ensure that it fully meets all requirements of this specification.

E. **APPROVED MANUFACTURERS:**

All manufacturers acceptable for use on this project under this section must be approved prior to bid. Manufacturers must submit evidence of compliance with all performance criteria specified herein. This evidence must include proof of conformance and test reports as specified below. Any exceptions taken from this specification must be noted on the approval request. If no exceptions are noted and approval is given, product performance will be as specified. Requests for approval, with appropriate submittal data shall be handled in conformance with the *Louisiana Standard Specification for Roads and Bridges*.

1.05 **SUBMITTALS:**

A. Submit shop drawings and color samples in accordance with the Louisiana *Standard Specifications for Roads and Bridges*. Shop Drawings shall include calculations for loads and reactions to be imposed on the Building structure by the Wall Light System. These calculations shall be prepared by a Professional Engineer licensed in the State of Louisiana.

B. The manufacturer shall submit written guarantee accompanied by substantiating data, stating that the products to be furnished are in accordance with or exceed these specifications.

C. The manufacturer shall submit certified test reports made by an independent organization for each type and class of panel system. Reports shall verify that the material will meet all performance requirements of this specification. Previously completed test reports will be acceptable if they are current and indicative of products used on this project. Test reports required are:

1. Self Ignition Temperature (ASTM 1929-3)
2. Smoke Density (ASTM D-2843)
3. Burning Extent (ASTM D-635)
4. Interior Flame Spread (ASTM E-84)
5. Color Difference (ASTM D-2244-85)
6. Weathering (ASTM D-4364)
7. Yellowing Index (ASTM D-1925)
8. Weathering Evaluation before and after exposure to 300°F, 25 minutes include Light Transmission, Color Change, and Yellowing Index, per ASTM E-1175, ASTM D-2244 and ASTM D-1925 respectively.
9. Shatter Resistance (ASTM D-3841/SPI Method B)
10. Large Missile Test - Impact Resistance per SFBC PA 201-94

**STATE PROJECT NO. 610-01-0021**  
**TECHNICAL SPECIFICATIONS**

11. Insulation "U" Factor per ASTM C-236 configured for/or NFRC100 test conditions of 15mph
12. Air Infiltration (ASTM E-283)
13. Water Penetration (ASTM E-331)
14. Load Bearing Capability (ASTM E-330-90)
15. OSHA Life Safety Fall and Walk Through Protection for 300 lb. point load per STD 29 CFR 1910.23 (e)(8)
16. OSHA Life Safety STD 29 CFR - Impact loading by blunt object of 500 ft. lbs. per ASTM E-695-03
17. Performance of exterior windows, curtain walls when impacted by wind-borne debris per ASTM E 1996-02, Level D
18. IES LM-44-90 Testing for Total and Diffused Reflectometry (Diffused Light Transmission)

D. MAINTENANCE DATA: The manufacturer shall provide recommended maintenance procedures, schedule of maintenance and materials required or recommended for maintenance.

**1.06 WARRANTY:**

- A. Provide a single source wall light system manufacturer warranty for glazing panels and framing system.
- B. Provide 10 year manufacturer warranty to include:
  1. Change in light transmission of no more than 6% per ASTM D-1003
  2. No delamination of panel affecting appearance, performance or structural integrity of the panel or the system.
  3. Thermal aging - the light transmission and the color shall not change after exposure to heat of 300°F for 25 minutes. (When measured per ASTM D-1003 and ASTM D-2244 respectively).

**PART 2 PRODUCTS**

**2.01 TRANSLUCENT INSULATING INTERLOCKING TIGHT CELL GLAZING TECHNOLOGY:**

- A. The design and performance criteria of this job are based on products manufactured by CPI International, Inc. Substitute products must be proven equal and approved in accordance with LaDOTD precedures Fiberglass skins are unacceptable.

CPI International, Regional Office: 813-855-7054

**2.02 TRANSLUCENT PANEL PERFORMANCE**

- A. Tight Cell Panel Technology – Longevity and Resistance to Buckling and Pressure

**STATE PROJECT NO. 610-01-0021**  
**TECHNICAL SPECIFICATIONS**

1. Translucent Panels must be of Tight-Cell technology. Wide Cell technology (cell size exceeding 0.18") shall not be acceptable.
2. The extruded panel shall include an integral extruded Tight-Cell structural core. The panel's exterior skins shall be connected with supporting continuous ribs, perpendicular to the skins, at a spacing not to exceed 0.18" (truss-like construction). In addition, the space between the two exterior skins shall be divided by multiple parallel horizontal surfaces, at a spacing not to exceed 0.18".

**B. Appearance:**

1. Panel assembly thickness shall be a minimum .47" with exposed interlocking 1.25" wide U battens or 1" Tee battens.
2. Panel Width: Shall not exceed 2'.
3. The panels shall be uniform in color with an integral Tight-Cell core. In a cross section, the core shall be constructed of tight honeycomb cells not to exceed 0.18" x 0.18". The appearance should be equal to CPI's Pentaglas 12 Panel. Wide cell panel configurations greater than 0.18" shall not be accepted.

**C. Thermal and solar performance:**

1. Insulation Value ("U") per ASTM C236 configured for/or NFRC 100 test conditions - 0.48
2. Light Transmission (L.T.%) 66% per ASTM E1175 or E972 OR D-1003
3. Solar Transmission (S.T.) 0.64 per ASTM E1084 at "normal" (90°) incidence angle.
4. Color: IceWhite

**D. Translucent Panel Joint System:**

1. Panel shall be extruded in one single formable length. Maximum panel width shall not exceed 2'. Transverse connections are not acceptable.
2. The panels should be manufactured with grip-lock double tooth upstands that are integral to the unit. The upstands shall be 90 degrees to the panel face (standing seam dry glazed concept). Welding or gluing of upstands or standing seam is not acceptable.
3. The U, H or Tee battens shall have a grip-lock double tooth locking mechanism to ensure maximum uplift capability.
4. The panel system U connection shall meet wind load performance requirements without deterioration after 100 months of Florida outdoor exposure. This performance must be demonstrated by providing independent lab comparison test reports for a weathered vs. a new panel assembly. As a standard for all systems, provide test reports for a 16mm panel assembly, 6' wide x 12' long with connectors that have been exposed to Florida weather conditions for 100 months

**STATE PROJECT NO. 610-01-0021**  
**TECHNICAL SPECIFICATIONS**

per ASTM E-330-97 for loading, ASTM E 1886-97 for cycling and ASTM E-1996-02 for missile impact at design load of 70 PSF.

5. Air Infiltration: Must meet standard of ASTM D-283 at test pressures of 12.0 PSF - 0.06 SCFM per linear ft. of panel U / H joint connection length.
6. Water Penetration: No water penetration of the panel U / H joint connection length at test pressure of 12.0 PSF per ASTM E-331
7. Free movement of the panels shall be allowed to occur without damage to the weather tightness of the completed system.

**E. Flammability**

1. The exterior and interior faces shall be an approved light transmitting panel with a CC1 fire rating classification per ASTM D-635. Flame spread no greater than 25 per ASTM E-84. Smoke density no greater than 75 per ASTM D2843 and a minimum self-ignition temperature of 1000°F per ASTM 1929. The panel shall be self-extinguishing.
2. Interior flame spread classification of Class I per ASTM E84.

**F. Impact Resistance - the panels shall pass the following tests:**

1. ASTM D-3841/SPI - Impact and Shatter Resistance of 200 ft. lbs.
2. SFBC – PA 201-94, impact resistance of 350 ft. lbs.
3. ASTM E-1996-02 - Must comply with standard specification for performance of exterior windows or curtain walls when impacted by windborne debris at level D and after cyclic wind loading at the specified design load.

**G. OSHA Life Safety Standards 29 CFR 1926.502 (i)(2) and 29 CFR 1910.23 (e)(8)**

1. Panel assembly shall withstand impact loading by blunt object of 500 ft. lbs. per ASTM E695-03
2. Panel assembly shall withstand a 300 lb. point load at 4' span

**H. Extreme Wind Loading - panel system shall meet wind uplift resistance requirements of 130 PSF.**

**I. Weatherability:**

1. The light transmission as measured by ASTM D1003, shall not decrease more than 6% over 10 years, or after exposure to temperature of 300°F for 25 minutes (thermal aging).
2. The panel shall be tested by recognized laboratory for weathering evaluation per ASTM D4364-84 (EMMAQUA, UNBACKED), after exposure to minimum concentrated natural sunlight radiation of 56000 MJ/M<sup>2</sup> (1540 MJ/M<sup>2</sup> of UV, 200 – 385 N.M). The panel shall not change in color more than 5.0 units Delta E, 5.0 units Delta L and Delta B.

**STATE PROJECT NO. 610-01-0021**  
**TECHNICAL SPECIFICATIONS**

3. The panel shall not change color more than 5.0 units (DELTA-E by ASTM D2244) after 60 months outdoor weathering in Arizona determined by an average of at least two samples.
4. Thermal aging - the interior and exterior faces shall not change color in excess of 0.75 Delta E by ASTM D2244 and shall not darken more than 0.3 units (Delta L by ASTM D2244) and 0.2 units Delta Y (YI) by ASTM D1925 and shall not show cracking or crazing when exposed to 300°F for 25 minutes.
5. The faces shall not become readily detached when exposed to temp of 300°F and 0°F for 25 minutes.
6. Panels shall consist of a polycarbonate resin with a permanent, co-extruded, ultra-violet protective layer. Post-applied coating or films of dissimilar materials are unacceptable. Fiberglass skins are unacceptable.
7. UV Maintenance: The system shall require no scheduled re-coating to maintain its performance or for UV protection.
8. Panel shall be factory sealed at the sill to restrict dirt ingress.

**J. Diffused Light Transmission:**

As a reference for measuring the quality of the diffused light through the panel assembly, the IES (Illuminating Engineering Societies) LM-44-1990 Approved Method for Total and Diffuse Reflectometry procedure shall be used. Results for a Clear Pentaglas / Single Glazed panel assembly shall be provided as a base standard for comparison.

For Pentaglas / Single Glazed systems with total illuminator flux output at 60 lumens, diffused light transmission requirements are:

Zonal Zone	% of transmittance from the maximum total lumens transmitted through the panels
0-30	66.0
0-40	78.5
0-60	94.0
0-90	100.0

**K. The minimum ratio of the panel weight to the panel thickness should be:**

For 0.47" thick Pentaglas 12 panel, 0.54 LB. per S.F.

**2.03 METAL FRAME STRUCTURE**

- A. Shall meet ANSI/ASCE 7-98 minimum design load for buildings and other structures.

**STATE PROJECT NO. 610-01-0021**  
**TECHNICAL SPECIFICATIONS**

- B. The Wall Light System framing shall be designed by the Wall Light System Manufacturer or by the Contractor to be self-supporting between the structural elements of the Pre-Engineered Metal Building. The Pre-Engineered Metal Building Structure shall be designed to support the transfer of all loads including horizontal and vertical, exerted by the Wall Light System. These loads shall be provided to the Contractor by the Wall Light System Manufacturer to inform design of the Pre-Engineered Metal Building. Structural engineering services for the design of primary and secondary structural members of the Pre-Engineered Metal Building shall be performed by the Pre-Engineered Metal Building Manufacturer or by the Contractor.
- C. Water Penetration: The Metal Framed Skylight shall allow no water penetration at a minimum differential static pressure of 6.24 lbs. per sq. ft. per AAMA 501-94 Pressure Difference Recommendations and as demonstrated by prior testing of typical framing sample per ASTM E-331
- D. Water test of Metal Frame Structure shall be conducted according to procedures in AAMA 501.2

## 2.04 METAL MATERIALS

- A. Extruded Aluminum shall be ANSI/ASTM B221; 6063-T6; 6063-T5 or 6005-T5.
- B. Flashing:
  - 1) 5005 H34 aluminum 0.04" minimum thickness.
  - 2) Sheet metal flashings/closures/claddings are to be furnished shop formed to profile - when lengths exceed 10 ft. in nominal 10-ft lengths. Field trimming of the flashing and field forming the ends is necessary to suit as-built conditions. Sheet metal ends are to overlap at least 6-in. to 8-in., set in a full bed of sealant and riveted if required.
- C. All Fasteners for aluminum framing to be stainless steel or cadmium plated steel, excluding the final fasteners to the building.
- D. All exposed ALUMINUM FINISH shall be standard color Clear Anodize.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. General Contractor to verify when structural support is ready to receive all work in this section and to convene a Pre-Installation Conference at least one week prior to commencing work of this Section. Attendance required of General Contractor, skylight installer and all parties directly affecting and effected by the work of this section.

**STATE PROJECT NO. 610-01-0021**  
**TECHNICAL SPECIFICATIONS**

- B. All submitted opening sizes, dimensions and tolerances are to be field verified by general contractor unless otherwise stipulated.
- C. Installer to examine area of installation to verify readiness of site conditions. Notify general contractor about any defects requiring correction. Do not work until conditions are satisfactory.

**3.02 INSTALLATION**

- A. Install components in strict accordance with manufacturer's instructions and approved shop drawings. Use proper fasteners and hardware for material attachments as specified.
- B. Use methods of attachment to structure allowing sufficient adjustment to accommodate tolerances.
- C. Remove all protective coverings on panels immediately after installation.

**3.03 CLEANING**

- A. Follow manufacturer's instructions when washing down exposed panel surfaces using a solution of mild detergent in warm water that is applied with soft, clean wiping cloths.
- B. Follow strict panel manufacturer guidelines when removing foreign substances from panel surfaces requiring mineral spirits or any solvents that are acceptable for use.
- C. Installers shall leave panel system clean at completion of installation. Final cleaning shall be performed by the Contractor in accordance with the manufacturer's cleaning instructions upon completion of project.

**PART 4 MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

**Item S-08000 – Doors and Windows, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**09260 - GYPSUM BOARD ASSEMBLIES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide gypsum board assemblies as indicated in the drawings and specifications, including without limitation:
  - 1. Interior walls, partitions, and ceilings with tape and joint compound finish.
  - 2. Steel framing systems to receive gypsum board.
  - 3. Insulation and vapor barrier systems in gypsum board assemblies.
  - 4. Cementitious backer units for application of tile.
  - 5. Installation of access panels in gypsum board assemblies.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Tolerances: Not more than 1/16 inch difference in true plane at joints between adjacent boards before finishing. After finishing, joints shall be not be visible. Not more than 1/8 inch in 10 feet deviation from true plane, plumb, level and proper relation to adjacent surfaces in finished work.
- C. Fire Resistance for Fire-Rated Assemblies: ASTM E 119.
- D. Mock-Ups: Provide mock-up as required to demonstrate quality of workmanship and level of finish.
- E. Performance: Fire, structural, and seismic performance meeting requirements of building code and local authorities.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Manufacturers of Gypsum Board: Domtar Gypsum, Georgia-Pacific Corp., National Gypsum Co., United States Gypsum Co., or approved equal.
- B. Manufacturers of Steel Framing and Furring: Dale Incor, Dietrich Industries, Marino Ware, National Gypsum Co., Unimast, or approved equal.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- C. Manufacturers of Grid and Suspension Systems: Armstrong World Industries, Chicago Metallic, USG Interiors, or approved equal.
- D. Gypsum Board:
  - 1. Gypsum Wallboard for Tape and Joint Compound Finish: ASTM C 36, regular, moisture-resistant, and fire-rated types as required:
    - a. Typical Thickness: 5/8 inch.
  - 2. Water-Resistant Gypsum Backing Board: ASTM C 630, regular and fire-rated types as required:
    - a. Typical Thickness: 5/8 inch.
  - 3. Joint Treatment: ASTM C 475 and ASTM C 840, 3-coat system, paper or fiberglass tape.
- E. Cementitious Backer Units:
  - 1. Type: ANSI A 118.9, cement-coated Portland cement panels.
  - 2. Thickness: 5/8 inch nominal.
- F. Trim Accessories:
  - 1. Material: Metal trim
  - 2. Types: Cornerbead, edge trim, and control joints.
- G. Steel Framing for Walls and Partitions:
  - 1. Steel Studs and Runners: ASTM C 645, steel studs with manufacturer's standard corrosion-resistant coating:
    - a. Thickness: 20 gauge (.0329 inch).
    - b. Typical Depths: 3-5/8 inch & 6 inch as shown in the plans.
  - 2. Furring Channels: ASTM C 645 with manufacturer's standard corrosion-resistant coating:
    - a. Thickness: 20 gauge (.0329 inch).
  - 3. Auxiliary Framing Components: Furring brackets, resilient furring channels, Z-furring members, and non-corrosive fasteners.
- H. Steel Framing for Suspended and Furred Ceilings:
  - 1. Furring Channels: ASTM C 645, channels with manufacturer's standard corrosion-resistant coating:
    - a. Type: Standard.
    - b. Thickness: 20 gauge (.0329 inch).
  - 2. Accessories: Hangers and inserts.
- I. Auxiliary Materials:
  - 1. Gypsum board screws, ASTM C 1002.
  - 2. Concealed acoustical sealant at all gypsum board and metal stud partitions.
  - 3. Mineral fiber sound attenuation blankets at Office Lunch Storage & Toilet Room demising Partitions.
  - 4. Mineral fiber thermal insulation at Maintenance Garage/Office wing demising partition.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

5. Polyethylene vapor retarder, 6 mils.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install steel framing in compliance with ASTM C 754. Install with tolerances necessary to produce substrate for gypsum board assemblies with tolerances specified. Include blocking for items such as railings, grab bars, casework, toilet accessories and similar items.
- B. Install gypsum board for a smooth tape and 3-coat joint compound finish in compliance with ASTM C 840 and GA 216, Recommended Specifications for the Application and Finishing of Gypsum Board. Install gypsum board assemblies true, plumb, level and in proper relation to adjacent surfaces.
- C. Provide continuous vapor retarder at exterior walls.
- D. Provide fire-rated systems where indicated and where required by authorities having jurisdiction.
- E. Install boards vertically. Do not allow butt-to-butt joints and joints that do not fall over framing members.
- F. Provide insulation full height and thickness in partitions at conference rooms, toilet rooms, between different occupancies, and where required.
- G. Provide acoustical sealant at both faces at top and bottom runner tracks, wall perimeters, openings, expansion and control joints.
- H. Install trim in strict compliance with manufacturer's instructions and recommendations.
- I. Repair surface defects. Leave ready for finish painting or wall treatment.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-09000 – Finishes**, per lump sum.

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**09300 - TILE**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Furnish and install Interior Tile as indicated in the drawings and specifications including:
  - 1. Wall tile over tile backer board at wet areas.
  - 2. Floor tile over concrete slab.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
  - 1. Include manufacturer's full range of color and finish options if additional selection is required.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Tile: ANSI A 137.1
- C. Tile Setting Materials: ANSI A 118 series standard specifications.
- D. Tile Installation: ANSI 108 series standard specifications and Tile Council of America, Handbook for Ceramic Tile Installation.
- E. Mock-Ups: Provide mock-up as required to demonstrate quality of workmanship.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Manufacturers of Tile: American Olean, Dal-Tile, Summitville Tiles, United States Ceramic Tile Co. or approved equal.
- B. Manufacturers of Setting Materials: American Olean, Bostick Construction Products, Laticrete, Mapei Corp or approved equal.
- C. Unglazed Ceramic Mosaic Tile, Floor & Cove Base:

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

Dal-Tile, Keystones porcelain ceramic Brownstone Range, D156. Abrasive or approved equal

1. Thickness: 1/4 inch nominal.
2. Size: 2 by 2 inches.
3. Type: Porcelain factory-mounted flat tile:
  - a. Abrasive admixture.
4. Face: Plain face with cushion edges.

**D. Glazed Wall Tile:**

Dal-Tile, Semi-gloss Wall Tile, porcelain ceramic White 0100

1. Thickness: 5/16 inch nominal thickness.
2. Size: 4-1/4 by 4-1/4 inches.
3. Type: Interior type body, flat tile.
4. Face: Plain face with cushion edge.

**E. Tile Accessories:**

1. Matching trim units. Base Cove to match floor tile, all other trim to match wall tile.
2. Marble thresholds.

**F. Setting Materials:**

1. Latex-Portland cement mortar.

**G. Grout:**

1. Chemical-resistant epoxy grout.

**H. Setting Accessories:**

1. Membrane waterproofing under tile, ANSI A 118.10.
2. Cementitious tile backer board, ANSI A 118.9.

**I. Elastomeric Sealants:**

1. One-part mildew-resistant silicone sealant for non-traffic areas.
2. Multi-part pourable urethane sealant for traffic areas.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Comply with Tile Council of America and ANSI Standard Specifications for Installation for substrate and installation required. Comply with manufacturer's instructions and recommendations.
- B. Install waterproof membrane in accordance with manufacturer's instructions and recommendations.
- C. Slope to floor drain. Coordinate with floor drain installation. Refer to the plumbing drawings.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- D. Lay tile in grid pattern with alignment grids. Layout to provide uniform joint widths and to minimize cutting; do not use less than 1/2 tile units.
- E. Provide sealant joints where recommended by TCA and approved by Engineer.
- F. Grout and cure, clean and protect.

3.02 SCHEDULE

A. Tile Schedule:

- 1. Toilet Room Walls: Glazed ceramic mosaic tile over tile backer board with thin-set latex-modified cement mortar and latex-Portland cement grout.
- 2. Toilet Room Floors & Cove Base: Unglazed ceramic mosaic tile over concrete slab with latex-Portland cement mortar and latex-Portland cement grout.

PART 4 – MEASUREMENT AND PAYMENT

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-09000 – Finishes**, per lump sum.

END OF SECTION

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**09512 - ACOUSTICAL PANEL CEILINGS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide acoustical lay-in panel ceilings and exposed metal suspension system as indicated in the drawings and specifications. Refer to the Finish Key and to the Reflected Ceiling Plans.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
- C. Extra Stock: Submit extra stock equal to 10% of quantity of installed units.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Performance: Fire, structural, and seismic performance meeting requirements of building code and local authorities. Acoustical performance based on project requirements.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Manufacturers: Armstrong World Industries, Celotex, USG Interiors or approved equal.
- B. Mineral Base Panels, Water Felted:  
  
Armstrong World Industries Item No. 1820, 24" X 24", fine fissured, angled tegular edge or approved equal.
  - 1. Size: 24 by 24 inches.
  - 2. Thickness: 3/4 inch.
  - 3. Pattern: Perforated and lightly textured.
  - 4. Edge: Angled Tegular.
  - 5. Type and Finish: Scrubbable finish, ASTM E 1264, Type IX, Form 2.
- C. Direct-Hung Suspension Systems, Non-Fire-Resistance Rated:

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

Armstrong World Industries: Prelude XL 15/16" Exposed Tee, White or approved equal.

1. Compatibility: Suspension system recommended by manufacturer for use with the approved panels
2. Type: Wide-face, capped double web galvanized steel, ASTM C 635.
  - a. G60 galvanizing.
3. Classification: Heavy duty.
4. Suspension System Accessories: Attachment devices and hangers, ASTM C 635.
5. Cap Material: Painted steel finish.

D. Auxiliary Materials:

1. Edge molding and trim.
2. Hold-down clips and impact clips.
3. Concealed acoustical sealant.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install materials and suspension systems in accordance with manufacturer's instructions and recommendations, and ASTM C 636. Coordinate installation with location of mechanical and electrical work to ensure proper locations and anchorage.
- B. Level ceiling to within 1/8" in 10' in both directions. Scribe and cut panels to fit accurately. Measure and layout to avoid less than half panel units.
- C. Removal and reinstallation at existing ceilings: Remove and store materials for reuse when allowed. Handle with white gloves and avoid damaging corners and edges. Clean tiles and grid system which have been removed. Provide additional materials to complete the work and to replace damaged existing materials. New materials shall match existing materials as approved.
- D. Adjust, clean, and touch-up all system components.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-09000 – Finishes, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**09650 - RESILIENT FLOORING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide resilient flooring and floor preparation where indicated in the drawings and specifications. Refer to the Finish Key.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
- C. Extra Stock: Submit extra stock equal to 10% of total used.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Performance: Fire performance meeting requirements of building code and local authorities.
- C. Provide materials and adhesives which do not contain asbestos.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Solid Vinyl Tile Flooring:
  - Azrock, Milano, SR Solid Vinyl Tile or approved equal.
- 1. Manufacturers: Amtico International, Azrock Industries, Flexco Co., VPI Floor Products, or approved equal.
- 2. Vinyl Tile: FS SS-T-312B, Type III
- 3. Size: 12 by 12 inches.
- B. Auxiliary Materials:
  - 1. Edge strips and terminations.
  - 2. Feature strips and inlaid borders.
  - 3. Manufacturer approved, compatible Leveling compound.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Comply with manufacturer's instructions and recommendations. Install in proper relation to adjacent work.
- B. Prepare surfaces by cleaning, leveling and priming as required.
- C. Test concrete slab substrate to verify that moisture vapor transmission does not exceed 3 lb per1000 SF per 24 hours when tested according to ASTM 1869.
- D. Test concrete slab substrate to verify that surface pH is no greater than 9.
- E. Test adhesive for bond before general installation. Level to 1/8" in 10' tolerance.
- F. Tile Flooring: Install tile with tight joints and with one-way pattern. Layout to prevent less than 1/2 tile units.
- G. Clean, polish, and protect.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-09000 – Finishes, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**09651 - RESILIENT BASE AND ACCESSORIES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide resilient wall base and associated accessories where indicated in the drawings and specifications. Refer to the Finish Key.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
- C. Submit extra stock equal to 10% of total used.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Performance: Fire performance meeting requirements of building code and local authorities.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Manufacturers: AFCO Rubber Corp., Johnsonite, Roppe, VPI Floor Products, or approved equal.
- B. Resilient Wall Base:
  - Roppe, 1/8" Rubber Base, ASTM type TP 7P194, Color P194 Burnt Umber or approved equal.
  - 1. Rubber Wall Base: FS SS-W-40, Type I.
  - 2. Thickness: 0.125 inches thick.
  - 3. Height: 4 inches.
- C. Installation Accessories:
  - 1. Concrete Slab Primer: Nonstaining type.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

2. Compatible Trowelable Underlayments and Patching Compounds: Latex-modified, Portland-cement-based formulation.
3. Adhesives: Manufacturer-approved compatible, Water-resistant type.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Comply with manufacturer's instructions and recommendations. Install in proper relation to adjacent work.
- B. Install base and accessories to minimize joints. Install base with joints as far from corners as practical.
- C. Clean, polish, and protect.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-09000 – Finishes**, per lump sum.

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**09910 - PAINTING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide the following:
  - 1. Painting and surface preparation for interior unfinished surfaces as scheduled.
  - 2. Painting and surface preparation for exterior unfinished surfaces as scheduled.
  - 3. Field-painting and surface preparation of exposed mechanical and electrical piping, conduit, ductwork, and equipment.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
  - 1. Include manufacturer's full range of color and finish options if additional selection is required.
- C. Extra Stock: Submit 2 unopened gallons of each paint and color used in the project.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Regulations: Compliance with VOC and environmental regulations.
- C. Mock-Ups: Provide mock-up as required to demonstrate quality of workmanship.
  - 1. Provide 4 foot x 4 foot mock-ups of each type of surface.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Manufacturers: ICI Devoe Coatings, Benjamin Moore, Pratt and Lambert, Sherwin Williams, Superior Coating Systems or approved equal. Provide First-line commercial-quality products for all coating systems.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Inspect surfaces, report unsatisfactory conditions in writing; beginning work means acceptance of substrate.
- B. Test concrete surfaces for moisture content and acidity. Verify compatibility with coating prior to application.
- C. Comply with manufacturer's instructions and recommendations for preparation, priming and coating work. Coordinate with work of other sections.
- D. Match approved mock-ups for color, texture, and pattern. Re-coat or remove and replace work which does not match or shows loss of adhesion. Clean up, touch up and protect work.

**3.02 PAINT SCHEDULE**

- A. Gypsum Drywall Walls and Ceilings: Lunch, Office, Storage, Mechanical Closet
  - 1. Finish Gloss:
    - a. Semi
  - 2. System:
    - a. 1 coat latex primer: Pro Mar Latex Wall Primer, B28-W-1 or approved equal.
    - b. 2 coats alkyd finish: Pro-Mar Alkyd Eg-Shel Enamel, B-33-W-100 or approved equal.
- B. Exposed Interior Concrete Masonry Units:
  - 1. Finish Gloss:
    - a. High
  - 2. System:
    - a. 1 coat latex block filler: Kem Cati-Coat Epoxy Filler/Sealer or approved equal.
    - b. 2 coats latex finish: Pro-Mar Alkyd Eg-Shel Enamel, B-33-W-100 or approved equal.
- C. Ferrous Metals:
  - 1. Finish Gloss:
    - a. High
  - 2. System:
    - a. 1 coat rust-inhibiting primer: Sherwin Williams, Kem Kromik Metal Primer B50N2/B50W1 or approved equal.
    - b. 2 coats alkyd enamel: Sherwin Williams Industrial Enamel B-45 Series or approved equal.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**D. Galvanized Metal:**

1. Finish Gloss:
  - a. Semi
2. System:
  - a. 1 coat galvanized metal primer: Sherwin Williams Galvite B50W3 or approved equal.
  - b. 2 coats alkyd enamel: Sherwin Williams Industrial Enamel B-45 Series or approved equal.

**E. Concrete Building Slab under Roof (including at Lube Oil Shed):**

1. Finish Gloss:
  - a. Semi – (High Gloss Finish is not acceptable)
2. System:
  - a. 1 coat Primer: Recommended for application, compatible with and produced by same manufacturer as successive coats; EP-5500 Pre-Primer as manufactured by Superior Coating Systems of Stony Point, New York, or approved equal.
  - b. 2 coats Recommended for application, compatible with and produced by same manufacturer as primer coat; Insl-Tile II, two-component, Activated Polyamide Epoxy Coating, EP-5300 as manufactured by Superior Coating Systems of Stony Point, New York, or approved equal.
3. Color:
  - a. Custom Color as selected by Engineer.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

**Item S-09000 – Finishes, per lump sum.**

**END OF SECTION**

**09910-3**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**09963 - ELASTOMERIC COATINGS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide exterior elastomeric coatings at all exposed surfaces of concrete masonry.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
  - 1. Include manufacturer's full range of color and finish options if additional selection is required.
- C. Extra Stock: Provide 2 unopened gallons of each paint used in the project.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Regulations: Compliance with VOC and environmental regulations.
- C. Single Source Responsibility: Provide recommended, compatible primers produced by the same manufacturer as the finish coats. Use only thinners recommended by the manufacturer, and only within recommended limits.
- D. Mock-Ups: Provide mock-up as required to demonstrate quality of workmanship.
  - 1. Provide 4 foot x 4 foot mock-ups of each type of surface.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Manufacturers: Benjamin Moore, Glidden, Sonneborn Building Products, Thoro - Harris Speciality Chemicals, Tnemec, or approved equal. First-line commercial-quality products for all elastomeric coating systems.
  - 1. Approved Products:
    - a. NeoFlex Waterproof Elastic Coating System by Neogard, or approved equal.
    - b. Thorolastic by Thoro Systems Products, or approved equal.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- c. 156 Enviro-Crete by Tnemec, or approved equal.
- 2. Primers: Factory pigmented formulated prime coat material compatible with the substrate and finish coats indicated.
- 3. Finish Coats: Factory formulated material, compatible with the substrate and primer. Pigmented, emulsion type, flexible, elastomeric, high-build, waterproof acrylic coating for application over all specified and primed surfaces.
- 4. Miscellaneous Materials: Provide materials not specifically described, but required for complete and proper performance of the work and as recommended by the manufacturer of the special coatings. These materials shall be compatible with the products specified in this section.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Inspect surfaces, report unsatisfactory conditions in writing; beginning work means acceptance of substrate.
- B. Comply with manufacturer's instructions and recommendations for preparation, priming and coating work. Coordinate with work of other sections.
- C. Mask surfaces not to receive elastomeric coating.
- D. Apply coatings with brush and roller applicators in accordance with the manufacturer's instructions.
- E. Apply product as packaged. Do not dilute or alter. Apply sufficient material to thoroughly wet masonry surface. Work coating into surface. Brush out drips and runs. Provide uniform monolithic appearance, free of ridges, brush-strokes, drips and runs. Allow surface to dry twenty-four hours prior to the application of successive coats.
- F. Match approved mock-ups for color, texture, and pattern. Re-coat or remove and replace work which does not match or shows loss of adhesion. Clean up, touch up and protect work.

**3.02 ELASTOMERIC COATING SCHEDULE**

- A. Concrete Masonry: 1 coat block filler where appropriate, 1 coat primer, 2 coats acrylic elastomeric coating; dry film thickness not less than 20 mils excluding block filler.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-09000 – Finishes**, per lump sum.

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**  
**10440-INTERIOR SIGNAGE**

**PART 1-GENERAL**

**1.01 SUMMARY**

- A. Provide Interior Signage Design Manufacture and Installation at the new Vehicle Maintenance Facility for a total of ten (10) interior signs to match those at the existing adjacent Police and Maintenance Building.

**1.02 SUBMITTALS**

- A. Samples:
  - 1. Submittal of samples is not required. Existing signage at the Crescent City Connection Police and Maintenance Building shall serve as the samples for the job. Match these signs in detail.
- B. Shop Drawings:
  - 1. Submit shop drawings typical of each sign type including details of sign wording and lettering layout. Show anchorages and accessory items.
  - 2. Fasteners, anchors, and hardware shall be of commercial quality.
    - a. Hardware shall be non-corrosive type and shall be non-conductive and/or insulated when joining non-compatible material. All hardware to be concealed.
- C. Signage Schedule:
  - 1. The Contractor shall prepare a Signage Schedule which gives the plan location code, sign copy, sign type, mounting surface and other information for each sign necessary to satisfy the ADA and to match the signage standards or the Crescent City Division of the DOTD. Copy for signs is within the signage schedule, and must be verified prior to any manufacturing of signs.

**PART 2. - PRODUCTS**

**2.02 SIGNAGE**

- A. General:
  - 1. Typography:
    - a. Provide Type Style: HELVETICA MEDIUM in locations indicated unless noted otherwise. Copy shall match sizes of CCCD standard signs.
    - b. Letterforms shall be aligned to maintain a base line parallel to the sign format. Margins shall be maintained as specified by sign type drawings.
    - c. Edges of letterforms shall be sharp and clean, with no edge build-up or bleeding. Surfaces of letterforms shall be without pinholes.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- d. Die cutting shall be executed in such a manner that all edges and comers of finished letterforms are true and clean. Letterforms with rounded positive or negative edges, nicked, cut or ragged edges shall not be accepted.
- e. Directional arrows shall be as indicated for each sign type.
- f. Letter height shall be identified as "cap" letter height.
- g. Letter spacing shall be standard, unless otherwise noted.

2. Symbols

- a. Regulatory symbols shall conform to the color, form, layout and content of Uniform Traffic Control Devices, U.S. Department of Transportation. Other symbols shall conform to the color, form, layout and content of international symbols adopted for use by the U.S. Department of Transportation. Symbols shall be provided where schematically indicated on signage schedule.

- 3. The graphic configuration of signs is ultimately governed by the original art for each sign provided by the successful contractor approval.
- 4. Original art shall conform to the dimensions and general configurations existing at the CCCD Police and Maintenance Building.
- 5. Sign units shall be adequately vented to dissipate heat.
- 6. No piccc shall carry any manufacturer's code or other identifying signs on any area or part of which may be visible.
- 7. The structural integrity of the signs shall be the responsibility of the sign manufacturer.

2.03 MATERIALS

A. Cast Acrylic Sheet:

- 1. 1. Provide cast methacrylate plastic sheet with a minimum flcxural strength of 16,000 psi. in the following general types:
  - a. Where indicated as "clear", provide colorless sheet with light transmittance of 95%, in matte finish, first surface.
  - b. Where indicated as "opaque", provide colored opaque acrylic sheet.

B. Aluminum:

- 1. Aluminum plate shall be fabricated from alloy 606 1-T6 or other alloy as required for applicable function and use as recommended by the ALUMINUM COMPANY OF AMERICA or equivalent manufacturer.

**STATE PROJECT NO. 610-01-0021**

**SPECIFICATIONS**

2. Aluminum used for all exposed surfaces shall be a minimum of .125" with a painted finish in strict accordance with manufacturer's specifications.

**C. Vinyl Film:**

1. 1.Non-reflective vinyl film, 10 mil minimum thickness, with pressure sensitive adhesive backing, suitable for exterior as well as interior applications. Color to be integral.

**D. Fasteners:**

1. Fasteners, anchors, and hardware shall be of commercial quality.
  - a. Hardware shall be non-corrosive type and shall be non-conductive and/or insulated when joining non-compatible material. All hardware to be concealed.

**E. Paint:**

1. All paints required shall be a type made for the surface material on which it is applied and recommended by the manufacturer of the paint. Exact identification of all paint shall be noted on the shop drawings, together with data describing the method of application.
2. Do not use paint that will fade, discolor or delaminate as a result of proximity to light source or heat therefrom shall be used.
3. All paints shall be evenly applied and without pinholes, scratches, orange peeling, application marks, etc.
4. Prime coats or other surface pre-treatments, where recommended by the manufacturer for paints, shall be included in the work as part of the finished surface work at no extra cost to the Owner.

**F. Grade II Braille:**

1. Grade II Braille shall match specifications as outlined in the "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities".

**G. Adhesives:**

1. All adhesives and adhesive tapes required for plastic shall be a type recommended for the particular usage by the manufacturer and guaranteed to meet the general and structural support criteria shown on the drawings.

**H. Engraving Material:**

1. Provide 1/16" thick colorless clear acrylic, matte surface for sign face panel.
2. Provide 1/16" thick continuous color white engraving substrate for tactile copy.
  - a. Rowmark "ADA Alternative", white 11-321-201.
  - b. Engineer approved equivalent.

**2.04 FABRICATION:**

- A. Fabricated panel signs to comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes and details of construction.

**STATE PROJECT NO. 610-01-0021**

**SPECIFICATIONS**

- B. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16" measured diagonally from corner to corner.
- C. Tactile Lettering:
  - 1. Tactile lettering shall be fabricated using a computerized routing/engraving system. Letterforms shall be routed into the sign panel face. Matching tactile letters shall be cut out of 1/16" material and inlaid into the routed out letterform recesses. There shall be no excess adhesive visible around letterforms. The tactile lettering shall project from the sign face 1/32".
- D. Graphic Image Process:
  - 1. Provide sign copy to comply with requirements indicated for sizes, styles, spacing, content, positions, materials, finishes and colors of letters numbers, symbols and other graphic devices.
  - 2. For exposed sign materials which require selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated.

**PART 3 - INSTALLATION**

- A. Locate sign unit and accessories where indicated, using mounting methods of type described and in compliance with manufacturer's instructions, unless otherwise indicated.
- B. Permanent identification signs shall be installed on the wall adjacent to latch side of the door. Where there is no wall space to the latch side, including at double leaf doors, signs shall be placed at the nearest adjacent wall. Mounting height shall be 60" from the finished floor to the centerline of the sign. Mounting locations for such signage shall be so that any person may approach 3' of the signs without encountering protruding objects or standing within the door swing. "Do Not Enter" signs and some general information signs may be placed on the door. These signs shall be mounted 60" from the finished floor to the centerline of the sign and placed in the center of the door.
- C. Install sign units level, plumb, with sign surface free from distortion or other defects of appearance.
- D. Interior Panel Signs:
  - 1. Attached wall mounted units to surfaces using methods indicated below:
  - 2. Mechanical Mounting: Provide concealed predrilled and countersunk holes in backplate and aluminum signs at locations indicated. Attach backplate with fasteners and expansion type anchors suitable for secure attachment to substrate. Attach panel sign to backplate by means of 1/32" of double sided urethane foam adhesive.

**STATE PROJECT NO. 610-01-0021**

**SPECIFICATIONS**

3. Vinyl die cut applications are to be applied to glass surfaces with water and mild detergent. Application to be placed level and free of debris and water or air pockets. Glass surface to be free of debris and water streaks.

**3.02 CLEANING AND PROTECTION**

- A. At completion of installation, clean soiled sign surfaces in accordance with manufacturer's instructions. Protect units from damage until acceptance by Owner.

**PART 4 - MEASUREMENT AND PAYMENT**

- A. Work to satisfy Signage will not be measured for payment.
- B. Payment for work under this section will be made under:

Item **S-10000 - Specialties**, per lump sum.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**10523 - FIRE EXTINGUISHERS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide fire extinguishers and mounting brackets as indicated in the drawings and specification.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Standards: UL and FM listed products, NFPA 10.
- C. Regulations: ADAAG.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Manufacturers: J. L. Industries, Walter Kidde, Larsen's Manufacturing, Potter-Roemer, or approved equal.
- B. Fire Extinguishers:
  - 1. Type: Multipurpose dry chemical type.
  - 2. Classification: 2-A:10-B:C
  - 3. Mounting: Metal brackets.
  - 4. Mounting Height: 4'-6" above finish floor
  - 5. Extinguisher Weight: Less than 40 Pounds
  - 6. Quantity: Six (6)

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- B. Install fire extinguishers such that the maximum travel distance to any fire extinguisher is no greater than 75 feet.
- C. Install fire extinguishers in service areas with wall-hung brackets at locations and heights indicated and acceptable to authorities having jurisdiction.
- D. Install fire extinguishers with wall-hung brackets in public areas plumb and level at heights acceptable to authorities having jurisdiction. Top of fire extinguisher to be 4'-6" above finish floor
- E. Provide drilling and tapping as may be required to mount extinguisher brackets to primary or secondary structural steel where required. Provide Masonry Anchors as may be required to mount extinguisher brackets to Concrete Masonry Units. Do not mount to Metal Wall Panels.
- F. Restore damaged finishes. Clean and protect work from damage.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-10000 – Specialties, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**10605 - WIRE MESH PARTITIONS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide Wire Mesh Partition system including standard and custom width and panels and sliding door to enclose the Mezzanine as indicated in the plans and specifications.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction. Shop Drawings shall incorporate field-verified dimensions.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Manufacturers: Acorn Wire & Iron Works, Kentucky Metal Products, Miller Wire Works, SpaceGuard Products, Wire Crafters or approved equal.
- B. Approved: SpaceGuard 2180 system as manufactured by SpaceGuard of Seymour, Indiana.
- C. Wire Mesh Partitions:
  - 1. Panel Size: Standard 5'-0" X 8'-0" panels and Custom width, 8'-0" tall end panels at each group.
  - 2. Panel Construction: 6 gauge 1 ½" x 1 ½" welded wire steel mesh securely welded to frames.
  - 3. Framing Posts:
    - a. Line posts are 14 gauge steel to be 2" x 2" square tubing.
    - b. Base plates of 4" x 7" x 10 gauge flat stock welded to posts. Base plates drilled to accept 3/8" anchors.
    - c. Corner post 1 ¼" x 1 ¼" x 11 gauge hot rolled flat angle.
  - 4. Hardware:
    - a. Furnished by Manufacturer
    - b. Heavy duty 5/16" through bolts

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- c. Field bracing, floor and wall anchors by Manufacturer. Bolt preparations, drilling and tapping by Contractor.
- 5. Finish: Phosphate washed with a standard finish of one shop coat of high quality semi-gloss machine grey.
- 6. Door: Trolley suspended, sliding door: SpaceGuard 2180 standard single sliding door. Model TF58SD or approved equal.
- 7. Door Lock: Padlock configuration.
- D. Accessories:
  - 1. Base shoes by Manufacturer.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- B. Drill and tap upper leg or flange of suspended Mezzanine Framing beam to accept floor plate mounting.
- C. Restore damaged components. Clean and protect work from damage.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-10000 – Specialties, per lump sum.**

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**10810 - TOILET ACCESSORIES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide toilet accessories and metal framed mirrors as indicated in the drawings and specifications. Refer to the Toilet Accessories Schedule.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Manufacturers: Acceptable manufacturers include: A&J Washroom Accessories, Bobrick Washroom Equipment, Bradley Corp., GAMCO, McKinney/Parker, or approved equal.
- B. Approved: Toilet Accessories in accordance with the Toilet Accessories Schedule by, Bradley Corp. or approved equals.
- C. Toilet Accessories:
  - 1. Toilet tissue dispensers, double roll.
  - 2. Combination towel dispenser/waste receptacle units.
  - 3. Grab bars.
  - 4. Soap dispensers, deck mounted.
  - 5. Mop and broom holders.
- D. Mirrors and Frames:
  - 1. Glazing: Mirror glass, 1/4 inch thick, ASTM C 1036.
  - 2. Frames: Stainless steel.
  - 3. Type: Standard wall unit.
  - 4. Type: Fixed tilt type.
- E. Finishes:

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

1. Stainless Steel; AISI Type 302 or 304, No. 4 polished finish.
2. Baked Enamel on Steel; factory-applied gloss white.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- B. Restore damaged finishes and test for proper operation. Clean and protect work from damage.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-10000 – Specialties**, per lump sum.

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**12490 - WINDOW TREATMENTS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Scope of work:
  - 1. Provide window treatments at interior and exterior windows as indicated in the Window and Louver Schedule.

**1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Manufacturers: MechoShade, Hunter Douglas, Kirsch, Levolor, LouverDrape or approved equal.
- B. Horizontal Louver Blinds:
  - 1. Operation: Tilting and lifting mechanisms.
  - 2. Slats: Aluminum.
  - 3. Slat Width: 1 inch.
  - 4. Color: To Be Selected by Architect from manufacturer's standard colors

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- B. Restore damaged finishes and test for proper operation. Clean and protect work from damage.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:  
**Item S-12490 – Window Treatments**, per lump sum.

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**13129 PRE-ENGINEERED METAL BUILDING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Work of this section covers the design, fabrication and erection of a low rise, modular, rigid frame type, pre-engineered metal building of dimensions and heights indicated in the drawings and specifications.
- B. The Pre-Engineered Metal Building will bear on new pile-supported, steel-reinforced, poured-in-place, concrete foundations designed by others. Refer to the Structural Drawings.
- C. Building components specified herein include Structural Framing, Roof Panels, Wall Panels, Fascia & Soffit Panels framed openings, suspended mezzanine floor beams, mezzanine floor framing and steel mezzanine floor deck to support the concrete mezzanine floor slab, flashings, gutters and downspouts, bracing, fasteners, and accessories as indicated or specified.
- D. Work Specified in Other Sections requiring coordination include without limitation:
  - 1. Concrete Foundations
  - 2. Concrete Masonry Unit Base Wall and associated Flashings
    - a. Lateral connection of CMU to Structural Steel Wind Beam.
  - 3. Doors, Windows, Wall Lights & Roof Accessories
  - 4. Roof & Wall-Mounted, Electrically-Operated Ventilation & Equipment
  - 5. Carbon Monoxide Exhaust System
  - 6. Electrically-Operated Overhead Coiling Doors
  - 7. Roof Access Ladder & Scuttle
  - 8. Interior Finishes
  - 9. Painting

**1.02 1.2 REFERENCES**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
  - 1. AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)
    - a. ASCE 7-98 Minimum Design Loads For Buildings And Other Structures
  - 2. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
    - a. AISC S326 (1989) Voluntary Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings. (Allowable Stress Design)
  - 3. AMERICAN IRON AND STEEL INSTITUTE (AISI)
    - a. AISI - 01 (1999) Cold-Formed Steel Design Manual

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

4. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
  - a. ASTM A36/A572/A992 (2000) Structural Steel
  - b. ASTM A653 (2000) Steel Sheet, Zinc-Coated (G-90 Galvanized) by Hot-Dip Process, Structural (Physical) Quality.
  - c. ASTM A475 (1998) Extra High Strength Grade Cable
  - d. ASTM A529 (2000) High-Strength Carbon-Manganese Steel of Structural Quality
  - e. ASTM A101 1 SS/HSLAS, Gr. 55 (2000) Steel, Sheet and Strip
  - f. ASTM A792 (1999) Steel Sheet, Aluminum-Zinc Alloy Coated by Hot-Dip Process
  - g. ASTM B1 17 (1999) Salt Spray (Fog) Testing
  - h. ASTM D523 (1999) Specular Gloss
  - i. ASTM D4214 (1998) Evaporating Degree of Chalking of Exterior Paints
  - j. ASTM D968 (1993; Rev 1986) Abrasion resistance of Organic Coatings by Falling Abrasive
  - k. ASTM D2244 (2000) Calculation of Color Differences from Instrumentally Measured Color Coordinates
  - l. ASTM D2247 (1999) Testing Water Resistance of Coatings in 100% Relative Humidity
  - m. AWS D1.1 (2000) Structural Welding Code-Steel
5. FEDERAL SPECIFICATIONS (FS)
  - a. FS TT-P-664 Protective Coatings for Fabricated Structural Members
6. METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)
  - a. MBMA-01 (1996) Low Rise Building Systems Manual
7. UNDERWRITERS LABORATORIES, INC (UL)
  - a. UL 580 (1988; 3rd Ed.) Test for Uplift Resistance of Roof Assemblies

**1.03 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Designer/Manufacturer regularly engaged in the fabrication of metal building systems for a minimum of 10 consecutive years and a member of the Metal Building Manufacturers Association.
  1. Certified by American Institute of Steel Construction (AISC) Metal Building Certification Program (Category - MB).
- B. As a basis of quality, these specifications herein delineate the material quality, design criteria and workmanship used in building systems designed, manufactured and furnished by United Structures of America, Inc. Like products of other manufacturers may be approved providing they meet all the requirements specified herein. Approval of such is subject to requirements as set forth in the *Louisiana Standard Specification for Roads and Bridges*.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- C. All structural mill sections and welded-up plate sections shall be designed in accordance with the AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings", and all cold-formed steel structural members shall be designed in accordance with AISI "Specifications for the Design of Cold-Formed Steel Structural Members".
- D. All roof and wall panels shall be designed in accordance with the AISI "Specifications for the Design of Light Gauge Cold-Formed Steel Structural Members".
- E. All welding shall be in accordance with the AWS "Structural Welding Code, D1.1."
- F. The application of loads, and the design of all other components shall be as specified in the Metal Building Manufacturers Associations Recommended Design Practices Manual.
- G. The design of all elements and components of the building shall also conform with the applicable national building code (or applicable State Building Codes) and local building codes having jurisdiction, and the requirements of such building codes shall take precedence if exceeding the requirements of the aforementioned standards.

**1.04 SUBMITTALS**

- A. Certifications: Provide a letter of design certification for the structural framing system, signed and sealed by an engineer registered by the state where the jobsite is located.
- B. Shop Drawings: Submit anchor bolt layouts, framing plans, elevations and necessary sections and details.
- C. Provide erection drawings bearing a seal by an Professional Engineer registered in the jurisdiction of the project. The jurisdiction of the project is Louisiana.
- D. Provide layouts of roofing and siding panels, edge conditions, panel joints, corners, trims and flashings.
- E. Foundation Reactions:
  - 1. Submit foundation reactions and anchor bolt sizes requirements for review by the Owner's Consulting Structural Engineer for coordination with the foundation design and to enable design of the bolt anchorage by the Structural Engineer.
  - 2. The Contractor shall be responsible to provide the Pre-Engineered Metal Building shop drawing submittal to the Engineer sufficiently in advance, that the foundation design can be coordinated with the Pre-Engineered Metal Building design prior to the start of construction of the building foundations. The sequence of this submittal and review process shall be incorporated into the Contractor's Plan of Work.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**1.05 DESIGN CRITERIA**

- A. Design loads shall be developed using procedures contained in MBMA-01 and shall be in accordance with the latest editions of the AISC Allowable Stress Designs Specification for Steel Buildings, AISC Code of Standard Practices for Steel Buildings and Bridges, and the AISI Specification for the Design of Cold Formed Steel Structural Members.
- B. Wind Loads shall be in accordance with ASCE, Exposure Importance factor 1.0 and a wind velocity of 130 MPH.
  - 1. The CMU base wall shall be capped with a U-block beam which shall tie into a Structural Steel Wind Beam, and apply lateral loads on the Rigid Frame.
  - 2. The Wind Beam shall be designed for a uniform load of 308 PLF.
  - 3. Deflection in the Wind Beam shall not exceed  $L/720$ .
- C. Roof Live Load, including snow, shall be 20 PSF minimum, with tributary reduction allowed as applicable per code.
- D. Mezzanine Live Load shall be 125 PSF
- E. Mezzanine Framing and Steel Deck design shall incorporate necessary dead Load for a 3" concrete Mezzanine Floor Slab.
- F. Dead Load shall be the weight of the metal and concrete building materials.
- G. Auxiliary Design Loads shall be 5 PSF to cover the dead load imposed by fire protection systems, ceilings and lighting, plus the actual weight of equipment or mechanical units located on or attached to the building. Refer to drawings for location of equipment and mechanical units.
- H. Minimum deflection criteria are to be  $L/360$  for primary framing members and  $L/180$  for secondary members and coverings.
  - 1. Frame side sway shall be designed with a minimum of  $H/200$ .
- I. Seismic Loads shall be based on Seismic Zone 1.
- J. For purposes of assessing wind, snow and seismic loads the building shall be designed with an importance factor of 1.0.

**1.06 WARRANTIES**

- A. Provide building manufacturers warranty guaranteeing the building system against defects in material for one year from the date of acceptance and shall provide for replacement material as required within that time period.
- B. Roof Panel Integrity: Provide manufacturers standard twenty year warranty against perforation of metal panels due to corrosion under normal weather and atmospheric conditions.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- C. Wall and Roof Panel Finish: Provide manufacturers standard twenty year warranty against cracking, peeling and color fade. The following are the color fade and chalking limitations:
1. Color Retention: No color change in excess of an average of 5 NBS Units when measured in accordance with the procedure set forth in ASTM D2244.
  2. Chalking: Minimum of 8 rating when tested in accordance with ASTM D659.

**PART 2- PRODUCTS**

**2.01 DESCRIPTION**

- A. The building shall have three principal parts, each having its own roof configuration:
1. The Main Building Portion shall be a Single slope building of steel rafters and columns, with building width, length and bay spacing, eave height and roof slope as indicated on the drawings.
  2. The Lunch Room/Office/Storage/Toilet Portion shall be a Double slope portion of steel rafters and framing with vertical fascia and soffit on three sides, bearing on CMU perimeter walls on three sides and abutting the Main Building Portion Endwall. Building width, length and eave height and roof slope as indicated on the drawings.
  3. The Lube Oil Dispensing Shed Portion shall be a Single slope portion of steel rafters framing into beams spanning steel-reinforced concrete masonry columns, with building width, length and bay spacing, eave height and roof slope as indicated on the drawings.

**2.02 PRIMARY FRAMING**

- A. The pre-engineered structure shall be a rigid frame "RF" manufactured of solid web members having tapered or uniform depth rafters, rigidly connected to tapered depth columns.
- B. The materials used in the fabrication of the primary framing shall be designed utilizing standard practices, generally in compliance with the AISC code.
- C. Structural flat plate, strip and/or bar stock generally shall conform to the physical requirements of ASTM A36, and shall have a minimum yield strength of 55,000 psi.
- D. W, M, and S shapes shall be of material conforming to the physical requirements of ASTM A572 and shall have a minimum yield strength of 50,000 psi.
- E. Round pipe sections shall be of material conforming to the physical requirements of ASTM A53 grade B and shall have minimum yield strength of 35,000 psi.
- F. Members fabricated from plate or bar stock materials shall have flanges and webs joined on one side of the web by a submerged arc continuous weld process.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**2.03     ENDWALL FRAMING**

- A. End wall framing shall include the corner columns, end wall columns and end wall rafters, and shall be manufactured of cold-formed light gage sections, welded plate sections and/or structural shapes. Tapered East side Endwall corner columns and East side intermediate columns shall be of uniform taper and dimensions to facilitate mounting of Translucent Daylighting panels.
- B. Materials used in the fabrication of end wall framing systems shall be designed utilizing standard practices, generally in compliance with the applicable sections of AISC and AISI.
  - 1. Cold-formed members shall be fabricated of material conforming to the physical requirements of ASTM A101 1 and shall have minimum yield strength of 55,000 psi.
  - 2. Structural shapes shall be of material conforming to the physical requirements of ASTM A36/A572/A992 and shall have minimum yield strength of 50,000 psi.
  - 3. Members fabricated from plate or bar stock materials shall have flanges and webs joined on one side of the web by a submerged arc continuous weld process.

**2.04     SECONDARY FRAMING**

- A. Secondary framing shall be the structural members which distribute the loads to the primary framing systems, and shall include the eave struts, purlins, girts, wind bracing and other miscellaneous structural members. They shall be manufactured of cold-formed, light gage sections, welded plate sections and/or structural shapes.
  - 1. Eave struts shall be nominal 8", 10" or 12" deep "Cee" shaped members, and shall be designed as simple span for the specified loads.
  - 2. Purlins and girts shall be nominal 6", 8", 10", or 12" deep "Zee" or "Cee" shaped members, and shall be designed as simple span, partially continuous or continuous for the specified loads. Upper wall girts shall not exceed 8" measured horizontally. Refer to the Wall Sections.
  - 3. Wind bracing shall be a system combining diagonal cable bracing, portal, fixed base or diaphragm bracing designed for the specified loads in accordance with standard design practices, and as required to allow unobstructed openings at the overhead coiling doors, wall light panels and mechanical ventilation wall penetrations.
  - 4. Miscellaneous structures shall normally be those members such as base angles, flange braces, jambs, headers, etc., and shall be designed to be supportive of the framing system.
- B. Materials used in the fabrication of secondary framing shall be designed utilizing standard practices, generally in compliance with the applicable sections of AISC and AISI.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

1. Cold formed members shall be fabricated of material conforming to the physical requirements of ASTM A101 1 and shall have a minimum yield strength of 55,000 psi.
2. Cable bracing shall be fabricated of material conforming to the physical requirements of ASTM A475-78 for extra strength grade.

**2.05 PRIME PAINTING OF STRUCTURAL MEMBERS**

- A. After fabrication, all components fabricated from welded plate sections, structural shapes or round pipe shall be prepared equal to the standards of SSPC-SP2 and primed with one shop coat of red primer which meets or exceeds the end performance of Federal Specification TTP-664. Primer shall be applied to a dry film thickness of 1 mil.
- B. Material used for components fabricated by cold form process shall be pre-coated by a commercial coater using a preparation process equal to SSPC-SP 10 and after oven heating, apply a red oxide primer which meets or exceeds the end performance of TTP-664. Primer shall be applied to a dry film thickness of .5 mil.

**2.06 FINISH PAINTING OF STRUCTURAL MEMBERS – Refer to painting 09910**

**2.07 ROOF COVERING**

- A. Roof covering shall consist of the roof panels, their attachments, trim and sealants for use on the exterior of the roof and shall be equal to USA “GUARDIAN-LOK STANDING SEAM as described in the following:
  1. Roof covering shall provide a 24” net coverage STANDING SEAM RIB “SSR” having 3” high trapezoidal major ribs at 24” on centers and 2 minor ribs between the major ribs. Install utilizing concealed steel clips, mechanically field seamed with a 360 degree double fold seam at the side joints and weatherproofed with factory applied sealants. Panels shall be continuous from ridge to eave until panel exceeds 40’ and/or panel becomes prohibitive to handle
  2. Material used in the fabrication of roof panels shall be a minimum of 24 gage having a minimum yield strength of 50,000 psi. Exterior finish shall have a precision coated, commercial grade Fluoropolymer-series 500 coating. Color shall be selected by the Architect from the manufacturer’s standard colors.

**2.08 WALL PANELS AND TRIM**

- A. Siding and trim coverings shall consist of wall panels, their attachments and trim or flashings for use on the exterior of the walls and/or attachment to the roof covering.
  1. Ribbed Siding shall be equal to Reverse Rolled, USA “R” Ribbed Profile as described in the following:
    - a. Siding coverings consisting of reverse rolled, rib style profile “R” shall provide a 36” net coverage having 1-1/4” deep major ribs at 12” on center and two minor ribs between major ribs. Sidelaps shall be one major rib. Panels shall be continuous from eave to sill/base attachment point. Finish panels so that (due to Reverse Rolling) Ribs shall project to the interior of the building.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- b. Material used in the fabrication of wall panels shall be a minimum of 24 gauge having a minimum yield strength of 50,000 psi. Exterior finish shall be precision coated, commercial coated grade Fluoropolymer-series 500 coating. Colors shall be as selected by the Architect from the manufacturer's standard colors.
- c. Material used in the fabrication of flashing and trim for the gutters and downspouts, corners, wall openings, etc. shall be of the same thickness and finish as the wall panel. Colors shall be selected by the owner from the manufacturer's standard colors.

**2.09 FLAT WALL PANELS, FASCIA & SOFFIT TRIM**

- A. Flat wall panels, Fascia Soffit and trim coverings shall consist of wall panels, their attachments and trim or flashings for use on the exterior of the walls and/or attachment to the roof covering.
  - 1. Flat Panels shall be equal to USA L-8, L-10 and L-12 as indicated in the drawings, and as described in the following:
    - a. Material used in the fabrication of wall, fascia & soffit panels shall be a minimum of 24 gauge. Exterior finish shall be precision coated, commercial coated grade Fluoropolymer-series 500 coating. Colors shall be as selected by the Architect from the manufacturer's standard colors.
    - b. Material used in the fabrication of flashing and trim for the gutters and downspouts, corners, wall openings, etc. shall be of the same thickness and finish as the wall panel. Colors shall be selected by the owner from the manufacturer's standard colors.

**2.010 ACCESSORIES**

- A. Sidewall Canopies as shown
- B. Vertical Fascia & Soffit
- C. Roof Flashing Units shall nominally be used for roof mounted mechanical equipment and/or vents. Flashings units are not intended to support any type of load. Loads are supported by means of sub-frames and/or auxiliary secondary support systems. Flashing units' base configuration shall match the panel profile of the roof on which it is used.
  - 1. Roof Curb Units are available in peak or hillside applications. Curbs are at least 18 gage galvanized material with welded construction and are insulated. Provide roof curb units with a baked-on powder coated finish to match the roof panel finish.
  - 2. Roof Jacks shall be for flashing of plumbing vent stacks and/or other pipe-like penetrations. Jacks shall be black with flat, malleable bases that can be field formed to fit any standard panel configuration. Jacks shall have a heat range of -65 degrees centigrade to +250 degrees centigrade.
- D. Doors, Frames, Hardware & Weatherstripping
  - 1. Doors & Frames: Refer to Section 08110 Steel Doors & Frames

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- 2. Hardware: Refer to 8710 Door Hardware
- E. Framed Openings in Walls shall be framed with 16-gage minimum; cold-formed members designed to meet the specified loads. Openings shall be trimmed in accordance with the detail drawings, or in the absence thereof, in accordance with the Manufacturer's standard practices.
- F. Aluminum Windows: Refer to 08520 Aluminum Windows
- G. Louvers shall be as indicated in the Mechanical & Electrical drawings.
  - 1. Install louvers in masonry walls in accordance with window and louver details. Install louvers in metal panel walls in accordance with the manufacturer's standard details.

**PART 3 - EXECUTION**

**3.01 PREPARATION**

- A. Erection of the pre-engineered building shall be performed by a company regularly engaged in the erection of metal buildings for a minimum of 5 years.
- B. Work shall be coordinated with work of other trades so that construction work of all trades can be properly completed.
- C. Before proceeding with the erection and in time to permit correction of defective setting, the Contractor shall verify the location and elevation of all anchor bolts for column bases. The Contractor shall advise the Owner in writing of the verified positions and of any deviation from the dimensions shown in the drawings.
- D. Erection practices shall conform to the MBMA "Code of Standard Practices". Section 5.

**3.02 ERECTION**

- A. Erect building in accordance with the building manufacturer's erection drawings and written instructions.
- B. Field modifications shall not be made to structural members except as authorized by the building manufacturer.
- C. Erect building and all components plumb, true and level to lines and profiles indicated.
- D. Framing: Level base plates to a true even plane with full bearing to supporting structures.
- E. Purlins and Girts: Locate and space girts to suit door and window arrangements and heights. Secure purlins and girts to structural framing and hold rigidly to straight line with temporary shoring until secured by exterior sheeting.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- F. Bracing: Provide diagonal cable bracing (or other bracing as required by design) in roof and sidewalls as indicated on the erection drawings.
- G. Siding and Roofing: Arrange and nest side-lap joints so prevailing winds blow over lapped joints. Apply panel and associated items for neat and weather tight enclosure. Avoid panel creep or applications not true to line. Protect factory finishes from damages.
  - 1. Field cutting of panels by torch is not permitted.
  - 2. Install weatherseals as per manufacturer's instruction.
- H. Sheet Metal Accessories: Install gutters, downspouts, curbs, trim and other sheet metal accessories in accordance with manufacturer's recommendations for positive anchorage to building and weathertight anchorage.
- I. Insulation: Install concurrently with wall and roof panels. Install blankets straight and true with both sets of tabs sealed to provide a complete vapor barrier. Install insulation at eave and base to prevent wicking of water from gutter and sheeting notch.

**3.03 CLEAN-UP AND PAINTING**

- A. Clean building and components free of dirt, dust, grease and oil.
- B. Prepare surfaces and touch up structural steel, purlins, girts and other framing members with coating system of same type and color as used in shop coat.
- C. Clean exposed surfaces of the building promptly after erection is completed. Clean pre-finished work per coating manufacturer's directions.

**PART 4 – MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be made under:

**Item S-13129 – Pre-Engineered Metal Building**, per lump sum.

**END OF SECTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**13130 - PRE-ENGINEERED FUEL CANOPY**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Provide all Professional Engineering Services, skilled labor, materials, transportation and equipment to design, fabricate, deliver and erect pre-fabricated, pre-engineered metal Fuel Canopy as indicated in the drawings and specifications. The Canopy will bear on new pile-supported concrete foundations. Refer to Concrete Formwork and Reinforcing Steel, and to Composite Piling.
- B. **WORK INCLUDES**
  - 1. Design, Drawings and Calculations, prepared by a qualified engineer licensed in the jurisdiction of the project.
  - 2. Coordinate the scope of the canopy work with the scope of work to be performed by other trades including Electrical & Concrete Foundations designed by others.
  - 3. Complete Primary and Secondary Structural Framing.
  - 4. Roof/Ceiling, Fascia, Gutters and Downspouts including trim, flashing, weather sealing materials, fasteners, and drainage system.
  - 5. Coordination with Electrical to ensure proper lighting fixture mounting.
  - 6. Painting of Structural Steel Framing: Refer to 09910 Painting.

**1.2 SUBMITTALS**

- A. **Product Data:** Submit manufacturer's product data and installation instructions for each material and product used.
- B. **Shop Drawings & Design Calculations:** Shop Drawings and Design Calculations shall include complete information about the construction and details of the Canopy. Shop Drawings and Design Calculations shall indicate design loads, material characteristics, details of construction, connections, and relationship with adjacent construction. Shop Drawings shall note elements to be field cut and field drilled.
  - 1. Shop drawings and Design Calculations shall be prepared and stamped by a qualified engineer licensed in the jurisdiction of the project. The jurisdiction of the project shall be the State of Louisiana.
- C. **Warranty:** Submit manufacturer's standard warranty. Include labor and materials to repair or replace defective materials.
  - 1. **Warranty Period:** 10 years.
    - a. **Materials and workmanship:** 1 year
    - b. **Fascia Paint Finish:** 10 years

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

- D. Maintenance Data: Submit manufacturer's operation and maintenance data, including list of spare parts and maintenance schedule.

**1.3 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. General Design:
1. Weather Resistance: Installations shall be weatherproof.
  2. Movement: Design and Construction shall make provisions for expansion and contraction of system components to resist buckling, opening of joints, and shearing of fasteners.
- C. Structural Design: Certified by registered engineer licensed in jurisdiction of project. The jurisdiction of the project shall be the State of Louisiana.
1. Canopy Loads:
    - a. Conform to ASCE 7-98 Minimum Design Loads for Building & Other Structures.
  2. AISC Specification for the design, fabrication and erection of structural steel for buildings. (Current Edition)
  3. AISC Code of Standard Practice for Buildings and Bridges (Current Edition)
  4. AISI Specification for the design of Cold-formed Steel Structural Members (Current Edition)
  5. AWS D1. 1-Structural Welding Code (Current Edition)
- D. Reference Standards
1. AAMA American Architectural Manufacturers Association.
  2. AISC American Institute of Steel Construction.
  3. AISI American Iron and Steel Institute.
  4. ANSI American National Standards Institute.
  5. ASTM American Society Of Testing and Materials.
  6. AWS American Welding Society.
  7. FS Federal Specifications.
  8. MIL Military Specifications.
  9. AA Aluminum Association.
  10. UL Underwriters Laboratories.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Manufacturers: The design and materials shown in the drawings and specified herein are based on the recommendations of TFC canopy at the time of production of the documents. The Pre-Engineered Fuel Canopy Manufacturer shall be responsible for the final design of the Fuel Canopy. The Canopy Manufacturer shall be TFC Canopy or approved equal.

TFC Canopy  
1107 N. Taylor Road  
Garrett, Indiana 46738  
TEL. (800) 832-3312  
TEL. (260) 357-6665  
FAX (260) 357-6533

B. Steel Framing:

1. Structural Framing: Structural steel shapes, and primary, secondary, and endwall framing including columns, beams, purlins, girts, struts and bracing. All steel delivered to site shall be prime painted. The contractor shall coordinate the Pre-Engineered Toll Canopy work with other structural steel erection work and with the work of all trades.
  - a. Hot-Rolled Structural Steel
  - b. Structural Tube
  - c. Plate
  - d. Cold-Formed Structural - A446 Grade A (FY=55 KSI)

C. Fascia Panel System:

1. Panel Type: ACM
2. Fasteners: Concealed.
3. Material: ACM, 3 mm, with 24 gage galvanized steel backer.
4. Siding Panel Finish: Fluoropolymer, Kynar 500

D. Roofing/Ceiling Panels:

1. Type: Factory-formed, Flush Face, standing-seam, interlocking roof panel system.
2. Material: 20 Gauge Prefinished Galvanized (ASTM G-60) steel sheets: A653 (FY=40 KSI)
  - a. Properties:
    1. Width (in) 16
    2. Depth (in) 3
    3. Ma+ 7.02 k-in./ft.
    4. Ma- 5.38 k-in./ft.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

5.  $S_{x+}$  0.2926 in<sup>3</sup>/ft.
  6.  $S_{x-}$  0.2243 in<sup>3</sup>/ft.
  7.  $I_{x+}$  0.6898 in<sup>4</sup>/ft.
  8.  $I_{x-}$  0.3450 in<sup>4</sup>/ft.
3. Texture: Smooth
  4. Roofing Panel Finish: Fluoropolymer, Kynar 500.
  5. Assembly: Non-insulating units
- E. Gutters, Downspouts, Trim & Flashing
1. Gutters: Concealed perimeter system to match roof/ceiling deck material, minimum 24 gage galvanized ASTM G-60 coating.
  2. Downspouts: Fabricate of same type, thickness and finish as gutter material. Size to adequately drain roof areas involved. Downspouts shall be routed to discharge at roadway level, and shall be attached to bridge structure at a maximum spacing of 10 feet.
  3. Trim and Flashing: minimum 24 gage galvanized ASTM G-60 coating. Finish quality shall match roof/ceiling deck.
- F. Attachment devices:
1. Provide manufacturer's standard devices such as subgirts, clips, pop-rivets and other devices necessary for assembly & attachment.
  2. Attach fascia panel to structural frame with a 1 inch x 2 inch backer channel.
- G. Light Fixtures:
1. Refer to the Electrical Drawings
- H. Related Materials:
1. Caulking and sealants.
  2. Washers: F436
  3. Bolts:
    - a. Primary Framing Connections: High-strength ASTM A325-86 or A490-85
    - b. Secondary Framing Connections: Low-carbon steel ASTM A307-86a
  4. Electrical circuits, wiring switching and fixture connection: Refer to the Electrical Drawings & Specifications.
  5. Paint: Refer also to 09910 Painting

**PART 3 - EXECUTION**

**3.1 FABRICATION & INSTALLATION**

- A. Perform shop-fabrication to the greatest degree possible to enable field-bolted assembly, and to minimize field-cutting and field-drilling. Install materials and systems in accordance with manufacturer's instructions and reviewed submittals. Install materials

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.

1. Steel shall be straight, true and within AISC tolerances.
2. Cold-formed sections shall be precision brake-formed to produce accurately dimensioned members, free of distortion.
3. Component surfaces shall be free of fins, burrs, deep gouges, and other irregularities.
4. Sharp edges shall be reduced by grinding to 1/8 inch radius.
5. Prior to erection, all column and beam mounts and mounting elevations shall be verified using a transit. Field Verify all mounting bolt centers.
6. Verify all steel is plumb, square, and level following erection.
7. ASTM A325 bolts shall be installed per the RCSC specification for structural joints using ASTM A325 or A490 bolts, (11/13/85) contained in Part 5 of the AISC Manual of Steel Construction Allowable Stress Design, 9th Edition.
8. The facing surfaces of all bolted connections shall be smooth and free from burrs or distortions.
9. Verify purlins are level using a transit.
10. Bracing for beams and purlins shall be welded prior to deck panel installation.
11. Welds: AWS/D1.1 E70XX Electrode.
  - a. Welds shall be made smooth, uniform, and free of projections, undercuts, overlaps, inclusions, and other detrimental defects.
  - b. Perform welding in accordance with AWS Code, by qualified welders and welding operators for the type of welding involved.
  - c. Whenever possible, perform welding in flat position, by shielded submerged electric arc methods only.
  - d. Avoid welding members while incorporating slag or scale.
  - e. Weld full area required to develop joint strength.
12. Provide weathertight light fixture mounting.
13. Field prime all structural steel connections and splices following steel erection.

3.2 Perform painting work in accordance with 09910 Painting.

**PART 4 – MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section will be made under:

**Item S-13130 – Pre-Engineered Fuel Canopy, per lump sum.**

**END OF SECTION**

**13130-5**

ELECTRONIC COPY - NOT VALID FOR PAPER BID SUBMITTAL

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS**

**1PART - GENERAL**

**1.1 SCOPE**

- A. This section, as well as the Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 - General Sections included in Division 15 Specifications are for mechanical and related work particular to Crescent City Connection Vehicle maintenance Facility and Storage Yard. Coordinate with plans and other specifications sections.

**1.2 RELATED DOCUMENTS**

SECTION 15000 - MECHANICAL - GENERAL REQUIREMENTS  
SECTION 15050 - BASIC MATERIALS AND METHODS  
SECTION 15060 - HANGERS AND SUPPORTS  
SECTION 15075 - MECHANICAL IDENTIFICATION  
SECTION 15081 - DUCT INSULATION  
SECTION 15083 - PIPE INSULATION  
SECTION 15110 - VALVES  
SECTION 15140 - DOMESTIC WATER PIPING  
SECTION 15150 - SANITARY WASTE AND VENT PIPING  
SECTION 15183 - REFRIGERANT PIPING  
SECTION 15191 - LUBRICATION SYSTEM EQUIPMENT AND PIPING  
SECTION 15211 - GENERAL-SERVICE COMPRESSED-AIR PIPING  
SECTION 15410 - PLUMBING FIXTURES  
SECTION 15430 - PLUMBING SPECIALTIES  
SECTION 15485 - ELECTRIC, DOMESTIC WATER HEATERS  
SECTION 15738- SPLIT SYSTEM AIR CONDITIONING UNITS  
SECTION 15766 - CABINET UNIT HEATERS  
SECTION 15815 - METAL DUCT  
SECTION 15820 - DUCT ACCESSORIES  
SECTION 15838 - POWER VENTILATORS  
SECTION 15855 - DIFFUSERS, REGISTERS AND GRILLES  
SECTION 15990 - TESTING, BALANCING, & ADJUSTING

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS**

**1.3 WORK INCLUDED**

- A. The work covered by this Division of the Specifications consists of furnishing all plant, labor, equipment, supervision, appliances, and materials, and in performing all operations in connection with the plumbing, air conditioning, heating and ventilating systems complete and in strict accordance with this Division of the Specifications and the applicable drawings.

**1.4 COORDINATION OF WORK**

- A. General: Refer to the Division 1 sections for general coordination requirements applicable to the entire work. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the mechanical work, and in its interface with other work, including electrical work, and that such establishment is the exclusive responsibility of the Contractor.
- B. Advise other trades of openings required in their work for the subsequent move-in of large equipment.
- C. Submit coordination drawings prior to purchase-fabrication-installation of any of the elements involved in the coordination.
- D. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- E. Verify all dimensions by field measurements.
- F. Arrange for chases, slots, and openings in other building components to allow for installation.
- G. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
- H. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the installation areas.
- I. Coordinate the cutting and patching of building components to accommodate the installation of equipment and materials. Comply with Division 1.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS**

- J. Install equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
- K. Coordinate the installation of materials and equipment above ceilings with suspension system, mechanical equipment and systems, and structural components.
- L. Contractor shall visit the site before bidding to familiarize himself with conditions under which he will have to perform his Contract.

**1.5 EXISTING CONDITIONS**

- A. The utilities and information shown on the drawings are based on information provided to the designers by the Architect, Owner or utility company. Contractor shall field verify existing conditions and notify the Architect in writing of any discrepancies prior to commencing with new work.
- B. All existing piping and materials not to be reused and becoming surplus or abandoned shall be removed from the premises and shall become the property of the Contractor, unless otherwise noted.

**1.6 INTERRUPTION OF SERVICES**

- A. All work shall be accomplished at a time most convenient to the Owner and so that the interruption of service (water, sewer, heating, and air conditioning) shall be minimum and only for changeover.
- B. No service shall be interrupted or changeover begun until the time and duration of service interruption have been agreed to, in writing, signed by the Owner's Representative, the Architect, and the Contractor.
- C. Temporary connections, or temporary rerouting to serve existing facilities will be required as the work progresses. Make due allowances in bid.
- D. Refer to the Architectural Phasing drawings for the phasing requirements.

**1.7 CODES AND STANDARDS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS**

- A. Workmanship, material and equipment shall be in accordance with Specifications and Drawings, and in some instances the requirements exceed those required by codes and standards. Where not exceeded, the codes and standards shall be considered as absolute minimum requirements.

**1.8 ELECTRICAL WORK**

- A. Refer to Division 16 for all electrical work as it pertains to work specified in this section.

**1.9 WORKMANSHIP**

- A. Install all materials and components of the work in accordance with instructions of manufacturer following the best modern construction practices and conforming with the Contract Documents. Workmanship shall be first class, in both function and appearance, whether finally concealed or exposed and shall be performed by experienced workmen skilled in the type of work. As practicable, the lines of all exposed components of the system shall be perpendicular or parallel to the lines of the building.

**1.10 DRAWINGS**

- A. Contract Drawings and details are shown to limit and explain structural conditions, requirements, and manner of erecting work. Drawings are intended to convey the scope of work and indicate general arrangements of equipment, ducts and piping and approximate sizes and locations of equipment and outlets. Trades shall follow these drawings in laying out their work, check general construction drawings to familiarize themselves with all conditions affecting their work, and shall verify spaces in which their work will be installed.
- B. It may be necessary to shift pipes and/or ducts and this is permissible, and may be required under the general contract, but all such changes must be referred to the Architect for approval. Where rearrangement of piping or equipment is required, the Contractor shall prepare and submit approval drawings of the proposed arrangement.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS**

- C. Where the Contractor is not certain about the method of installation, he shall ask for details. Lack of details, not requested, will not be an excuse for improper installation, and any such work must be corrected.

**1.11 SHOP DRAWINGS AND DATA TO BE SUBMITTED**

- A. Submit adequate engineering data on each piece of equipment to allow a careful check of compliance with the technical requirements of the Contract Documents. Clearly indicate on submitted data the manufacturer's name, piece number, equipment capacity, and other applicable technical data. Refer to individual sections for specific requirements.
- B. Corrections or comments made on shop drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents, Plans and Specifications. Shop Drawings will be checked for general conformance with the design concept of the project and general compliance with information given in the Contract Documents. Review of Shop Drawings shall not relieve the Contractor from responsibility for confirming and correlating all quantities and dimensions, coordinating work with that of all other trades, and performing work in a safe and satisfactory manner. Review of Shop Drawings shall not permit any deviation from Plans and Specifications. Shop Drawings must be accompanied by signed statement from the Contractor, stating that he has reviewed the submittal and checked it for compliance.
- C. Shop Drawings: Submit 1/4 inch minimum scale coordinated shop drawings relating to the duct systems and lubrication systems showing clearances and relationship to structural members, piping, lights and ceilings. Shop drawings for all ductwork and lubrication systems must be submitted and reviewed before any work is constructed or installed.
- D. Contractor shall provide products as specified if submittals for review of materials are not received within thirty (30) days after award of the Contract.
- E. Any item not specified herein but submitted as a substitute for the specified item shall be accompanied by manufacturers' documentation stating/illustrating the following applicable information in addition to the specific information requested in other sections:
1. Dimensions/weight.
  2. Electrical ratings-voltage, amperage, short circuit capability, etc.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS**

3. Construction - gauge of steel/aluminum, paint finish/application method, color, NEMA type, etc.
4. Warranty.

**1.12 INSTRUCTIONS**

- A. Contractor shall furnish the services of competent instructors who will give full instruction to designated personnel in the adjustment, operation, and maintenance, including pertinent safety requirements of the equipment or system specified. Instructions shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation.

**1.13 OPERATING AND MAINTENANCE MANUALS**

- A. Bind in looseleaf binders with the words, "Operating and Maintenance Manual" and the project identification imprinted on the cover. Prepare three complete sets of records for the Owner, with table of contents, index, and tabbed section dividers.
- B. During the construction period, accumulate the following for inclusion in the Operating and Maintenance Manuals:
  1. Plumbing.
  2. Wiring and control diagrams.
  3. Shop Drawings.
  4. Operating instructions for:
    5. HVAC Systems
  6. Recommended maintenance procedures.
- D. Submit the manuals for approval at approximately 95 percent job completion. Each manual shall consist of:
  1. Complete description of each item of equipment and apparatus furnished and installed - including ratings, capacities, and characteristics.
  2. Fully detailed parts list, including all numbered parts of each item of equipment and apparatus furnished and installed.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS**

3. Manufacturer's printed instructions describing operation, servicing, maintenance and repair of each item of equipment and apparatus.

**1.14 DELIVERY, STORAGE AND HANDLING**

- A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications, adequately packaged and protected to prevent damage during shipment, storage, and handling.
- B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.
- C. Coordinate deliveries of materials and equipment to minimize construction site congestion.

**1.15 GUARANTEES**

- A. Contractor shall guarantee all materials, workmanship, and equipment furnished under Division 15 for a period of one (1) year after the date of final acceptance or beneficial use by the Owner, whichever date is the earliest.

**2PART - PRODUCTS**

**2.1 AVAILABLE MANUFACTURERS**

- A. Manufacturer's names and catalog numbers are scheduled or specified for the purpose of establishing standard of design, quality, appearance, performance and serviceability, and not to limit competition. Scheduled products (as may be modified by detailed Specifications) are those selected as the basis for system design with respect to physical size and space arrangements, required capacity and performance characteristics, and the product quality intended.
- B. The Drawings indicate specified products physically arranged in the spaces, as catalogued by Specific manufacturers, generally as listed in the equipment schedules.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS**

- C. Listed "Acceptable Manufacturers" are those considered capable of manufacturing products conforming to detailed Specifications, and as such, are invited to compete on an equal basis provided the offering is comparable in every respect to scheduled or specified products and actually conforms to the detailed Specifications and schedule requirements. Listing herein as "acceptable manufacturers" does not imply "accepted," "approved," "prior approval," or any other such connotation.

**2.2 FLAME-SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS**

- A. Materials and adhesives used throughout the mechanical and electrical systems for insulation, acoustical lining, filters, ducts, flexible connections, and jackets or coverings regardless of kind, or for piping or conduit system components, shall have a flame-spread rating not over 25 without evidence of continued combustion and with a smoke developed rating not higher than 50. If such materials are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame-spread rating not over 25 and a smoke developed rating not higher than 50.
- B. "Flame-Spread Rating" and "Smoke Developed Rating" shall be as determined by the "Method of Test of Surface Burning Characteristics of Building Materials, NFPA No. 225, ASTM E84, Underwriter's Laboratories, Inc., Standard." Such materials are listed in the Underwriter's Laboratories, Inc. "Building Materials List" under the heading "Hazard Classification (Fire)."

**2.3 AUXILIARY STRUCTURAL SUPPORTS**

- A. Provide auxiliary structural supports as necessary to support mechanical systems from the building structure. Supporting members shall be metal strut framing or standard structural shapes, designed to support imposed loads with a working stress no greater than 25 percent of ultimate stress values of the members, and articulation with the building structure without exceeding structural limitations at the point of attachment to the building structure.

**2.4 SPECIAL TOOLS**

- A. Furnish a set of special tools and devices required for the proper maintenance of the major pieces of equipment and install on adequate tool board. This shall include only tools which cannot normally be purchased "over-the-counter" at hardware stores.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS**

**2.5 EQUIPMENT GUARDS**

- A. Provide equipment with exposed moving parts with belt guards, coupling guards, fan guards or other enclosures as necessary for personnel safety.

**2.6 ACCESS DOORS**

- A. Furnish, for installation under appropriate section of the work, access doors at each point required to provide access to concealed valves, cleanouts, dampers, damper operators, and other devices requiring operation, adjustment, or maintenance.
- B. Access doors shall be 16 gauge steel, with mounting straps, concealed hangers, and screwdriver locks, designed for the doors to open 180 degrees, minimum.
- C. Access doors installed in fire walls or partitions shall be U.L. labeled to maintain the fire rating of the wall or partition.
- D. Provide prime coat finish for installation in ceilings and walls.
- E. Milcor Style M for masonry and surfaces not specified otherwise.
- F. Milcor Style K for plastered surfaces.
- G. Milcor Style DW for drywall surfaces.
- H. Milcor Style AT-FRSC "Special" for drywall ceilings. (Designated "fire resistive suspended ceiling door" by manufacturer).
- I. Milcor Style AP for acoustical plaster ceilings.
- J. Acceptable Manufacturers: Josam, J.R. Smith, Milcor, Titus, Wade, Zurn.

**3PART - EXECUTION**

**3.1 PROTECTION OF EQUIPMENT AND MATERIALS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS**

- A. Protect equipment and materials from physical damage, water damage and deterioration after it is delivered to the project, and during the installation.
- B. The equipment shall be kept clean. Motors and electrical devices shall be covered with suitable materials to prevent dirt or dust accumulation within equipment. Machinery and devices shall be properly oiled and maintained to prevent rusting and deterioration.
- C. Repair scratches, mars, or paint deterioration.

**3.2 MATERIAL DAMAGE**

- A. The Contractor shall immediately report in writing to the Owner and design professional any incident involving equipment or material damage including rain water damage, pipe leaks, physical damage, etc.
- B. At a minimum the report shall include the areas and extent of damage and proposed resolution.
- C. Water damaged materials shall be replaced with new materials without exception.

**3.3 EXCAVATION AND BACKFILL**

- A. Perform excavation and backfill required for the installation of underground pipe, ducts, equipment, and devices in accordance with other divisions of this Specification relating to such work. Carefully check for existing underground services before using power equipment for excavation.
- B. Trenches shall be wide enough for proper installation of the pipe. Grade the ditch bottom for proper slope and provide bell holes to allow the full bearing of the pipe barrel. Comply with all health and safety regulations relating to ditching.
- C. De-water to extent necessary to keep trenches dry and to provide proper compaction under all pipes. Continue de-watering operation until system has been tested, approved, backfilled and compacted.
- D. Excavate 6" below the pipe and fill with sand to pipe grade.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS**

- E. No excavation shall be under or near footings without approval of the Architect.
- F. Backfill trenches with clean dirt or sand. Take care not to disturb the pipe grade or alignment. Compact around and under the pipe carefully. The fill shall be compacted in 6" layers with a power tamper to achieve 95% compaction. Clean up around the ditch area to remove trash and any excess dirt.
- G. Refer to the Civil Drawings and Specifications for trenching, bedding and backfill requirements for site utilities not under structurally supported slabs.

**3.4 EQUIPMENT AND PIPE SPACE**

- A. The Drawings indicate specified products physically arranged in the spaces, as catalogued by specific manufacturers, generally as listed in the equipment schedules.
- B. Drawings show pipe and ductwork diagrammatically.
- C. Adhere to Drawings as closely as possible in layout of work.
- D. Vary run of piping, run and shape of ductwork and make offsets during progress of work as required to meet structural and other interferences per reviewed shop drawings.
- E. Install piping and ductwork in furred spaces wherever possible. Run exposed piping and ductwork parallel to or at right angles to building walls.
- F. Keep horizontal lines as high as practicable.
- G. Conform to ceiling heights established on the Drawings with adequate clearance for light fixtures.

**3.5 PAINTING AND FINISHING AND CLEANING**

- A. Finish painting (other than factory applied) of mechanical and electrical equipment, and its associated piping, ductwork, and devices is specified in other sections. Provide touch-up painting of pre-finished mechanical products.
- B. Surfaces shall be left clean, debris shall be removed, and equipment shall be furnished in prime coat finish unless otherwise specified.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS**

- C. Piping, ductwork and equipment: Clean exterior of piping, ductwork and equipment, removing rust, plaster and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable solvents.
- D. Supports and anchors: Exterior and exposed supports and anchors shall be hot dipped galvanized steel with cold galvanized welds.
- E. Motors, pumps and other items with factory finish. Remove grease and oil and leave surfaces clean and polished.
- F. Plumbing Fixtures: Clean and polish fixtures immediately prior to final inspection.
- G. Cleaning operations are supplemented by detailed instructions for specific systems.

**PART 4 - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be made under:

**Item S-15000 - Mechanical Work, per Lump Sum.**

**END OF SECTION 15000**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15050 - MECHANICAL GENERAL REQUIREMENTS**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Sleeves.
4. Escutcheons.
5. Grout.
6. Mechanical demolition.
7. Equipment installation requirements common to equipment sections.
8. Concrete bases.

**1.2 DEFINITIONS**

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

**1.3 SUBMITTALS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15050 - MECHANICAL GENERAL REQUIREMENTS**

A. Product Data: For the following

1. Escutcheons
2. Dielectric fittings

B. Welding certificates.

**1.4 QUALITY ASSURANCE**

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

**1.5 DELIVERY, STORAGE, AND HANDLING**

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Protect steel pipe from weather during storage to prevent corrosion and scale build-up.

**1.6 COORDINATION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15050 - MECHANICAL GENERAL REQUIREMENTS**

- A. Arrange for pipe spaces, chases, slots, core drilling and openings in building structure during progress of construction, to allow for mechanical installations. Contractor is responsible for providing required penetrations in new and existing structure to accommodate piping.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for mechanical items requiring access that are concealed behind finished surfaces.

**2PART - PRODUCTS**

**2.1 PIPE, TUBE, AND FITTINGS**

- A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

**2.2 JOINING MATERIALS**

- A. Refer to individual Division 15 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated. Full-Face type for flat-face, Class 125, flanges and narrow-face type for raised face, Class 250, flanges.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.
- E. Welding Filler Metals: Comply with AWS D10.12.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15050 - MECHANICAL GENERAL REQUIREMENTS**

**2.3      TRANSITION FITTINGS**

- A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

**2.4      DIELECTRIC FITTINGS**

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 degrees F.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and non-corrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 degrees F.
- F. Dielectric Nipples: Electroplated steel nipple with inert and non-corrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 degrees F.

**2.5      SLEEVES**

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

**2.6      ESCUTCHEONS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15050 - MECHANICAL GENERAL REQUIREMENTS**

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

C. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated.

**2.7 GROUT**

A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, non-staining, non-corrosive, non-gaseous, and recommended for interior and exterior applications.

2. Design Mix: 5000-psi, 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

**3PART - EXECUTION**

**3.1 MECHANICAL DEMOLITION**

A. Refer to Division 1 for general demolition requirements and procedures.

B. Disconnect, demolish, and remove mechanical systems, equipment and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material so as to clear new construction.

C. If pipe, insulation, or equipment to remain is damaged, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15050 - MECHANICAL GENERAL REQUIREMENTS**

**3.2 PIPING SYSTEMS - COMMON REQUIREMENTS**

- A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated or in equipment rooms and service areas.
- D. Install at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors in exposed areas.
- M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs. Cut sleeves to length for mounting flush with both surfaces. Seal space outside of sleeve fittings with grout.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15050 - MECHANICAL GENERAL REQUIREMENTS**

N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and non-shrink grout.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.

O. Fire-Barrier Penetrations: Seal all mechanical penetrations to maintain indicated fire rating of walls, partitions, ceilings, and floors. at mechanical penetrations. Match or exceed the T-rating and F-rating of the construction penetrated in accordance with ASTM E814. Firestop system shall be UL-Classified in accordance with the penetrating items and construction penetrated.

P. Verify final equipment locations prior to roughing-in.

Q. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

R. Expansion and Contraction of Piping:

1. Allowance shall be made throughout for expansion and contraction of pipe. Horizontal runs of pipe with expansion loops or joints shall be anchored to the wall or the supporting construction to force expansion toward the expansion joints or loops. Horizontal runs of piping without expansion joints or loops, over 50 feet in length, shall be anchored in the middle of the run to force the expansion evenly toward the ends.
2. All pipe shall be so installed that it may contract or expand freely without damage to any other work or injury to itself. Any swing joints, expansion joints, or bends necessary shall be installed whether shown or not.

S. Underground Pipe Settlement and Movement:

1. Provide flexible connections or swing joints to account for ground settlement between underground utility piping and building service entrance.

**3.3 PIPING JOINT CONSTRUCTION**

A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15050 - MECHANICAL GENERAL REQUIREMENTS**

- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

**3.4 PIPING CONNECTIONS**

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15050 - MECHANICAL GENERAL REQUIREMENTS**

4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.
- E. Equipment shall be installed at the more stringent elevation required by the local authority having jurisdiction, FEMA or owner's insurer. The Contractor is responsible for verifying the benchmark and setting the proper elevation. Provide supplemental support structure or increase equipment base height to achieve required elevation. Provide permanently mounted access ladder and fenced service area for installations greater than 36" above finished grade.

3.6 PAINTING

- A. Painting of mechanical systems, equipment, and components is specified in Division 9.
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.7 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15050 - MECHANICAL GENERAL REQUIREMENTS**

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use ~~3000-psi~~ concrete and reinforcement as specified in Division 3.

**3.8 GROUTING**

- A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

**4PART - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15050 - MECHANICAL GENERAL REQUIREMENTS**

B. Payment for work under this section shall be made under:

**Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15050

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15075 - MECHANICAL IDENTIFICATION**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes the following mechanical identification materials and their installation:

1. Equipment nameplates.
2. Equipment markers.
3. Equipment signs.
4. Access panel and door markers.
5. Pipe markers.
6. Duct markers.
7. Valve tags.

**1.2 SUBMITTALS**

A. Product Data: For each type of product indicated.

**1.3 QUALITY ASSURANCE**

A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

**2PART - PRODUCTS**

**2.1 EQUIPMENT IDENTIFICATION DEVICES**

A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.

1. Data:

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15075 - MECHANICAL IDENTIFICATION**

- a. Manufacturer, product name, model number, and serial number.
- b. Capacity, operating and power characteristics, and essential data.
- c. Labels of tested compliances.
2. Location: Accessible and visible.
3. Fasteners: As required to mount on equipment.
- B. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive or affix with stainless steel screws.
  1. Terminology: Match schedules as closely as possible.
  2. Data:
    - a. Name and plan number.
    - b. Equipment service.
    - c. Design capacity.
    - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
  3. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.
- C. Equipment Signs: ASTM D 709, Type I, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
  1. Engraving: Manufacturer's standard letter style, of sizes and with terms to match equipment identification.
  2. Thickness: 1/16 inch, unless otherwise indicated.
  3. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

**2.2 PIPING IDENTIFICATION DEVICES**

- A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.
  1. Colors: Comply with ASME A13.1, unless otherwise indicated.
  2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length .

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15075 - MECHANICAL IDENTIFICATION**

3. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers extending 360 degrees around pipe at each location.
  4. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
  5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.
- B. Pre-tensioned Pipe Markers: Pre-coiled semirigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.
- C. Shaped Pipe Markers: Preformed semirigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.
- D. Self-Adhesive Pipe Markers: Plastic with pressure-sensitive, permanent-type, self-adhesive back.

**2.3 VALVE TAGS**

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers, with numbering scheme. Provide 5/32-inch hole for fastener.
1. Material: 0.032-inch- thick brass .
  2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook.

**3PART - EXECUTION**

**3.1 APPLICATIONS, GENERAL**

- A. Products specified are for applications referenced in other Division 15 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

**3.2 EQUIPMENT IDENTIFICATION**

- A. Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have nameplate or has nameplate that is damaged or located

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15075 - MECHANICAL IDENTIFICATION**

where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:

1. Pumps, compressors, condensers and similar motor-driven units.
  2. Fans, blowers, primary balancing dampers, and mixing boxes.
  3. Packaged HVAC units.
- B. Install equipment signs with stainless steel screws or permanent adhesive on or near each major item of mechanical equipment. Locate signs where accessible and visible.
1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
  3. Include signs for the following general categories of equipment:
    - a. Main control and operating valves, including safety devices and compressed air outlets.
    - b. Lubrication systems.
    - c. Pumps, compressors, condensers and similar motor-driven units.
    - d. Fans, blowers, primary balancing dampers, and mixing boxes.
    - e. Packaged HVAC units.
    - f. Tanks and pressure vessels.
    - g. Strainers, filters, humidifiers, water-treatment systems, and similar equipment.

**3.3 PIPING IDENTIFICATION**

- A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.
1. Pipes with OD, Including Insulation, Less Than 6 Inches: Pre-tensioned pipe markers. Use size to ensure a tight fit.
  2. Pipes with OD, Including Insulation, Less Than 6 Inches: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least **3/4 inch** 1-1/2 inches wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.
  3. Pipes with OD, Including Insulation, 6 Inches and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15075 - MECHANICAL IDENTIFICATION**

4. Pipes with OD, Including Insulation, 6 Inches and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.
- B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior non-concealed locations as follows:
  1. Near each valve and control device.
  2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  3. Near penetrations through walls, floors, ceilings, and non-accessible enclosures.
  4. At access doors, manholes, and similar access points that permit view of concealed piping.
  5. Near major equipment items and other points of origination and termination.
  6. Spaced at maximum intervals of 15 feet along each run. Reduce intervals to 10 feet in areas of congested piping and equipment.
  7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

3.4 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:

1. Valve-Tag Size and Shape:
  - a. 1-1/2 inches~~2 inches~~, round.
  - b. ~~1-1/2 inches2 inches1-1/2 inches2 inches1-1/2 inches2 inches~~
2. Valve-Tag Color:
  - a. Cold Water: Blue.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15075 - MECHANICAL IDENTIFICATION**

- b. Hot Water: Yellow.
  - c. Lubrication Systems: Yellow.
  - d. Compressed Air: Blue.
3. Letter Color:
- a. All Piping: Black.

**3.5 ADJUSTING AND CLEANING**

- A. Relocate mechanical identification materials and devices that have become visually blocked by other work.
- B. Clean faces of mechanical identification .

**PART 4 - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be made under:

**Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15075

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15081 - DUCT INSULATION**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes semirigid and flexible duct, insulating cements, field-applied jackets, AND accessories and attachments.

**1.2 SUBMITTALS**

A. Product Data: Thermal conductivity, thickness, and jackets, for each type of product indicated.

**1.3 QUALITY ASSURANCE**

A. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Mineral-Fiber Insulation:
  - a. CertainTeed Manson.
  - b. Knauf FiberGlass GmbH.
  - c. Owens-Corning Fiberglas Corp.
  - d. Schuller International, Inc.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15081 - DUCT INSULATION**

**2.2 INSULATION MATERIALS**

A. Mineral-Fiber Board Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

B. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

C. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.

1. Adhesive: As recommended by insulation material manufacturer.
2. Ultraviolet-Protective Coating: As recommended by insulation manufacturer.

D. Field-Applied Jackets: ASTM C 921, Type 1, unless otherwise indicated.

1. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
2. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming.

E. Accessories and Attachments:

1. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. Yd..
2. Bands: Aluminum 3/4 inch wide.
3. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

**3PART - EXECUTION**

**3.1 GENERAL APPLICATION REQUIREMENTS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15081 - DUCT INSULATION**

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application including all dust, dirt and particulates.
- B. Site Preparation: The installation area shall be enclosed and weather proof during and after installation to prevent moisture intrusion. If insulation is water damaged, all affected insulation shall be removed and replaced with new materials. The contractor shall report in writing any incident of water damage to the design professional.
- C. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.
- D. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- E. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
- F. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
- G. Apply insulation with the least number of joints practical.
- H. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
- I. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.
- J. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- K. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15081 - DUCT INSULATION**

L. Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire/smoke damper sleeves for fire-rated wall and partition penetrations.

M. Floor Penetrations: Terminate insulation at underside of floor assembly and at floor support at top of floor.

3.2 DUCT AND PLENUM APPLICATION SCHEDULE

A. Service: supply-air, return-air, and outside-air ducts, concealed.

1. Material: Exterior Wrapped. Mineral-fiber board or Mineral-fiber blanket.
2. Thickness: ~~1/2 inch~~ ~~1 inch~~ ~~1-1/2 inches~~ 2 inches.
3. Number of Layers: One.
4. Field-Applied Jacket: Foil and paper.
5. Vapor Retarder Required: Yes.

4PART - MEASUREMENT AND PAYMENT

A. Work under this section will not be measured for payment.

B. Payment for work under this section shall be made under:

**i)Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15081

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15083 - PIPE INSULATION**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes semirigid and flexible piping insulation, insulating cements, field-applied jackets, accessories and attachments, and sealing compounds.

**1.2 SUBMITTALS**

A. Product Data: Thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

B. Shop Drawings: Shop fabrication and installation details for the following:

1. Application of protective shields, saddles, and inserts at pipe hangers for each type of insulation and hanger.
2. Insulation application at pipe expansion joints for each type of insulation.
3. Insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
4. Removable insulation at piping specialties and equipment connections.
5. Application of field-applied jackets.

**1.3 QUALITY ASSURANCE**

A. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

B. Insulation shall be installed by a firm whose principal business is the application and installation of thermal insulating material on piping and duct systems, with a minimum of five years experience in this principal business. Materials shall be installed by skilled mechanics in accordance with manufacturer's standard published instructions except as otherwise specified.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15083 - PIPE INSULATION**

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Mineral-Fiber Insulation:

- a. CertainTeed Manson.
- b. Knauf FiberGlass GmbH.
- c. Owens-Corning Fiberglas Corp.
- d. Schuller International, Inc.

2. Flexible Elastomeric Thermal Insulation:

- a. Armstrong World Industries, Inc.
- b. Rubatex Corp.

**2.2 PIPE INSULATION MATERIALS**

A. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:

- 1. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
- 2. Blanket Insulation: Comply with ASTM C 553, Type II. 3/4 pcf density, type 75 insulation with ASJ. Secure joints with galvanized staples and 2-1/2" pressure sensitive foil tape.
- 3. Fire-Resistant Adhesive: Comply with MIL-A-3316C Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.
- 4. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
- 5. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15083 - PIPE INSULATION**

6. Expanded or Exfoliated Vermiculite Insulating Cements: Comply with ASTM C 196.
  7. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
- B. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
- C. Field-Applied Jackets: ASTM C 921, Type 1, unless otherwise indicated.
1. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
  2. Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil- thick, high-impact, ultraviolet-resistant PVC.
  3. Aluminum Jacket: Aluminum jacketing, .016" thickness with bands and seals of same material.
- D. Accessories and Attachments:
1. Fiberglass insulation Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, pre-sized a minimum of 8 oz./sq. Yd..
  2. Bands: 3/4 inch wide, .016 inch thick, aluminum. Tie wire is not acceptable.~~0.080-inch0.062-inch0.062-inch~~

**3PART - EXECUTION**

**3.1 GENERAL APPLICATION REQUIREMENTS**

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Site Preparation: The installation area shall be enclosed and weather proof during and after installation to prevent moisture intrusion. If insulation is water damaged, all affected insulation shall be removed and replaced with new materials. The contractor shall report in writing any incident of water damage to the design professional.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15083 - PIPE INSULATION**

- C. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of pipes and fittings.
- D. Use accessories compatible with insulation materials and suitable for the service indicated. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- E. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder. Do not use joint sealants to fill voids in excess of 1/8".
- F. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer. Joint voids shall not exceed 1/8".
- G. Apply insulation with the least number of joints practical.
- H. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
- I. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.
- J. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- K. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.
- L. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions except fire-rated walls and partitions.
- M. Floor Penetrations: Apply insulation continuously through floors, except rated floor assemblies.

**3.2 PIPE INSULATION APPLICATION SCHEDULE**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15083 - PIPE INSULATION**

A. Service: Domestic cold water. Insulate all domestic cold water except piping drops in walls and headers in walls serving fixtures.

1. Operating Temperature: 35 to 80 deg F.
2. Insulation Material: Mineral-fiber preformed pipe.
3. Insulation Thickness: 1/2"
4. Jacket: All service jacket with self sealing laps on all pipe. Provide preformed PVC jackets for all fittings.
5. Field-Applied Jacket: Aluminum jacket for all exposed piping.

B. Service: Domestic hot water.

1. Operating Temperature: 60 to 140 deg F.
2. Insulation Material: Mineral fiber .
3. Insulation Thickness: Size according to the following table:

<u>Pipe Size</u>	<u>Insulation thickness</u>
# 2"	1"
≥ 2-1/2"	1-1/2"

4. Jacket: All service jacket with self sealing laps on all pipe. Provide preformed PVC jackets for all fittings.

C. Service: Refrigerant suction and hot-gas piping.

1. Operating Temperature: 35 to 50 deg F.
2. Insulation Material: Flexible elastomeric.
3. Insulation Thickness: 1"
4. Field-Applied Jacket: Provide UV protective finish on all exterior insulation.

D. Service: Condensate drain piping..

1. Operating Temperature: 35 to 50 deg F.
2. Insulation Material: Flexible elastomeric.
3. Insulation Thickness: 1/2"
4. Field-Applied Jacket: Provide UV protective finish on all exterior insulation.

**PART 4 - MEASUREMENT AND PAYMENT**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15083 - PIPE INSULATION**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be made under:

**Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15083

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15110 - VALVES**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes the following general-duty valves:

1. Copper-alloy ball valves.
2. Bronze check valves.

B. See Division 15 piping Sections for specialty valves applicable to those Sections only.

**1.2 SUBMITTALS**

A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; furnished specialties; and accessories.

**1.3 QUALITY ASSURANCE**

A. ASME Compliance: ASME B31.9 for building services piping valves.

B. NSF Compliance: NSF 61 for valve materials for potable-water service.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

A. Manufacturers are listed below each valve type.

**2.2 VALVES, GENERAL**

**15110 - 1**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15110 - VALVES**

- A. Refer to Part 3 "Valve Applications" Article for applications of valves.
- B. Bronze Valves: Threaded ends, unless otherwise indicated.
- C. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- D. Valve Sizes: Same as upstream pipe, unless otherwise indicated.
- E. Valve Actuators:
  - 1. Lever Handle: For quarter-turn valves.
- F. Extended Valve Stems: On insulated valves.
- G. Solder Joint: With sockets according to ASME B16.18.
  - 1. Caution: Use solder with melting point below 840 degrees F for check valves; below 421 degrees F for all ball valves.
- H. Threaded: With threads according to ASME B1.20.1.
- I. Valve Bypass and Drain Connections: MSS SP-45.

**2.3 CHECK VALVES**

- A. Check valves 2 inches and smaller shall be Class 125 (125 PSI SWP / 200 PSI WOG) bronze body and trim, threaded ends, and conform to MSS SP-80. Valves shall be RED-WHITE 236, NIBCO T 413B, HAMMOND or CRANE.
- B. Check valves shall be installed where shown on drawings and where required for satisfactory system operation.

**2.4 BALL VALVES:**

- A. All ball valves and their components shall be designed for a minimum working pressure of 600 PSI WOG and conform to MSS-SP-110. All non-metallic components and elastomers shall be suitable for 250 degrees F minimum continuous operating

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15110 - VALVES**

temperature, or not less than 50 degrees F above the operating temperature of the system, whichever is higher. All mating surfaces of closure faces shall be of bronze or Type 300 series or 17-4PH stainless steel, or elastomer, approved for the particular service, and materials must be compatible to prevent poisoning of contact surfaces of different materials (electrolytic action). Each valve shall be provided with a handle which shall be secured to the stem.

- B. Valves shall have bronze bodies with chrome-plated balls, threaded ends, and shall conform to MSS SP-110. Valves may be 2-piece or 3-piece bolt-through body. Use stem extensions on all insulated lines. Valves shall be RED-WHITE 5544/5549 OR EQUALS BY NIBCO, HAMMOND or CRANE.

**3PART - EXECUTION**

**3.1 VALVE APPLICATIONS**

- A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:
1. Shutoff Service: Ball valves.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.
- C. Valves shall be Class 125 (125 PSI SWP / 200 PSI WOG) or 150 percent of the system operating pressure, whichever is the greater.

**3.2 VALVE INSTALLATION**

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install valves with unions at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- C. Locate valves for easy access.
- D. Install valves in horizontal piping with stem at or above center of pipe.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15110 - VALVES**

E. Install valves in position to allow full stem movement.

F. Install check valves for proper direction of flow.

**3.3 JOINT CONSTRUCTION**

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated. Use silver soldered joints for all chilled and hot water piping applications.

**3.4 ADJUSTING**

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

**PART 4 - MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section shall be made under:

**Item S-15000 - Mechanical Work, per Lump Sum.**

**END OF SECTION 15110**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15140 - DOMESTIC WATER PIPING**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes domestic water piping from locations indicated to fixtures and equipment inside the building.

**2PART - PRODUCTS**

**2.1 PIPING MATERIALS**

A. PVC, AWWA Pipe: AWWA C900, Class 150, with bell end with gasket and spigot end.

1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Gaskets: AWWA C111, rubber.

2. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Soft Copper Tube: ASTM B 88, Types K, water tube, annealed temper.–For underground use only.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.

3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15140 - DOMESTIC WATER PIPING**

C. Hard Copper Tube: ASTM B 88, Types L, water tube, drawn temper. For aboveground use only.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought- copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

**2.2 VALVES**

A. Refer to Division 15 Section "Valves " for bronze and cast-iron, general-duty valves.

B. Refer to Division 15 Section "Plumbing Specialties " for balancing and drain valves.

**3PART - EXECUTION**

**3.1 PIPING APPLICATIONS**

A. Domestic Water Piping Aboveground: Use the following piping materials for each size range:

1. NPS 1-1/2 and Smaller: Hard copper tube, Type L~~Type M~~; copper pressure fittings; and soldered joints.

B. Domestic Water Piping Underground: Use the following piping materials for each size range:

1. NPS 1-1/2 and Smaller: Soft Copper tube, Type K, water tube~~Type M~~; and soldered joints.
  2. NPS 4 and Larger: PVC AWWA C900 Class 150 pipe; mechanical or push-on -joint, ductile-iron fittings; and restrained gasketed joints.
- a. Provide tie rods and clamps. Provide stainless steel tee head bolts with hexagonal nuts. All bolts, rods and nuts shall be given a full coat of Bitumastic #50

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15140 - DOMESTIC WATER PIPING**

after being placed. The shall be allowed to dry before backfilling.~~NPS 4 to NPS 6~~

~~1. NPS 3 1/2 NPS 3 1/2 Type L Type M NPS 4 to NPS 6 NPS 4 to NPS 6 NPS 4 to NPS 6 NPS 3 1/2 NPS 3 1/2~~

**3.2 VALVE APPLICATIONS**

A. Refer to Division 15 Section "Valves" for valve requirements.

**3.3 PIPING INSTALLATION**

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods " for basic piping installation.

B. Extend domestic water service piping to exterior water distribution piping in sizes and locations indicated.

C. Install shutoff valve, hose-end drain valve and flexible connection inside building at each domestic water service. Refer to Division 15 Section "Plumbing Specialties " for drain valves and strainers.

D. Install domestic water piping level or slope downward toward drain.

E. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.

F. Perform the following steps before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
5. Close drain valves and replace drain plugs.

G. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.

H. Check plumbing specialties and verify proper settings, adjustments, and operation.~~80 psig~~

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15140 - DOMESTIC WATER PIPING**

**3.4 JOINT CONSTRUCTION**

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods " for basic piping joint construction.
- B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

**3.5 ROUGHING-IN FOR WATER METERS**

- A. Rough-in domestic water piping for water meter installation according to utility company's requirements. Water meters will be furnished by New Orleans Sewerage and Water Board.

**3.6 VALVE INSTALLATION**

- A. Install sectional valve close to water main on each branch and riser serving plumbing fixtures or equipment. Use ball valves.
- B. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops. Use ball valves.
- C. Install drain valves for equipment and where indicated on Drawings.

**3.7 HANGER AND SUPPORT INSTALLATION**

- A. Refer to Division 15 Section "Hangers and Supports " for pipe hanger and support devices. Install the following:
  - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15140 - DOMESTIC WATER PIPING**

2. Individual, Straight, Horizontal Piping Runs: MSS Type 1, adjustable, steel clevis hangers.
- B. Install supports according to Division 15 Section "Hangers and Supports ."
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
  1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
  2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
  3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
- F. Support piping and tubing according to MSS SP-69 and manufacturer's written instructions.

**3.8 CONNECTIONS**

- A. Drawings indicate general arrangement of piping, fittings and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to exterior water service piping. Use dielectric fitting to join dissimilar piping materials.
- D. Connect domestic water piping to service piping with shutoff valve and extend and connect to the following:
  1. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
  2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures ."
  3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15140 - DOMESTIC WATER PIPING**

**3.9 FIELD QUALITY CONTROL**

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least 72 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
  - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
  - b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Cap and subject piping to static water pressure of 150 psig. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

**3.10 CLEANING**

A. Clean and disinfect potable domestic water piping as follows:

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15140 - DOMESTIC WATER PIPING**

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
  2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:
    - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    - b. Fill and isolate system according to either of the following:
      - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
      - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
    - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

**PART 4 - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be made under:

**Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15140

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15150 - SANITARY WASTE AND VENT PIPING**

**1PART - GENERAL**

**1.1 SUMMARY**

- A. This Section includes soil and waste, sanitary drainage and vent piping inside the building and the exterior piping between the building and the site main

**2PART - PRODUCTS**

**2.1 PIPING MATERIALS**

- A. Hub-and-Spigot Cast-Iron Pipe and Fittings: ASTM A 74, Service weight.

1. Gaskets: ASTM C 564, rubber.

- B. Hubless Cast-Iron Pipe and Fittings: ASTM A 888 or CISPI 301.

1. Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral, center pipe stop.
- a. Compact, Stainless Steel Couplings: CISPI 310 with ASTM A167, Type 301 stainless steel corrugated shield; stainless steel bands; and sleeve.
- 1) NPS 1 1/2 to NPS 4: 2 1/8 inch wide shield with 2 bands.
- 4) ~~NPS 1 1/2 to NPS 42 1/8 inch NPS 5 and NPS 63 inch NPS 8 and NPS 104 inch NPS 12 and NPS 155 1/2 inch~~

- C. PVC Pipe: ASTM D 2665, solid-wall drain, waste and vent.

1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.

**3PART - EXECUTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15150 - SANITARY WASTE AND VENT PIPING**

**3.1 PIPING APPLICATIONS**

**A. Aboveground, Soil, Waste, and Vent Piping:**

1. H-ubless, cast-iron soil piping and compact, Type 301 ~~[304]~~, stainless steel couplings.

**B. Underground, Soil, Waste, and Vent Piping Below Slab:**

1. Service weight, cast-iron soil piping; gaskets; and gasketed joints.

**C. Underground Site Sewer Main Piping:**

1. ASTM D 2665, PVC solid-wall drain, waste and vent piping; ASTM D 2665, socket type, drain, waste and vent pattern fittings.

**3.2 PIPING INSTALLATION**

**A. Refer to Division 15 Section "Basic Mechanical Materials and Methods " for basic piping installation.**

**B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.**

**C. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."**

**D. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15150 - SANITARY WASTE AND VENT PIPING**

- E. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- F. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
  - 1. Piping up to 3" size: 1/4"/ft.
  - 2. Piping 4" and larger: 1/8"/ft.
- G. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- H. Install underground PVC soil and waste drainage piping according to ASTM D 2321.
- I. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- J. Provide stainless steel hanger rods to support all sanitary sewer and vent piping installed below building slabs and all structurally supported slabs that are not building slabs (service yards, driveways, etc.). Rods shall be minimum 1/4" diameter, type 316 stainless steel spaced at 5'-0" maximum spacing with hanger occurring at all pipe joints. Additional, provide support at each joint or fitting and at each "P-trap" and closet bend.
- K. Install test plugs, wood plugs or caps in all open pipes at time of installation and do not remove until the pipes are connected tight into the existing systems. All cost incurred from damage to the project due to failure to make plumbing systems tight shall be borne by the contractor.

**3.3 JOINT CONSTRUCTION**

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods " for basic piping joint construction.
- B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15150 - SANITARY WASTE AND VENT PIPING**

1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
  2. Hubless Joints: Make with rubber gasket and sleeve or clamp.
- C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- D. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

**3.4 HANGER AND SUPPORT INSTALLATION**

- A. Refer to Division 15 Section "Hangers and Supports " for pipe hanger and support devices. Install the following within the building:
1. Vertical Piping: MSS Type 8 or Type 42, clamps.
  2. Individual, Straight, Horizontal Piping Runs: MSS Type 1, adjustable, steel clevis hangers.
- B. Install supports according to Division 15 Section "Hangers and Supports ."
- C. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- D. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
  2. NPS 3: 60 inches with 1/2-inch rod.
  3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
  4. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- E. Install supports for vertical cast-iron soil piping.
- F. Support piping according to MSS SP-69 and manufacturer's written instructions.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15150 - SANITARY WASTE AND VENT PIPING**

**3.5 CONNECTIONS**

A. Connect building soil and waste piping to exterior sanitary sewerage piping.

B. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures ."
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by New Orleans Sewerage and Water Board Plumbing Code. Refer to Division 15 Section "Plumbing Specialties ."

**3.6 FIELD QUALITY CONTROL**

A. During installation, notify authorities having jurisdiction at least 72 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.

1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
2. Prepare reports for tests and required corrective action.

**3.7 CLEANING**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15150 - SANITARY WASTE AND VENT PIPING**

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

**PART 4 - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be made under:

**Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15150

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15183 - REFRIGERANT PIPING**

**1PART - GENERAL**

**1.1 SUMMARY**

- A. This Section includes refrigerant piping used for air-conditioning applications.
- B. See Division 15 Section "Meters and Gages" for thermometers and pressure gages.
- C. The "Manufacturer" as used herein in this Specification Section shall mean the Manufacturer of the air cooled condensing units, chillers with remote air cooled condensers, other Direct Expansion (D/X) refrigeration equipment, etc. requiring field fabricated and installed refrigerant piping and associated specialties.

**1.2 SUBMITTALS**

- A. Product Data: Submit calculations and layout drawings of each complete refrigerant piping installation including, but not limited to, size, pressure drop, layout, and location of the following: Piping, valves, filters, dryers, site glasses, etc. as required by the Manufacturer.

**1.3 QUALITY ASSURANCE**

- A. ASHRAE Standard: Comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
- B. ASME Standard: Comply with ASME B31.5, "Refrigeration Piping."
- C. UL Standard: Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Nonelectrical"; or UL 429, "Electrically Operated Valves."

**2PART - PRODUCTS**

**2.1 COPPER TUBE AND FITTINGS**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15183 - REFRIGERANT PIPING**

- A. Drawn-Temper Copper Tube: ASTM B 280, Type ACR ~~ASTM B 88, Type L.~~
- B. Annealed-Temper Copper Tube: ASTM B 280, Type ACR ~~ASTM B 88, Type L~~ ~~ASTM B 88, Type K.~~
- C. Wrought-Copper Fittings: ASME B16.22.
- D. Wrought-Copper Unions: ASME B16.22.

**2.2 VALVES**

- A. Diaphragm Packless Valves: 500-psig working pressure and 275 deg F working temperature; globe design with straight-through or angle pattern; forged-brass or bronze body and bonnet, phosphor bronze and stainless-steel diaphragms, rising stem and handwheel, stainless-steel spring, nylon seat disc, and with solder-end connections.
- B. Check Valves Smaller Than NPS 1: 400-psig operating pressure and 285 deg F operating temperature; cast-brass body, with removable piston, polytetrafluoroethylene seat, and stainless-steel spring; globe design. Valve shall be straight-through pattern, with solder-end connections.
- C. Service Valves: 500-psig pressure rating; forged-brass body with copper stubs, brass caps, removable valve core, integral ball check valve, and with solder-end connections.
- D. Solenoid Valves: Comply with ARI 760; 250 deg F temperature rating and 400-psig working pressure; forged brass, with polytetrafluoroethylene valve seat, 2-way, straight-through pattern, and solder-end connections; manual operator; fitted with suitable NEMA 250 enclosure of type required by location, with 1/2-inch conduit adapter and holding coil. Coordinate the solenoid valve type, normally open or closed, and voltage with Manufacturer and Control Contractor.
- E. Pressure Relief Valves: Straight-through or angle pattern, brass body and disc, neoprene seat, and factory sealed and ASME labeled for standard pressure setting.
- F. Thermostatic Expansion Valves: Comply with ARI 750; brass body with stainless-steel parts; thermostatic-adjustable, modulating type; size and operating characteristics as recommended by manufacturer, and factory set for superheat requirements; solder-end connections; with sensing bulb, distributor having side connection for hot-gas bypass line, and external equalizer line.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15183 - REFRIGERANT PIPING**

**2.3 REFRIGERANT PIPING SPECIALITIES**

- A. Straight- or Angle-Type Strainers: 500-psig working pressure; forged-brass or steel body with stainless-steel wire or brass-reinforced Monel screen of 80 to 100 mesh in liquid lines up to 1-1/8 inches, 60 mesh in larger liquid lines, and 40 mesh in suction lines; with screwed cleanout plug and solder-end connections.
- B. Moisture/Liquid Indicators: 500-psig maximum working pressure and 200 deg F operating temperature; all-brass body with replaceable, polished, optical viewing window with color-coded moisture indicator; with solder-end connections.
- C. Replaceable-Core Filter-Dryers: 350-psig 500-psig maximum working pressure; heavy gage protected with corrosion-resistant-painted steel shell, flanged ring and spring, ductile-iron cover plate with steel cap screws; wrought-copper fittings for solder-end connections; with replaceable-core kit, including gaskets and the following:
  - 1. Filter-Dryer Cartridge: Pleated media with solid-core sieve with activated alumina, ARI 730 rated for capacity.

**3PART - EXECUTION**

**3.1 PIPING APPLICATIONS**

- A. Aboveground, within Building: Type ACR drawn-copper tubing~~Type L~~.
- B. Belowground for NPS 2 and Smaller:~~Type L~~Type K annealed-copper tubing.

**3.2 VALVE APPLICATIONS**

- A. Valve applications are subject to approval for use by the Manufacturer. Valves shall be applied as specified unless the manufacturer does not approve of the application.
- B. Install diaphragm packless or packed-angle valves in suction and discharge lines of compressor, for gage taps at hot-gas bypass regulators, on each side of strainers.
- C. Install check valves in compressor discharge lines and in condenser liquid lines on multiple condenser systems.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15183 - REFRIGERANT PIPING**

- D. Install packed-angle valve in liquid line between receiver shutoff valve and thermostatic expansion valve for system charging.
- E. Install diaphragm packless or packed-angle valves on each side of strainers and dryers, in liquid and suction lines at evaporators, and elsewhere as indicated.
- F. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve.
  - 1. Install solenoid valves in horizontal lines with coil at top.
  - 2. Electrical wiring for solenoid valves is work of this division and shall comply with Division 16 Sections.
- G. Install thermostatic expansion valves as close as possible to evaporator.
  - 1. If refrigerant distributors are used, install them directly on expansion-valve outlet.
  - 2. Install valve so diaphragm case is warmer than bulb.
  - 3. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line. Locate bulb as recommended by the manufacturer.
  - 4. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.
- H. Install pressure-regulating and pressure relief valves as required by ASHRAE 15. Pipe pressure relief valve discharge to outside.

**3.3 SPECIALTY APPLICATIONS**

- A. Install liquid indicators as recommended by manufacturer. .
- B. Install strainers as recommended by manufacturer.
- C. Install moisture-liquid indicators in liquid lines between filter-dryers and thermostatic expansion valves and in liquid line to receiver.
- D. Install pressure relief valves on ASME receivers; pipe discharge to outdoors.
- E. Install filter/dryers and suction line filters as required by the Manufacturer. Fabricate the piping at all filter/dryers and suction line filter so that the core can be removed horizontally or down.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15183 - REFRIGERANT PIPING**

- F. Install solenoid valves as recommended by manufacturer.
- G. Install flexible connectors at or near compressors where piping configuration does not absorb vibration.

**3.4 PIPING INSTALLATION**

- A. Install refrigerant piping according to ASHRAE 15.
- B. Basic piping installation requirements are specified in Division 15 Section "Basic Mechanical Materials and Methods."
- C. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- D. Arrange piping to allow inspection and service of compressor and other equipment. Install valves and specialties in accessible locations to allow for service and inspection.
- E. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.
- F. Belowground, install copper tubing in protective conduit. Vent conduit outdoors.
- G. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.
- H. Slope refrigerant piping as follows:
  - 1. Pitch all horizontal refrigerant lines  $\frac{1}{2}$ " per 10' in the direction of refrigerant flow.
  - 2. Install the suction line so that it drops below the evaporator coil before any horizontal run.
  - 3. If the the A/C System(s) have paired condensing units serving single AHU's with Intertwined coils, expansion valves at the evaporator coils may have to be field changed or modified. Follow Manufacturer's requirements.
  - 4. Install traps and double risers to entrain oil in vertical runs.
- I. Install unions to allow removal of solenoid valves, pressure-regulating valves, and expansion valves and at connections to compressors and evaporators.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15183 - REFRIGERANT PIPING**

J. When brazing, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion valve bulb.

K. Hanger, support, and anchor products are specified in Division 15 Section "Hangers and Supports."

L. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
3. Pipe rollers for multiple horizontal runs 20 feet or longer, supported by a trapeze.

M. Install hangers with the following maximum spacing and minimum rod sizes:

1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
6. NPS 2: Maximum span, 96 inches; minimum rod size, 3/8 inch.

**3.5 PIPE JOINT CONSTRUCTION**

A. Braze joints according to Division 15 Section "Basic Mechanical Materials and Methods."

B. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide) during brazing to prevent scale formation.

**3.6 REFRIGERANT PIPE INSULATION**

A. Insulate all suction lines as specified in Division 15 "Mechanical Insulation".

B. Do not insulate the liquid lines, except where they come in Contact with the suction lines.

C. Do not apply the insulation until the refrigerant piping system has passed all tests and inspections as specified herein, but not limited to, pressure testing and the Manufacturer inspection.

**3.7 FIELD QUALITY CONTROL**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15183 - REFRIGERANT PIPING**

A. Test and inspect refrigerant piping according to ASME B31.5, Chapter VI.

1. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure.
2. Test high- and low-pressure side piping of each system at not less than the lower of the design pressure or the setting of pressure relief device protecting high and low side of system.
  - a. System shall maintain test pressure at the manifold gage throughout duration of test.
  - b. Test joints and fittings by brushing a small amount of soap and glycerine solution over joint.
  - c. Fill system with nitrogen to raise a test pressure of 150 psig or higher as required by authorities having jurisdiction.
  - d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

B. The contractor shall not startup the equipment served by the refrigerant piping system until given written approval by the Manufacturer with copies to the Architect/Engineer that the installed refrigerant piping system meets their standards and adheres to the submitted shop drawings.

**3.8 SYSTEM CHARGING**

A. Charge system using the following procedures:

1. Install core in filter-dryer after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to a vacuum of 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line. Provide full-operating charge

**4PART - MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section shall be made under:

**i)Item S-15000 - Mechanical Work, per Lump Sum.**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15183 - REFRIGERANT PIPING**

END OF SECTION 15183

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15191 - LUBRICATION SYSTEM EQUIPMENT & PIPING**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes bulk waste oil tank, specialties and accessories within the building.

B. See Division 15 Section "Basic Mechanical Materials and Methods" for flexible connectors.

C. See Division 15 Section 15110 "Valves" for general purpose valves for domestic water piping.

D. See Division 15 Section 15140 "Domestic Water Piping" for water piping to hose reels.

E. See Division 15 Section 15211 "General Service Compressed Air Piping" for compressed air piping to hose reels and air operated motors and equipment.

**1.3 SUBMITTALS**

A. Product Data: For specialty valves and equipment indicated.

B. Shop Drawings: Piping and equipment. Include plans and attachments to other Work.

C. Operation and maintenance data.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

**15191 - 1**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15191 - LUBRICATION SYSTEM EQUIPMENT & PIPING**

A. In other Part 2 articles where subparagraphs titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

**2.2 LUBRICATION EQUIPMENT**

A. Bulk waste oil storage tank shall be equal to "Containment Solutions" WasteEvac Systems package, double wall tank, UL 142 listed, skid mounted, 500 gallon storage capacity. System shall be complete with 1" UL listed air operated double diaphragm pump, air filter/regulator, automatic air operated high level shutoff valve with whistle, manual air inlet shutoff valve, UL listed 3/4" x 8 foot long hard wall suction hose with in-line strainer and quick connect adapter, 2" suction tube with "Kamlock" adapter with dust cap, primary working vent, primary and secondary emergency vents, level gage, corrosion resistant exterior coating, leak monitoring port and 6" fill hatch with screen.

B. Compressed air reels shall be Owner furnished and contractor installed.

C. Domestic water reels shall each be Owner furnished and contractor installed.

D. Reel mounting channels shall be equal Owner furnished and contractor installed.

**3PART - EXECUTION**

**3.1 PIPING APPLICATIONS**

A. General: Unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated. ~~NPS 1-1/4 to NPS 2~~

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15191 - LUBRICATION SYSTEM EQUIPMENT & PIPING**

**3.2 PIPING INSTALLATION**

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements.

**3.3 JOINT CONSTRUCTION**

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

**3.4 VALVE INSTALLATION**

A. Install valves in accessible locations, protected from possible damage.

B. Install valves at branch connections to supply mains and at equipment.

C. Refer to Division 15 Section "Valves" for general installation requirements.

**3.5 HANGER AND SUPPORT INSTALLATION**

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices.

**3.6 CONNECTIONS**

A. Install piping adjacent to equipment to allow service and maintenance.

B. Connect piping to equipment with oil shutoff valve and union. Install union between valve and equipment.

**3.7 QUALITY ASSURANCE**

A. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15191 - LUBRICATION SYSTEM EQUIPMENT & PIPING**

- B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Report test results in writing.

**3.8 DEMONSTRATION**

- A. Provide a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lubrication system equipment. Refer to Division 1 for requirements.

**PART 4 - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be made under:

**Item S-15000 - Mechanical Work, per Lump Sum.**

**END OF SECTION 15191**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15211 - GENERAL-SERVICE COMPRESSED -AIR PIPING**

**1PART - GENERAL**

**1.1 SUMMARY**

- A. This Section includes piping and related specialties for general-service compressed-air systems operating at 200 psig and less.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

**2.2 PIPES, TUBES, AND FITTINGS**

- A. Schedule 40, Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade A or B, hot dip, zinc coated. Provide Type S, Grade B, and hot-dip zinc-coated pipe options if indicated.

1. Steel Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized seamless steel pipe. Include ends matching joining method.
2. Malleable-Iron Fittings: ASME B16.3. Provide Class 300 and galvanized finish.
3. Malleable-Iron Unions: ASME B16.39, Class 300, threaded, galvanized finish.

- B. Flexible Pipe Connectors: Corrugated tubing with wire-braid covering.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15211 - GENERAL-SERVICE COMPRESSED -AIR PIPING**

1. Bronze-Hose Flexible Pipe Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
  - a. Working-Pressure Rating: 200 psig minimum.
  - b. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.

**2.3 JOINING MATERIALS**

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for joining materials not in this Section.

**2.4 SPECIALTIES**

- A. Air-Line Pressure Regulators: Bronze body, direct acting, spring-loaded manual pressure-setting adjustment, and rated for 200-psig minimum inlet pressure.
  1. Type: Diaphragm operated.
- B. Air-Line Lubricators: Sizes and capacities indicated; equip with drip chamber and sight dome for observing oil drop entering airstream; with oil-feed adjustment screw and quick-release collar for easy bowl removal.
  1. Provide with automatic feed device for supplying oil to lubricator.
- C. Mechanical Filters: Two-stage, mechanical-separation-type, air-line filters. Equip with deflector plates, resin-impregnated-ribbon-type filters with edge filtration, and drain cock.
- D. Quick Couplings: Assembly with locking-mechanism feature for quick connection and disconnection of compressed-air hose.
  1. Manufacturers:

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15211 - GENERAL-SERVICE COMPRESSED -AIR PIPING**

- a. Schrader-Bridgeport; Amflo Div.
  - b. Schrader-Bridgeport/Standard Thomson.
  - c. Snap-Tite, Inc.
  - d. Tuthill Corporation; Hansen Coupling Div.
2. Automatic-Shutoff Quick Couplings: Straight-through brass body with O-ring or gasket seal and stainless-steel or nickel-plated-steel operating parts.
- a. Socket End: With one-way valve and threaded inlet for connection to piping or threaded hose fitting.

**3PART - EXECUTION**

**3.1 PIPING APPLICATIONS**

- A. Install nipples, flanges, unions, transition and special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications below, unless otherwise indicated.
- B. Joining of Dissimilar Metal Piping: Use dielectric fittings. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for dielectric fitting types.
- 1. NPS 2 and Smaller: Dielectric unions.
- C. Use metal general-service compressed-air piping between air compressors and air receivers. Use of plastic piping for this application is prohibited.
- D. Compressed-Air Distribution Piping: Use the following piping materials for each size range:
- 1. NPS 2 and Smaller: Schedule 40, galvanized-steel pipe; galvanized, threaded malleable-iron fittings; and threaded joints.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15211 - GENERAL-SERVICE COMPRESSED -AIR PIPING**

**3.2 PIPING INSTALLATION**

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Install air and drain piping with 1 percent slope downward in direction of airflow.
- C. Install eccentric reducers where piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.
- D. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.
- E. Install flexible pipe connector on each connection to air compressors.

**3.3 VALVE INSTALLATION**

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping and valve installation.
- B. Install valves according to Division 15 Section "Valves."
- C. Install shutoff valve at each connection to and from general-service compressed-air specialties, equipment, and accessories. Install strainer.
- D. Install check valves to maintain correct direction of fluid flow to and from compressed-air piping specialties and equipment.

**3.4 JOINT CONSTRUCTION**

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Dissimilar Metal Piping Material Joints: Use dielectric fittings.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15211 - GENERAL-SERVICE COMPRESSED -AIR PIPING**

**3.5 HANGER AND SUPPORT INSTALLATION**

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices.  
Install the following:

1. Individual, Straight, Horizontal Piping Runs: According to the following:

a. 100 Feet and Less: MSS Type 1, adjustable, steel, clevis hangers.

B. Install supports according to Division 15 Section "Hangers and Supports."

C. Support horizontal piping within 12 inches of each fitting and coupling.

D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for Schedule 40, steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1/4 to NPS 1/2: 96 inches with 3/8-inch rod.

2. NPS 3/4 to NPS 1-1/4: 84 inches with 3/8-inch rod.

**every 10 feet.**

**F. Install vinyl-coated hangers for ABS piping with the following maximum horizontal spacing and minimum rod diameters:**

**3.6 CONNECTIONS**

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to specialties and equipment to allow service and maintenance.

C. Connect piping to air compressors, accessories, and specialties with shutoff valve and union.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15211 - GENERAL-SERVICE COMPRESSED -AIR PIPING**

**3.7 LABELING AND IDENTIFICATION**

- A. Install identifying labels and devices for general-service compressed-air piping systems. Refer to Division 15 Section "Mechanical Identification" for labeling and identification materials.

**3.8 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections and prepare test reports:

1. Test and adjust piping safety controls. Replace damaged and malfunctioning safety controls.
2. Piping Leak Tests: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen to pressure of 200 psig. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
  - a. Repair leaks and retest until no leaks exist.
3. Report results in writing.

**PART 4 - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be made under:

**Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15211

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15410 - PLUMBING FIXTURES**

**1PART - GENERAL**

**1.1 SUMMARY**

- A. This Section includes plumbing fixtures and related components.
- B. See Division 15 Section "Plumbing Specialties" for specialty fixtures not in this Section.

**1.2 DEFINITIONS**

- A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

**1.3 SUBMITTALS**

- A. Product Data: Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports and indicate materials and finishes, dimensions, construction details, and flow-control rates for each type of fixture indicated.
- B. Wiring Diagrams: Power, signal, and control wiring.
- C. Operation and maintenance data.

**1.4 QUALITY ASSURANCE**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; about plumbing fixtures for people with disabilities.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15410 - PLUMBING FIXTURES**

- C. Regulatory Requirements: Comply with requirements in U.S. Architectural & Transportation Barriers Compliance Board's "Uniform Federal Accessibility Standards (UFAS), 1985-494-187" about plumbing fixtures for people with disabilities.
- D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

- 1. Products: Subject to compliance with requirements, provide one of the products specified.
- 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

**2.2 PLUMBING FIXTURES**

- A. Refer to the Drawing's fixture schedule for plumbing fixtures.

~~2.2.5 gpm (9.5 L/min. 3-3/8 inches (86 mm) 4 inches (102 mm) 6 inches (152 mm) 8 inches (203 mm) 4 inches (100 mm) 6 inches (150 mm) NPS 3/8 (DN 10) NPS 3/8 (DN 10) NPS 1/2 (DN 15) NPS 1/2 (DN 15) NPS 1/2 (DN 15) 1.5 gpm (5.7 L/min.) 2.5 gpm (9.5 L/min.) NPS 1/2 (DN 15) NPS 1/2 (DN 15) 1.5 gpm (5.7 L/min.) 2.5 gpm (9.5 L/min.) NPS 1/2 (DN 15) NPS 1/2 (DN 15) 1.5 gpm (5.7 L/min.) 2.5 gpm (9.5 L/min.) 3-3/8 inches (86 mm) 4 inches (102~~

STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS

SECTION 15410 - PLUMBING FIXTURES

~~mm6 inches (152 mm8 inches (203 mm4 inches (100 mm6 inches (150 mmNPS 3/8 (DN 10NPS 3/8 (DN 10NPS 1/2 (DN 15NPS 1/2 (DN 15NPS 1/2 (DN 15NPS 1 (DN 250.5 gal./flush (1.9 L/flush1.0 gal./flush (3.8 L/flush1.5 gal./flush (5.7 L/flush1.6 gal./flush (6.0 L/flush3.5 gal./flush (13.3 L/flushNPS 3/4 (DN 20NPS 1-1/4 (DN 32NPS 1-1/2 (DN 40NPS 1-1/4 (DN 32NPS 1-1/2 (DN 40NPS 2 (DN 5032 by 32 inches (813 by 813 mm36 by 36 inches (914 by 914 mm32 by 42 inches (813 by 1067 mm48 by 60 inches (1219 by 1524 mmNPS 1-1/2 (DN 40NPS 2 (DN 50NPS 3 (DN 80NPS 1-1/2 (DN 40190 deg F (88 deg C0.3 gal. (1.3 L0.5 gal. (1.9 L1.6 gal./flush (6 L/flush3.5 gal./flush (13.3 L/flushNPS 1/2 (DN 151.6 gal./flush (6 L/flush3.5 gal./flush (13.3 L/flush1.6 gal./flush (6 L/flush3.5 gal./flush (13.3 L/flushNPS 3/8 (DN 10NPS 1/2 (DN 151.6 gal./flush (6 L/flush3.5 gal./flush (13.3 L/flush1.6 gal./flush (6 L/flushNPS 1/2 (DN 151.6 gal./flush (6 L/flush0.5 gal./flush (1.9 L/flush1 gal./flush (3.8 L/flush1.5 gal./flush (5.7 L/flushNPS 3/4 (DN 20NPS 1-1/4 (DN 32NPS 1-1/2 (DN 40NPS 1-1/2 (DN 40NPS 2 (DN 50NPS 3 (DN 800.5 gal./flush (1.9 L/flush1 gal./flush (3.8 L/flushNPS 3/4 (DN 20NPS 1-1/2 (DN 40NPS 1-1/2 (DN 400.045-inch (1.1 mm 21-inch (535 mm24-inch (610 mm1 gal./flush (3.8 L/flushNPS 3/4 (DN 20NPS 2 (DN 5018 by 15 inches (457 by 381 mm19 by 16 inches (483 by 406 mm20 by 18 inches (508 by 457 mm24 by 20 inches (610 by 508 mm2-inch (51-mm4-inch (102-mmNPS 3/8 (DN 10NPS 1-1/4 (DN 32NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40NPS 1-1/4 (DN 32NPS 1-1/2 (DN 400.032-inch (0.8-mm-0.045-inch (1.1-mm-18 by 15 inches (457 by 381 mm19 by 16 inches (483 by 406 mm20 by 18 inches (508 by 457 mm24 by 20 inches (610 by 508 mm19 by 16 inches (483 by 406 mm20 by 17 inches (508 by 432 mm18 inches (457 mm19 inches (483 mm2-inch (51-mm4-inch (102-mmNPS 3/8 (DN 10NPS 1-1/4 (DN 32NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40NPS 1-1/4 (DN 32NPS 1-1/2 (DN 400.032-inch (0.8-mm-0.045-inch (1.1-mm-25 by 17 inches (635 by 432 mm31 by 19 inches (787 by 483 mm49 by 22 inches (1245 by 559 mm73 by 22 inches (1854 by 559 mm19 by 16 inches (483 by 406 mm20 by 17 inches (508 by 432 mm2-inch (51-mm4-inch (102-mmNPS 3/8 (DN 10NPS 1-1/4 (DN 32NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40NPS 1-1/4 (DN 32NPS 1-1/2 (DN 400.032-inch (0.8-mm-0.045-inch (1.1-mm-17 by 16 by 5 inches (432 by 406 by 127 mmNPS 1/2 (DN 15NPS 1-1/2 (DN 400.045-inch (1.1 mm 48 by 30 inches (1220 by 765 mm60 by 30 inches (1525 by 765 mm66 by 30 inches (1680 by 765 mmNPS 1/2 (DN 15NPS 1-1/2 (DN 40NPS 1-1/2 (DN 4036 by 34 inches (915 by 865 mm42 by 36 inches (1065 by 915 mm43 by 39 inches (1090 by 990 mm48 by 34 inches (1220 by 865 mm52 by 36 inches (1320 by 915 mm60 by 36 inches (1525 by 915 mm72 by 36 inches (1830 by 915 mmNPS 2 (DN 5030 by 30 inches (760 by 760 mm32 by 32 inches (815 by 815 mm36 by 36 inches (915 by 915 mm36 by 39~~

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15410 - PLUMBING FIXTURES**

~~inches (915 by 990 mm) 45 by 39 inches (1145 by 990 mm) NPS 1/2 (DN 15) NPS 2 (DN 50) 24 by 20 inches (610 by 508 mm) 32 by 20 inches (813 by 508 mm) 42 by 21 inches (1067 by 533 mm) 3 1/2 inch (89 mm) 3 1/2 inch (89 mm) 1 1/2 inch (38 mm) 3 1/2 inch (89 mm) NPS 1/2 (DN 15) NPS 1 1/2 (DN 40) 0.045 inch (1.1 mm) 2. 22 by 18 inches (560 by 460 mm) 24 by 20 inches (610 by 510 mm) 19 by 16 inches (480 by 405 mm) 22 by 20 inches (560 by 510 mm) NPS 2 (DN 50) NPS 3 (DN 80) NPS 2 (DN 50) NPS 3 (DN 80) 28 by 28 inches (710 by 710 mm) NPS 2 (DN 50) NPS 3 (DN 80) 24 by 24 inches (610 by 610 mm) 28 by 28 inches (710 by 710 mm) 24 by 36 inches (610 by 915 mm) 32 by 32 inches (815 by 815 mm) 36 by 36 inches (915 by 915 mm) 6 inches (150 mm) 10 inches (255 mm) 12 inches (305 mm) 12 inches (305 mm) NPS 2 (DN 50) NPS 3 (DN 80) 24 by 21 inches (610 by 535 mm) 25 by 22 inches (635 by 560 mm) NPS 1/2 (DN 15) NPS 1 1/2 (DN 40) NPS 1 1/2 (DN 40) 0.045 inch (1.1 mm)~~

**3PART - EXECUTION**

**3.1 FIXTURE INSTALLATION**

- A. Assemble fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. For wall-hanging fixtures, install off-floor supports affixed to building substrate.
  - 1. Use carrier supports without waste fitting for fixtures with tubular waste piping.
- C. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- D. Install wall-hanging fixtures with tubular waste piping attached to supports.
- E. Install counter-mounting fixtures in and attached to casework.
- F. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.
- G. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15410 - PLUMBING FIXTURES**

1. Exception: Use ball valve if stops are not specified with fixture. Refer to Division 15 Section "Valves" for general-duty valves.
- H. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- I. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- J. Install toilet seats on water closets.
- K. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- L. Install traps on fixture outlets.
  1. Exception: Omit trap on fixtures with integral traps.
- M. Install escutcheons at piping wall and ceiling penetrations in exposed locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for escutcheons.
- N. Install water hammer arrestors on all water closet supplies.
- O.

Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Refer to Division 7 for sealant and installation requirements.

**3.2 CONNECTIONS**

- A. Connect water supplies from water distribution piping to fixtures.
- B. Connect drain piping from fixtures to sanitary sewer piping.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15410 - PLUMBING FIXTURES**

- C. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.
- D. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections: Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.

**3.3 PROTECTION**

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

**PART 4 - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be made under:

**Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15410

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15430 - PLUMBING SPECIALTIES**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes the following plumbing specialties:

1. Backflow preventers.
2. Wall and yard post hydrants.
3. Trap priming systems.
4. Miscellaneous piping specialties.
5. Cleanouts.
6. Floor drains.
7. Area drains.
8. Oil/Water Separator.

**1.2 PERFORMANCE REQUIREMENTS**

A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:

1. Domestic Water Piping: 150 psig.
2. Sanitary Waste and Vent Piping: 10-foot head of water.

**1.3 SUBMITTALS**

A. Product Data: Include rated capacities and indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following:

1. Water hammer arresters.
2. Wall and yard post hydrants.
3. Trap priming systems.
4. Cleanouts, floor drains, open receptors and area drains.
5. Oil/Water Separator.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15430 - PLUMBING SPECIALTIES**

- B. Field quality-control test reports.
- C. Operation and maintenance data for the following:
  - 1. Oil/Water Separator.

1.4 **QUALITY ASSURANCE**

- A. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.
- D. NSF Compliance:
  - 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components. Include marking "NSF-PW" on plastic potable-water piping and "NSF-DWV" on plastic drain, waste, and vent piping.
  - 2. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

**2PART - PRODUCTS**

2.1 **MANUFACTURERS**

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15430 - PLUMBING SPECIALTIES**

1. Products: Subject to compliance with requirements, provide one of the products specified.
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

**2.2 BACKFLOW PREVENTERS**

**A. Available Manufacturers:**

1. Watts Industries, Inc.; Water Products Div.
2. Woodford Manufacturing Co.
3. Zurn Industries, Inc.; Wilkins Div.

**B.**

Hose-Connection Vacuum Breakers: ASSE 1011, nickel plated, with nonremovable and manual drain features, and ASME B1.20.7, garden-hose threads on outlet.

**2.3 NONFREEZE WALL BOX HYDRANT (NARROW WALL INSTALLATION)**

**A. Manufacturers:**

1. J.R. Smith. Co.
2. Woodford Manufacturing Co.

**B. Description:** Frost proof design similar to ASME A112.21.3 for wall mounting within a narrow wall situation allowing for a 4" maximum depth of installation, with chrome plated, cast bronze enclosure box, quarter turn nonfreeze hydrant, NPS 3/4" threaded or solder joint inlet connection that allows 360 degree swivel to any position, with ASME B1.20.7 garden hose threads on outlet. Unit shall be concealed in a chrome plated, cast bronze box with a full 180 degree cover opening, integral vacuum breaker and "T" handle key.

**2.4 NONFREEZE YARD (POST) HYDRANTS**

**A. Manufactures:**

1. J.R. Smith. Co.
2. Woodford Manufacturing Co.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15430 - PLUMBING SPECIALTIES**

- B. Description: Bronze frost proof design with cast iron casing guard and secured wheel handle. Inlet and hose connection size shall be NPS 1. Hydrant shall be provided with minimum three foot burial depth for valve housing and drain hole. Set drain hole in minimum one foot by one foot by one foot deep gravel bed.

**2.5 TRAP SEAL PRIMER SYSTEMS**

- A. Trap Seal Primer System: Factory-fabricated, automatic-operation assembly for wall mounting with the following:

1. Manufacturers:
  - a. Precision Plumbing Products, Inc.
2. Piping: NPS 3/4, ASTM B 88, Type L; copper, water tubing inlet and manifold with number of NPS 1/2 outlets as indicated.
3. Cabinet: Steel box with stainless-steel cover.
4. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.
5. Water Hammer Arrester: ASSE 1010.
6. Vacuum Breaker: ASSE 1001.

**2.6 DRAIN VALVES**

- A. Hose-End Drain Valves: MSS SP-110, NPS 3/4 ball valve, rated for 400-psig minimum CWP. Include two-piece, copper-alloy body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.
1. Inlet: Threaded or solder joint.
  2. Outlet: Short-threaded nipple with ASME B1.20.7, garden-hose threads and cap.

**2.7 MISCELLANEOUS PIPING SPECIALTIES**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15430 - PLUMBING SPECIALTIES**

A. Water Hammer Arresters: ASSE 1010 or PDI-WH 201, metal-bellows type with pressurized metal cushioning chamber. Size per ASSE 1010 or PDI-WH 201 recommendations, Sizes A through F.

1. Manufacturers:

- a. J. R. Smith Manufacturing Co.
- b. Precision Plumbing Products, Inc.

B. Hose Bibbs: Bronze body with replaceable seat disc complying with ASME A112.18.1M for compression-type faucets. Include NPS 3/4 threaded or solder-joint inlet, of design suitable for pressure of at least 125 psig; integral, nonremovable, drainable hose-connection vacuum breaker; and garden-hose threads complying with ASME B1.20.7 on outlet.

- 1. Finish: Rough bronze, or chrome or nickel plated.
- 2. Operation: Wheel handle.

C. Open Drains: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting, joined with ASTM C 564, rubber gaskets.

**2.8 CLEANOUTS AND CLEANOUT COVERS**

A. Cleanouts shall consist of cast iron bodies or ferrule material and brass closure plugs with tapered threads.

B. Cleanout covers shall be flush scoriated, secured tops and frames with nickel bronze finish, equal to "J.R. Smith" Model 4810. Minimum opening shall be 10 inches clear.

C. Exterior cleanouts shall be brought to grade and recessed in an 20" x 6" deep concrete box with cast iron access cover and frame.

**2.9 FLOOR DRAINS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15430 - PLUMBING SPECIALTIES**

- A. Floor drains installed in toilet rooms shall be supplied with cast iron bodies with flashing collar and round adjustable strainer head with nickel bronze finish, equal to "J.R. Smith" Model 2005-A. Strainer shall be minimum 5" diameter for 2" floor drains and minimum 8" diameter for 4" drains.
- B. Floor drains shall be provided with trap primer inlet connection.

**2.10 AREA DRAINS**

- A. Area drains shall be supplied with fabricated steel bodies and ductile iron loose grates with coated inside and outside finish and stainless steel ported bucket with mesh screen and trap primer connections. Grates shall be minimum 12" square. Drains shall be equal to "J. R. Smith" model 2450.

**2.11 ROOF FLASHING FOR ROOF DRAINS AND VENT STACKS**

- A. Flashing shall be lead of not less than four pounds per square feet and shall be tall enough to turn into the top of the vent pipe 12" above the roof and extend out from the roof drains and stacks at least 12" on each side.

**2.12 OIL/WATER SEPARATOR**

- A. Separator shall be a double basin, gravity flow design interceptor manufactured by Highland Tank Co., for below ground use and have a nominal capacity of 550 gallons with an oil holding compartment of 89 gallons. The interceptor shall be designed to intercept and collect sand, grit, grease and free oil (hydrocarbons and other petroleum products). Separator shall be furnished with oil level alarm and leak detection systems.
- B. The Oil/Water Separator shall be 3'-6" in diameter and 9'-0" long. The unit shall be constructed of 7 gage mild steel. The metal surfaces shall be protected with a corrosion control system equal to a Highguard 75 mil thick polyurethane. The unit shall be provided with a 30 year warranty.
- C. The separator shall be designed for intermittent and variable flows of water, oil, or any combination of non-emulsified oil-water mixtures ranging from zero to 55 gal/min. Minimum separator retention time shall be 10 minutes. Operating temperatures of the

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15430 - PLUMBING SPECIALTIES**

influent oil-in-water mixture shall range from 40 degrees F to 80 degrees F. The specific gravity of the oils at operating temperatures shall range from 1.00 to 1.03.

- D. The free oil and grease concentration on the effluent from the separator shall not exceed 100mg/l (100 PPM).
- E. Separator shall be the standard patented product of a steel tank manufacturer regularly engaged in the production of such equipment. Manufacturer shall have at least 10 years experience in manufacturing similar units for identical applications. No subcontracting of tank fabrication shall be permitted.
- F. Separator shall be fabricated, inspected, and tested for leakage before shipment from the factory by manufacturer as a completely assembled vessel ready for installation.
- G. Separator shall be cylindrical, horizontal, atmospheric-type steel vessel intended for the separation and storage of flammable and combustible liquids. The separator shall have the structural strength to withstand static and dynamic hydraulic loading while empty and during operating conditions.
- H. Separator shall consist of 4" inlet and outlet connections, integral sand interceptor compartment, fore-basin with heavy duty sludge baffle, fore-basin downcomer positioned to prevent discharge of free oil that has been separated from the waste water, after-basin downcomer, heavy duty striker plates, access manway and fittings for vent, oil pump-out sampling, gauging, leak detection, and lifting lugs.
- I. Separator shall be supplied with an audible and visual alarm system to indicate High Oil Level (visual only) and High Oil Level (audible and visual) of oil storage in the oil/water separator. An audible and visual leak detection alarm system that indicates hydrocarbon and/or water in the interstice shall be provided. A silence control shall be provided for the audible alarms. Level sensor (s) to be intrinsically safe. Level sensor floats to be made of stainless steel. The control panel shall contain both level sensor and leak detection control. The control panel shall be NEMA 4. Power to the control panel is to be 120volt, single phase.
- J. Separator shall be supplied with Nylon Hold-down straps.

3PART - EXECUTION

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15430 - PLUMBING SPECIALTIES**

**3.1 INSTALLATION**

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.
- B. Install trap seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- C. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
  - 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
  - 2. Locate at each change in direction of piping greater than 45 degrees.
  - 3. Locate at minimum intervals of 50 feet for piping NPS 3 and smaller and 75 feet for larger piping.
  - 4. Locate at base of each vertical soil and waste stack.
- D. Install cleanout access covers with top flush with finished floor.
- E. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.
- F. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.
- G. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
  - 1. Position floor drains for easy access and maintenance.
  - 2. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
  - 3. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- H. Install interceptors, including trapping, venting, and flow-control fitting, according to the manufacturer's written requirements and the authorities having jurisdiction regulations and with clear space for servicing.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15430 - PLUMBING SPECIALTIES**

- I. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.
- J. Fasten recessed-type plumbing specialties to reinforcement built into walls.
- K. Install wood-blocking reinforcement for wall-mounting and recessed-type plumbing specialties.
- L. Install individual shutoff valve in each water supply to plumbing specialties. Use ball valve. Install shutoff valves in accessible locations. Refer to Division 15 Section "Valves" for general-duty ball, butterfly and check valves.
- M. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
- N. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.
- O. All fixtures equipped with quick closing valves and flush valves shall be provided with a pre-manufactured shock absorber installed at the fixture connection or battery when multiple fixtures are served by a header.

**3.2 CONNECTIONS**

- A. Install piping adjacent to equipment to allow service and maintenance.
- B. Connect plumbing specialties and devices that require power according to Division 16 Sections.

**3.3 PROTECTION**

- A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15430 - PLUMBING SPECIALTIES**

**PART 4 - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be made under:

**Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15430

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15485 - ELECTRIC, DOMESTIC WATER HEATERS**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes commercial electric water heaters.

**1.2 SUBMITTALS**

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type and size of water heater indicated.

**1.3 QUALITY ASSURANCE**

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE Standards: Comply with performance efficiencies prescribed for the following:

1. ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15485 - ELECTRIC, DOMESTIC WATER HEATERS**

**2.2 LIGHT-COMMERCIAL, STORAGE, ELECTRIC WATER HEATERS**

A. Description: Comply with UL 174 or UL 1453, and listed by manufacturer for commercial applications.

1. Manufacturers:

- a. A. O. Smith Water Products Co.
- b. Rheem Manufacturing Co.; Ruud Water Heater Div.

2. Storage Tank Construction: Non-ASME-code steel with 150-psig working-pressure rating. Tank shall be U.L. label service listed.

- a. Tappings: Factory fabricated of materials compatible with tank for piping connections, relief valve, pressure gage, thermometer, drain, anode rod, and controls as required. Attach tappings to tank before testing and labeling. Include ASME B1.20.1, pipe thread.
  - b. Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets. Provide full three year factory tank warranty.
  - c. Insulation: Comply with ASHRAE 90.1. Surround entire storage tank except connections and controls.
  - d. Jacket: Steel, with enameled finish.
3. Heating Elements: Electric, screw-in, immersion type.
4. Temperature Control: Adjustable surface mounted thermostat.
5. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems. Drain Valve: ASSE 1005, corrosion-resistant metal, factory installed.
6. Anode Rod: Factory installed, magnesium.
7. Storage Tank Capacity: 30 gallons.
8. Electrical Characteristics: 2000 watts, 240 volts, single phase operation.

**2.3 WATER HEATER ACCESSORIES**

A. Combination Temperature and Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into tank.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15485 - ELECTRIC, DOMESTIC WATER HEATERS**

B. Vacuum Relief Valves: Comply with ASME PTC 25.3. Furnish for installation in piping.

1. Exception: Omit if water heater has integral vacuum-relieving device.

C. Drain Pans: Corrosion-resistant metal with raised edge. Include dimensions not less than base of water heater and include drain outlet not less than NPS 3/4.

D. Expansion Tank: Pre-charged steel thermal expansion tank with a fixed FDA approved butyl diaphragm. The tank shall have a top NPT stainless steel system connection and a 0.301" -32 charging valve connection (standard tire valve) to facilitate on-site charging of the tank to meet the system requirements. The tank shall be constructed in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code and stamped for 150 psig working pressure.

**3PART - EXECUTION**

**3.1 INSTALLATION**

A. Install water heater, level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange unit so controls and devices needing service are accessible.

B. Install combination temperature and pressure relief valve in top portion of storage tank. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet with water piping in continuous downward pitch and discharge to the exterior.

C. Install vacuum relief valves in cold-water-inlet piping.

D. Install water heater drain piping as indirect waste to spill into drain pan.

E. Install heat traps on inlet and outlet piping of water heater storage tank.

F. Install piping to facilitate service and maintenance.

**3.2 CONNECTIONS**

A. Connect hot- and cold-water piping with shutoff valves and unions.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15485 - ELECTRIC, DOMESTIC WATER HEATERS**

- B. Make connections with dielectric fittings where piping is made of dissimilar metal.
- C. Electrical Connections: Power wiring and disconnect switches are specified in Division 16 Sections. Arrange wiring to allow unit service.
- D. Expansion Tank: Thermal expansion tank, sized per manufacturer's recommendations.

**3.3 FIELD QUALITY CONTROL**

- A. In addition to manufacturer's written installation and startup checks, perform the following:
  - 1. Check for clear relief valve inlets, outlets, and drain piping.
  - 2. Test operation of safety controls, relief valves, and devices.
  - 3. Adjust operating controls.
  - 4. Adjust hot-water-outlet temperature settings. Do not set above 120 degrees F.

**PART 4 - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be made under:

**Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15485

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15738 - SPLIT-SYSTEM AIR-CONDITIONING UNITS**

**1PART - GENERAL**

**1.1 SUMMARY**

- A. This Section includes split-system air-conditioning units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for concealed mounting, and may be connected to ducts.

**1.2 SUBMITTALS**

- A. Product Data: For each unit indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

- B. Operation and maintenance data.

- C. LEED Submittals:

1. Credit EA 4: Manufacturers' product data for refrigerants, including printed statement that refrigerants are free of HCFCs.

**1.3 QUALITY ASSURANCE**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- B. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

- C. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

- D. Units shall be designed to operate with HCFC-free refrigerants.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15738 - SPLIT-SYSTEM AIR-CONDITIONING UNITS**

**1.4 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace split-system air-conditioning units that fail in materials and workmanship within five years from date of Substantial Completion.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Carrier Air Conditioning; Div. of Carrier Corp.
  2. Friedrich Air Conditioning Company.
  3. Lennox Industries Inc.
  4. Mitsubishi Electronics America, Inc.; HVAC Division.
  5. Mitsubishi Heavy Industries America, Inc.; Air-Conditioning & Refrigeration Division, Inc.
  6. Trane Co. (The); Unitary Products Group.
  7. York International Corp.

**2.2 EVAPORATOR-FAN UNIT**

- A. Concealed Unit Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
1. Insulation: Faced, glass-fiber duct liner.
  2. Drain Pans: Galvanized steel, with connection for drain; insulated.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15738 - SPLIT-SYSTEM AIR-CONDITIONING UNITS**

- B. Floor-Mounting, Unit Cabinet: Enameled steel with removable panels on front and ends.
1. Insulation: Faced, glass-fiber, duct liner.
  2. Drain Pans: Galvanized steel, with connection for drain; insulated.
- C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
- D. Electric Coil: Helical, nickel-chrome, electric-resistance heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.
- E. Evaporator Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
- F. Filters: 1 inch thick, in fiberboard frames.

**2.3 AIR-COOLED, CONDENSING UNIT**

- A. Casing steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
- B. Compressor: Hermetically sealed [reciprocating] [scroll] type with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
1. Refrigerant Charge: [R-22].
- C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
- D. Fan: Aluminum-propeller type, directly connected to motor.
- E. Motor: Permanently lubricated, with integral thermal-overload protection.
- F. Low Ambient Kit: Permits operation down to 45 deg F.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15738 - SPLIT-SYSTEM AIR-CONDITIONING UNITS**

G. Anti-short cycling timer.

H. Coil Guard.

**2.4 ACCESSORIES**

- A. Thermostat: Low voltage with subbase to control compressor and evaporator fan.  
Thermostat shall have fan on-auto-off and occupied/unoccupied cooling and heating set points. Thermostat shall be 7-day programmable type.
- B. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

**3PART - EXECUTION**

**3.1 INSTALLATION**

- A. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- B. Install ground-mounted, condensing unit components on 2-inch- thick, reinforced concrete base; 2 inches larger on each side than unit. Concrete, reinforcement, and formwork are specified in Division 3 Section "Cast-in-Place Concrete." Coordinate anchor installation with concrete base.

**3.2 CONNECTIONS**

- A. Connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.
- B. Install piping adjacent to unit to allow service and maintenance.

**3.3 FIELD QUALITY CONTROL**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15738 - SPLIT-SYSTEM AIR-CONDITIONING UNITS**

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including connections. Report results in writing.
- B. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- C. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new components, and retest.
- D. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

**4PART - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be under:
  - i) **Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15738

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15766 - CABINET UNIT HEATERS**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes cabinet unit heaters with centrifugal fans and electric-resistance heating coils.

**1.2 SUBMITTALS**

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each product indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Plans, elevations, sections, and details.
2. Location and size of each field connection.

C. Field quality-control test reports.

D. Operation and maintenance data.

**1.3 QUALITY ASSURANCE**

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

**2PART - PRODUCTS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15766 - CABINET UNIT HEATERS**

**2.1 MANUFACTURED UNITS**

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. Airtherm; a Mestek Company.
2. Berko Electric Heating; a division of Marley Engineered Products.
3. Carrier Corporation.
4. Chromalox, Inc.; a division of Emerson Electric Company.
5. Dunham-Bush, Inc.
6. Engineered Air Ltd.
7. Indeeco.
8. International Environmental Corporation.
9. Markel Products; a division of TPI Corporation.
10. Marley Electric Heating; a division of Marley Engineered Products.
11. McQuay International.
12. Trane.

D. Description: A factory-assembled and -tested unit complying with ARI 440.

1. Comply with UL 2021.

E. Coil Section Insulation: Glass-fiber insulation; surfaces exposed to airstream shall be erosion-resistant coating to prevent erosion of glass fibers.

1. Thickness: ½ inch.
2. Thermal Conductivity (k-Value): 0.26 Btu x in./h x sq. ft. at 75 deg F mean temperature.
3. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
4. Adhesive: Comply with ASTM C 916 and with NFPA 90A or NFPA 90B.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15766 - CABINET UNIT HEATERS**

- F. Cabinet: Steel with baked-enamel finish with manufacturer's standard paint, in color selected by Architect.
1. Vertical Unit, Exposed Front Panels: Minimum 0.0528-inch- thick, sheet steel, removable panels with channel-formed edges secured with tamperproof cam fasteners.
  2. Recessing Flanges: Steel, finished to match cabinet.
  3. Control Access Door: Key operated.
  4. Base: Minimum 0.0528-inch- thick steel, finished to match cabinet, 4 inches high with leveling bolts.
  5. False Back: Minimum 0.0428-inch- thick steel, finished to match cabinet.
  6. Factory louvered face.
- G. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with fuses in terminal box for overcurrent protection and limit controls for high-temperature protection. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.
- H. Fan and Motor Board: Removable.
1. Fan: Forward curved, double width centrifugal; directly connected to motor. Thermoplastic or painted-steel wheels, and aluminum, painted-steel, or galvanized-steel fan scrolls.
  2. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board. Comply with requirements in Division 15 Section "Motors."
  3. Wiring Terminations: Connect motor to chassis wiring with plug connection.
- I. Control devices and operational sequences are specified in Division 15 Sections "HVAC Instrumentation and Controls" and "Sequence of Operation."
- J. Basic Unit Controls:
1. Control voltage transformer.
  2. Wall-mounting thermostat with the following features.
    - a. Heat-off switch.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15766 - CABINET UNIT HEATERS**

- b. Fan on-auto switch
- K. Electrical Connection: Factory wire motors and controls for a single field connection.
- L. Capacities and Characteristics:
  - 1. Cabinet:
    - a. Vertical, Surface Mounted: Downflow.
      - 1) Top: Flat or sloped.
      - 2) Air Inlet: Front extruded-aluminum bar grille.
      - 3) Air Outlet: Front, quad louver grille.
  - 2. Fan:
    - a. Airflow: as noted
    - b. Motor Horsepower: as noted
  - 3. Heating Capacity:
    - a. Output: as noted
  - 4. Electrical Characteristics for Single-Point Connection:
    - a. As noted

**3PART - EXECUTION**

**3.1 INSTALLATION**

- A. Install cabinet unit heaters to comply with NFPA 90A.
- B. Suspend cabinet unit heaters from structure with elastomeric hangers.
- C. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation. Install devices 60 inches above finished floor.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15766 - CABINET UNIT HEATERS**

- D. Comply with safety requirements in UL 1995.
- E. Ground equipment according to Division 16 Section "Grounding and Bonding."
- F. Connect wiring according to Division 16 Section "Conductors and Cables."

**3.2 FIELD QUALITY CONTROL**

A. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

**4PART - MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section shall be made under:

**i)Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15766

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15815 - METAL DUCTS**

**1PART - GENERAL**

**1.1 SUMMARY**

- A. This Section includes metal, rectangular ducts and fittings for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 2- to plus 10-inch wg.
- B. See Division 15 Section "Nonmetal Ducts" for fibrous-glass ducts.
- C. See Division 15 Section "HVAC Casings" for factory- and field-fabricated casings for mechanical equipment.
- D. See Division 15 Section "Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

**1.2 SUBMITTALS**

- A. Shop Drawings: Show fabrication and installation details for metal ducts.
  - 1. Penetrations through fire-rated and other partitions.
  - 2. Duct accessories, including access doors and panels.

**1.3 QUALITY ASSURANCE**

- A. NFPA Compliance:
  - 1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
  - 2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

**2PART - PRODUCTS**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15815 - METAL DUCTS**

**2.1 MANUFACTURERS**

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

**2.2 SHEET METAL MATERIALS**

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

**2.3 SEALANT MATERIALS**

- A. Joint and Seam Tape: 2 inches wide; glass-fiber-reinforced fabric.
- B. Tape Sealing System: Woven-fiber tape impregnated with gypsum mineral compound and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15815 - METAL DUCTS**

- C. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts.
- D. Solvent-Based Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant formulated with a minimum of 75 percent solids.
- E. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.
- F. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

**2.4 HANGERS AND SUPPORTS**

- A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
  - 1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
  - 2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
- B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
  - 1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
  - 2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Galvanized-steel shapes and plates complying with ASTM A 36/A 36M.

**2.5 RECTANGULAR DUCT FABRICATION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15815 - METAL DUCTS**

- A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
  2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.
1. Manufacturers:
    - a. Ductmate Industries, Inc.
    - b. Nexus Inc.
    - c. Ward Industries, Inc.
- C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.
1. Manufacturers:
    - a. Ductmate Industries, Inc.
    - b. Lockformer.
  2. Duct Size: Maximum 30 inches wide and up to 2-inch wg pressure class.
  3. Longitudinal Seams: Pittsburgh lock sealed with noncuring polymer sealant.
- D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of nonbraced panel area unless ducts are lined.

**3PART - EXECUTION**

**3.1 DUCT APPLICATIONS**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15815 - METAL DUCTS**

A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:

1. Supply Ducts: 1-inch wg.
2. Return Ducts (Negative Pressure): 1-inch wg Round duct shall be longitudinal seam duct.
3. Exhaust Ducts (Negative Pressure): 1-inch wg. Round duct shall be longitudinal seam duct.
4. Car exhaust Ducts (Negative Pressure): 5-inch wg. Round duct shall be longitudinal seam duct.

**3.2 DUCT INSTALLATION**

- A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
- B. Install ducts with fewest possible joints.
- C. Install fabricated fittings for changes in directions, size, and shape and for connections.
- D. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.
- E. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- H. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.
- I. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15815 - METAL DUCTS**

- J. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
- K. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- L. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.
- M. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 15 Section "Duct Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Through-Penetration Firestop Systems."
- N. Protect duct interiors from the elements and foreign materials until building is enclosed.  
[Follow SMACNA's "Duct Cleanliness for New Construction."]

**3.3 SEAM AND JOINT SEALING**

- A. Seal all joints and seams of all duct.
- B. Seal ducts before external insulation is applied.

**3.4 HANGING AND SUPPORTING**

- A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
- B. Support vertical ducts at maximum intervals of 16 feet and at each floor.
- C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
- D. Install concrete inserts before placing concrete.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15815 - METAL DUCTS**

E. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

1. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

**3.5 CONNECTIONS**

A. Make connections to equipment with flexible connectors according to Division 15 Section "Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

C. Flexible duct connections shall be a maximum 3'-0" in length and shall not exceed 15 degrees in change of direction.

**4PART - MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section shall be made under:

**i)Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15815

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15820 - DUCT ACCESSORIES**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes the following:

1. Backdraft dampers.
2. Volume dampers.
3. Fire dampers.
4. Turning vanes.
5. Flexible connectors.
6. Flexible ducts.
7. Duct accessory hardware.

B. See Division 16 Section "Fire Alarm" for duct-mounting fire and smoke detectors.

C. See Division 15 Section "HVAC Instrumentation and Controls" for electric and pneumatic damper actuators.

**1.2 SUBMITTALS**

A. Product Data: For the following:

1. Backdraft dampers.
2. Volume dampers.
3. Fire dampers.
4. Flexible ducts.

**1.3 QUALITY ASSURANCE**

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15820 - DUCT ACCESSORIES**

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

**2.2 SHEET METAL MATERIALS**

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Aluminum Sheets: ASTM B 209, alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

D. Extruded Aluminum: ASTM B 221, alloy 6063, temper T6.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

**2.3 BACKDRAFT DAMPERS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15820 - DUCT ACCESSORIES**

**A. Manufacturers:**

1. Air Balance, Inc.
2. American Warming and Ventilating.
3. CESCO Products.
4. Duro Dyne Corp.
5. Greenheck.
6. Penn Ventilation Company, Inc.
7. Prefco Products, Inc.
8. Ruskin Company.
9. Vent Products Company, Inc.

**B. Description:** Multiple-blade, parallel action gravity balanced, with blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.

**C. Frame:** 0.052-inch- thick, galvanized sheet steel, with welded corners and mounting flange.

**D. Blades:** 0.050-inch- thick aluminum sheet.

**E. Blade Seals:** Neoprene.

**F. Blade Axles:** Galvanized steel.

**G. Tie Bars and Brackets:** Galvanized steel.

**H. Return Spring:** Adjustable tension.

**2.4 VOLUME DAMPERS**

**A. Manufacturers:**

1. Air Balance, Inc.
2. American Warming and Ventilating.
3. Flexmaster U.S.A., Inc.
4. McGill AirFlow Corporation.
5. METALAIRE, Inc.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15820 - DUCT ACCESSORIES**

6. Nailor Industries Inc.
7. Penn Ventilation Company, Inc.
8. Ruskin Company.
9. Vent Products Company, Inc.

B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

C. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.

1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanized sheet steel.
3. Blade Axles: Galvanized steel.
4. Bearings: Oil-impregnated bronze.
5. Tie Bars and Brackets: Galvanized steel.

D. Jackshaft: 1-inch- diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.

1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.

E. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

**2.5 FIRE DAMPERS**

A. Manufacturers:

1. Air Balance, Inc.
2. CESCO Products.
3. Greenheck.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15820 - DUCT ACCESSORIES**

4. McGill AirFlow Corporation.
5. METALAIRE, Inc.
6. Nailor Industries Inc.
7. Penn Ventilation Company, Inc.
8. Prefco Products, Inc.
9. Ruskin Company.
10. Vent Products Company, Inc.
11. Ward Industries, Inc.

B. Fire dampers shall be labeled according to UL 555.

C. Fire Rating: 1-1/2 hours.

D. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.

E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.052 or 0.138 inch thick as indicated and of length to suit application.
2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

F. Mounting Orientation: Vertical or horizontal as indicated.

G. Blades: Roll-formed, interlocking, 0.034-inch-thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch-thick, galvanized-steel blade connectors.

H. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

I. Fusible Links: Replaceable, 165 deg F rated.

**2.6 TURNING VANES**

A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15820 - DUCT ACCESSORIES**

- B. Manufactured Turning Vanes: Fabricate 1-1/2-inch- wide, single -vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into vane runners suitable for duct mounting.

1. Manufacturers:

- a. Ductmate Industries, Inc.
- b. Duro Dyne Corp.
- c. METALAIRE, Inc.
- d. Ward Industries, Inc.

- C. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

2.7 FLEXIBLE CONNECTORS

A. Manufacturers:

- 1. Duro Dyne Corp.
- 2. Ventfabrics, Inc.
- 3. Ward Industries, Inc.

- B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

- C. Flexible Connector Fabric: Glass fabric double coated with neoprene.

- 1. Minimum Weight: 26 oz./sq. yd..
- 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
- 3. Service Temperature: Minus 40 to plus 200 deg F.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15820 - DUCT ACCESSORIES**

**2.8 FLEXIBLE DUCTS**

**A. Manufacturers:**

1. Ductmate Industries, Inc.
2. Flexmaster U.S.A., Inc.
3. Hart & Cooley, Inc.
4. McGill AirFlow Corporation.

**B. Noninsulated-Duct Connectors:** UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 210 deg F.

**C. Insulated-Duct Connectors:** UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor barrier film.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 10 to plus 160 deg F.

**D. Flexible Duct Clamps:** Nylon strap, in sizes 3 through 18 inches to suit duct size.

**2.9 DUCT ACCESSORY HARDWARE**

**A. Instrument Test Holes:** Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.

**B. Adhesives:** High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

**3PART - EXECUTION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15820 - DUCT ACCESSORIES**

**3.1 APPLICATION AND INSTALLATION**

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- D. Install volume dampers in ducts with liner; avoid damage to and erosion of duct liner.
- E. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.
- F. Provide test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire dampers, with fusible links, according to manufacturer's UL-approved written instructions.
- H. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.
- I. Connect diffusers or light troffer boots to low pressure ducts[ directly or] with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- J. Connect flexible ducts to metal ducts with adhesive liquid adhesive plus tape draw bands adhesive plus sheet metal screws.
- K. Install duct test holes where indicated and required for testing and balancing purposes.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15820 - DUCT ACCESSORIES**

**3.2 ADJUSTING**

- A. Adjust duct accessories for proper settings.
- B. Adjust fire and smoke dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Division 15 Section "Testing, Adjusting, and Balancing."

**4PART - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be made under:

**i)Item S-15000 - Mechanical Work, per Lump Sum.**

END OF SECTION 15820

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15838 - POWER VENTILATORS**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes the following:

1. Centrifugal wall ventilators.
2. Ceiling-mounting ventilators.

**1.2 SUBMITTALS**

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material gages and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.
2. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

C. Operation and maintenance data.

**1.3 QUALITY ASSURANCE**

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15838 - POWER VENTILATORS**

B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.

C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

D. U.L. Standard: Power ventilators shall comply with U.L. 705.

**1.4 EXTRA MATERIALS**

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set for each belt-driven unit.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

A. In other Part 2 articles where subparagraphs titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

**2.2 CENTRIFUGAL WALL VENTILATORS**

A. Description: Belt-driven or direct-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and accessories.

1. Manufacturers:

- a. Acme Engineering & Mfg. Corp.
- b. Aerovent; a Twin City Fan Company.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15838 - POWER VENTILATORS**

- c. Ammerman Company, Inc./General Resource Corp.
- d. Breidert Air Products, Inc.
- e. Broan Mfg. Co., Inc.
- f. Carnes Company HVAC.
- g. Chelsea Fans & Blowers, Inc.
- h. Cook, Loren Company.
- i. Dayton Electric Manufacturing Co.
- j. Greenheck Fan Corp.
- k. Hartzell Fan, Inc.
- l. ILG Industries, Inc./American Coolair Corp.
- m. JennFan; Div. of Breidert Air Products, Inc.
- n. NuTone Inc.
- o. Penn Ventilation Companies, Inc.

B. Housing: Heavy-gage, removable, spun-aluminum, dome top and outlet baffle; venturi inlet cone.

C. Fan Wheel: Aluminum hub and wheel with backward-inclined blades.

D. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:

- 1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
- 2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
- 3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
- 4. Fan and motor isolated from exhaust airstream.

E. Accessories:

- 1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through internal aluminum conduit.
- 2. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
- 3. Wall Grille: Ring type for flush mounting.
- 4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in wall sleeve; factory set to close when fan stops.

**2.3 CEILING-MOUNTING VENTILATORS**

A. Description: Centrifugal fans designed for installing in ceiling or wall or for concealed in-line applications.

- 1. Manufacturers:

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15838 - POWER VENTILATORS**

- a. Ammerman Company, Inc./General Resource Corp.
- b. Breidert Air Products, Inc.
- c. Broan Mfg. Co., Inc.
- d. Carnes Company HVAC.
- e. Chelsea Fans & Blowers, Inc.
- f. Cook, Loren Company.
- g. Dayton Electric Manufacturing Co.
- h. FloAire, Inc.
- i. Greenheck Fan Corp.
- j. ILG Industries, Inc./American Coolair Corp.
- k. JennFan; Div. of Breidert Air Products, Inc.
- l. NuTone Inc.
- m. Penn Ventilation Companies, Inc.

B. Housing: Steel, lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.

D. Grille: Plastic louvered grille with flange on intake and thumbscrew attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories:

- 1. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
- 2. Time-Delay Switch: Assembly with single-pole rocker switch, timer, and cover plate.
- 3. Motion Sensor: Motion detector with adjustable shutoff timer.
- 4. Ceiling Radiation Damper: Fire-rated assembly with ceramic blanket, stainless-steel springs, and fusible link.
- 5. Filter: Washable aluminum to fit between fan and grille.
- 6. Isolation: Rubber-in-shear vibration isolators.
- 7. Manufacturer's standard roof jack or wall cap, and transition fittings.

**3PART - EXECUTION**

**3.1 INSTALLATION**

A. Support units using spring isolators having a static deflection of 1 inch .

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15838 - POWER VENTILATORS**

1. Secure vibration and seismic controls to concrete bases using anchor bolts cast in concrete base.
- B. Install floor-mounting units on concrete bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."
- C. Secure roof-mounting fans to roof curbs with cadmium-plated hardware. Refer to Division 7 Section "Roof Accessories" for installation of roof curbs.
- D. Ceiling Units: Suspend units from structure; use steel wire or metal straps.
- E. Support suspended units from structure using threaded steel rods and spring hangers.
- F. Install units with clearances for service and maintenance.
- G. Label units according to requirements specified in Division 15 Section "Mechanical Identification."

**3.2 CONNECTIONS**

- A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 15 Section "Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.

**3.3 FIELD QUALITY CONTROL**

- A. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
- B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Shut unit down and reconnect automatic temperature-control operators.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15838 - POWER VENTILATORS**

- D. Refer to Division 15 Section "Testing, Adjusting, and Balancing" for testing, adjusting, and balancing procedures.
- E. Replace fan and motor pulleys as required to achieve design airflow.
- F. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

**Item S-15000 - Mechanical Work, per Lump Sum.**

**END OF SECTION 15838**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTIONS 15855 - DIFFUSERS, REGISTERS, AND GRILLES**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes the following air outlets and inlets:

1. Diffusers.
2. Registers
3. Grilles.

**1.2 SUBMITTALS**

A. Product Data: For each model indicated, include the following:

1. Data Sheet: Indicate construction, finish, and mounting details for each type of air outlet, inlet, and accessory indicated.
2. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet indicated.
3. Assembly Drawing: Indicate materials and methods of assembly of components for each type of air outlet and inlet indicated.

**1.3 QUALITY ASSURANCE**

A. NFPA Compliance: Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems."

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

A. In other Part 2 articles where subparagraphs titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTIONS 15855 - DIFFUSERS, REGISTERS, AND GRILLES**

**2.2 DIFFUSERS**

A. Diffuser : .

1. Products:
  - a. Air Systems Components, Krueger Div.; .
  - b. Anemostat Products, Dynamics Corp. of America; .
  - c. Carnes Co. Inc.; .
  - d. Hart & Cooley, Inc., Hart & Cooley Div.; .
  - e. Hart & Cooley, Inc., Tuttle & Bailey Div.; .
  - f. Nailor Industries Inc.; .
  - g. Titus;.
2. Material: Aluminum.
3. Finish: Baked enamel, white
4. Duct Connection: as noted.
5. Duct Connection Size: ~~inches~~ ~~(mm)~~ as noted
6. Face Size: ~~inches~~ ~~(mm)~~
7. Maximum Noise-Criterion Rating:
8. Face Style: as noted on plans
9. Mounting: as noted on plans
10. Pattern: as noted on plans
11. Dampers: Opposed blade

**2.3 REGISTERS**

A. Register : .

1. Products:
  - a. Air Systems Components, Krueger Div.; .
  - b. Anemostat Products, Dynamics Corp. of America; .
  - c. Carnes Co. Inc.; .
  - d. Hart & Cooley, Inc., Hart & Cooley Div.; .
  - e. Hart & Cooley, Inc., Tuttle & Bailey Div., .
  - f. Nailor Industries Inc.; .
  - g. Titus; .
2. Material: Aluminum.
3. Finish: Baked enamel, white.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTIONS 15855 - DIFFUSERS, REGISTERS, AND GRILLES**

4. Face Blade Arrangement: Fixed horizontal
5. Rear Blade Arrangement: Fixed vertical.
6. Frame: as noted
7. Mounting: as noted.
8. Damper Type: Adjustable opposed-blade assembly

**2.4 GRILLES**

**A. Grille : .**

1. Products:
  - a. Air Systems Components, Krueger Div.; .
  - b. Anemostat Products, Dynamics Corp. of America;
  - c. Carnes Co. Inc.;
  - d. Hart & Cooley, Inc., Hart & Cooley Div.;
  - e. Hart & Cooley, Inc., Tuttle & Bailey Div.; .
  - f. Nailor Industries Inc.;
  - g. Titus; .
2. Material: Aluminum.
3. Finish: Baked enamel, white
4. Face Blade Arrangement: Fixed horizontal.
5. Rear Blade Arrangement: Fixed vertical.
6. Frame: as noted .
7. Mounting: as noted.

**2.5 SOURCE QUALITY CONTROL**

- A. Testing:** Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

**3PART - EXECUTION**

**3.1 INSTALLATION**

- A. Ceiling-Mounted Outlets and Inlets:** Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTIONS 15855 - DIFFUSERS, REGISTERS, AND GRILLES**

in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

- B. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

**Item S-15000 - Mechanical Work, per Lump Sum.**

**END OF SECTION 15855**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15990 - TESTING, ADJUSTING AND BALANCING**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:

1. Balancing airflow and water flow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
2. Adjusting total HVAC systems to provide indicated quantities.
3. Measuring electrical performance of HVAC equipment.
4. Setting quantitative performance of HVAC equipment.
5. Verifying that automatic control devices are functioning properly.
6. Measuring sound and vibration.
7. Reporting results of activities and procedures specified in this Section.

**1.2 DEFINITIONS**

A. AABC: Associated Air Balance Council.

B. AMCA: Air Movement and Control Association.

C. NEBB: National Environmental Balancing Bureau.

D. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

**1.3 SUBMITTALS**

A. Strategies and Procedures Plan: Testing, adjusting, and balancing strategies and step-by-step procedures. Include a complete set of report forms intended for use on this Project.

B. Certified Testing, Adjusting, and Balancing Reports: Prepared on approved forms certified by the testing, adjusting, and balancing Agent.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15990 - TESTING, ADJUSTING AND BALANCING**

**1.4 QUALITY ASSURANCE**

- A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by AABC or NEBB.
- B. Certification of Testing, Adjusting, and Balancing Reports: Certify testing, adjusting, and balancing field data reports. This certification includes the following:
  - 1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.
  - 2. Certify that testing, adjusting, and balancing team complied with approved testing, adjusting, and balancing plan and procedures specified and referenced in this Specification.
- C. Testing, Adjusting, and Balancing Reports: Use standard forms from AABC's "National Standards for Testing, Adjusting, and Balancing." or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
- D. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."
- E. Instrumentation Calibration: Calibrate instruments at least every two years or more frequently if required by the instrument manufacturer.

**1.5 COORDINATION**

- A. Coordinate efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.
- B. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

**2PART - PRODUCTS (Not Applicable)**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15990 - TESTING, ADJUSTING AND BALANCING**

**3PART - EXECUTION**

**3.1 EXAMINATION**

- A. Examine the Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.
  - 1. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. Examine Project Record Documents described in Division 1 Section "Project Record Documents."
- D. Examine equipment performance data, including fan and pump curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from those presented when equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with design data and installed conditions.
- E. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.
- F. Examine system and equipment test reports.
- G. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15990 - TESTING, ADJUSTING AND BALANCING**

their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

- H. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- I. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- J. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- K. Examine equipment for installation and for properly operating safety interlocks and controls.
- L. Examine automatic temperature system components to verify the following:
  - 1. Dampers, and other controlled devices operate by the intended controller.
  - 2. Dampers and valves are in the position indicated by the controller.
  - 3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.
  - 4. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
  - 5. Sensors are located to sense only intended conditions.
  - 6. Sequence of operation for control modes is according to the Contract Documents.
  - 7. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
  - 8. Interlocked systems are operating.
  - 9. Changeover from heating to cooling mode occurs according to design values.
- M. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

**3.2 PREPARATION**

- A. Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15990 - TESTING, ADJUSTING AND BALANCING**

B. Complete system readiness checks and prepare system readiness reports. Verify the following:

1. Permanent electrical power wiring is complete.
2. Automatic temperature-control systems are operational.
3. Equipment and duct access doors are securely closed.
4. Balance, smoke, and fire dampers are open.
5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
6. Windows and doors can be closed so design conditions for system operations can be met.

**3.3 TESTING AND BALANCING PROCEDURES**

A. Perform testing and balancing procedures on each system according to procedures contained in SMACNA's "HVAC Systems--Testing, Adjusting, and Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.

C. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

D. As a part of the work of this contract, the Contractor shall make any adjustments and/or replacement of the pulleys, belts, and dampers (or the addition of dampers required for correct balance) as recommended by the Air Balance and Testing Agency, at no additional cost to the Owner.

1. For fan motors 5 HP and above:
  - a. At no additional cost to the Owner, install variable pitch pulleys on the fan motors, to facilitate fan speed adjustments, during the balancing period only.
  - b. Upon completion of the testing and before final inspection, install fixed drive and driven pulleys and belts of the required size, as determined during the testing period.
2. For fan motors smaller than 5 HP:

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 15990 - TESTING, ADJUSTING AND BALANCING**

- a. Upon completion of the testing and before final inspection, install variable pitch drive and driven pulleys and belts of the required size, as determined during the testing period.
3. The pulleys and belts supplied with the fan may or may not be the right size. In no case, reduce the manufacturer required number of belts.
4. All belt driven fans shall have their speeds adjusted and drives changed where necessary so that the fans deliver design CFM at actual static pressure developed by the installed system.
5. For fan motors with variable speed drives on constant air flow systems, such as fractional horsepower exhaust fans, using the variable speed controller supplied with the fan, adjust the fan speed as required to obtain the design CFM against the actual system static pressure developed by the installed system.

**3.4 TOLERANCES**

A. Set HVAC system airflow and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans: Plus 5 to plus 10 percent.
2. Air Outlets and Inlets: Plus 0 to minus 5 percent.

**3.5 REPORTS**

A. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

B. Final Report: Typewritten, or computer printout in letter-quality font, on standard bond paper, bound in three-ring, loose-leaf binder, and tabulated and divided into sections by tested and balanced systems.

1. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing agent.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Final Report Contents: In addition to certified field report data, include the following:
  - a. Fan curves.
  - b. Manufacturers' test data.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15990 - TESTING, ADJUSTING AND BALANCING**

- c. Field quality-control test reports prepared by system and equipment installers.
- d. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.
  
- 4. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
  - a. Title page.
  - b. Name and address of testing, adjusting, and balancing Agent.
  - c. Project name.
  - d. Project location.
  - e. Architect's name and address.
  - f. Engineer's name and address.
  - g. Contractor's name and address.
  - h. Report date.
  - i. Signature of testing, adjusting, and balancing Agent who certifies the report.
  - j. Summary of contents, including the following:
    - 1) Design versus final performance.
    - 2) Notable characteristics of systems.
    - 3) Description of system operation sequence if it varies from the Contract Documents.
  
  - k. Nomenclature sheets for each item of equipment.
  - l. Data for terminal units, including manufacturer, type size, and fittings.
  - m. Notes to explain why certain final data in the body of reports vary from design values.
  - n. Test conditions for fans and pump performance forms, including the following:
    - 1) Settings for outside-, return-, and exhaust-air dampers.
    - 2) Conditions of filters.
    - 3) Cooling coil, wet- and dry-bulb conditions.
    - 4) Face and bypass damper settings at coils.
    - 5) Fan drive settings, including settings and percentage of maximum pitch diameter.
    - 6) Settings for supply-air, static-pressure controller.
    - 7) Other system operating conditions that affect performance.

**3.6 ADDITIONAL TESTS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 15990 - TESTING, ADJUSTING AND BALANCING**

- A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial testing, adjusting, and balancing procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions.

**4PART - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section shall be made under:

- i) **Item S-15000 - Mechanical Work, per Lump Sum.**

- ii)

- iii) **END OF SECTION 15990**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

**PART 1 - GENERAL**

**1.1 SCOPE**

- A. This specification is for electrical and related work particular to Crescent City Connection - New Vehicle Maintenance Facility. Coordinate with other plans and specifications sections.

**1.2 RELATED DOCUMENTS**

- A. The general provisions of the Contract, including Contract Requirements, and other Division 1 Specification sections, apply to this Section. Sections included in DIVISION 16 of the Project Manual are as follows:

SECTION 16010 - ELECTRICAL GENERAL PROVISIONS  
SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS  
SECTION 16051 - ELECTRICAL SITE WORK  
**SECTION 16060 - GROUNDING AND BONDING**  
**SECTION 16075 - ELECTRICAL IDENTIFICATION**  
**SECTION 16120 - CONDUCTORS AND CABLES**  
**SECTION 16130 - RACEWAYS AND BOXES**  
**SECTION 16140 - WIRING DEVICES**  
**SECTION 16145 - LIGHTING CONTROL DEVICES**  
**SECTION 16146 - LIGHTING CONTROLS**  
**SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS**  
**SECTION 16420 - ENCLOSED CONTROLLERS**  
**SECTION 16442 - PANELBOARDS**  
**SECTION 16491 - FUSES**  
**SECTION 16511 - INTERIOR LIGHTING**  
**SECTION 16722 - INTERCOM EQUIPMENT**  
**SECTION 16724 - ACCESS CONTROL SYSTEM**

**1.3 DESCRIPTION OF WORK**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

- A. This Section specifies several categories of provisions for electrical work, including: (1) Certain adaptive expansions of requirements specified in DIVISION 1, (2) General performance requirements within the electrical systems as a whole, and (3) General work to be performed as electrical work because of its close association.
- B. This Project Manual and accompanying Drawings are intended to describe complete workable systems of the various types. Items of materials, work, or equipment not mentioned but normally necessary for the proper execution of this work, shall be provided as if specifically called for, at no additional cost to the Owner.

**1.4 SUMMARY OF ELECTRICAL WORK**

- A. Drawings:
  - 1. Refer to the Electrical Drawings for graphic representations, schedules and notations showing electrical work.
  - 2. The Drawings show approximate locations only of feeders, branch circuits, outlets, etc., except where specific routing or dimensions are indicated. The Architect reserves the right to make reasonable changes in locations indicated before roughing-in without additional cost to the Owner.
  - 3. Because of the small scale of the Drawings, it is not possible to indicate all of the offsets, fittings, and accessories required. The Contractor shall investigate the structural and finish conditions affecting his work and shall arrange such work accordingly, furnishing fittings, bends, junction boxes, pull boxes, access panels, and accessories required to meet such conditions.
- B. Project Manual:
  - 1. Refer to the DIVISION 16 Sections for the primary technical Sections of electrical work.
  - 2. General Outline: This section of the Project Manual covers furnishing materials, equipment, constant competent supervision, special tools, test equipment, technicians, and labor necessary for installation of a complete working electrical system, all as indicated on the plans of in this Project Manual.
- C. Scope:

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

1. This part of the contract includes all electrical work associated with the construction of a new Vehicle Maintenance Facility, the construction of a new fuel canopy, the installation of power and communication circuits between the two, and the demolition of the existing Vehicle Maintenance Facility complex. A new electrical service from Entergy will be established for the new facility. Telephone/Data/Communications circuits shall be extended from the existing facility. Electrical service to the existing facility will be removed once the new facility is completed.
2. **Phasing of the project is critical. The existing building will be operating to full capacity throughout the construction period.**
3. **The work shall include but not necessarily be limited to the following:**
  - a. **Power distribution systems - feeder & branch circuits, panels, wiring, transformers, devices, etc.**
  - b. **Installation of motors which are not an integral part of equipment furnished under other Divisions.**
  - c. **Power wiring and connections of mechanical equipment.**
  - d. **Service systems.**
  - e. **Grounding systems.**
  - f. **Raceway systems.**
  - g. **Lighting systems-fixtures/lamps/auxiliaries wiring/connections/etc.**
  - h. **Telephone and data system raceways.**
  - i. **Access Control System.**
  - j. **Detection System.**
  - k. **Intercom system.**
  - l. **Lighting control systems.**
  - m. **All required sleeves, thimbles, anchors, hangers, bolts, miscellaneous structural steel, cutting, etc., for the complete installation of the electrical systems serving the building.**
  - n. **Temporary electrical services for construction.**

1.5 COORDINATION OF ELECTRICAL WORK

- A. General: Refer to the DIVISION 1 sections for general coordination requirements applicable to the entire work. It is recognized that the contract documents are

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

diagrammatic in showing certain physical relationships which must be established within the electrical work, and in its interface with other work including utilities and mechanical work, and that such establishment is the exclusive responsibility of the Contractor.

- B. Arrange electrical work in a neat, well organized manner with exposed conduit and similar services running parallel with primary lines of the building construction, and with a minimum of 8'-0" overhead clearance or as directed by the Architect.
- C. Advise other trades of openings required in their work for the subsequent move-in of large units of electrical work (equipment).
- D. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- E. Refer to equipment Sections in Divisions 2 through 15 for rough-in requirements.
- F. Verify all dimensions by field measurements.
- G. Arrange for chases, slots, and openings in other building components to allow for electrical installations.
- H. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.
- I. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
- J. Coordinate the cutting and patching of building components to accommodate the installation of electrical equipment and materials.
- K. Where mounting heights are not detailed or dimensioned, install electrical services and overhead equipment to provide the maximum headroom possible.
- L. Install electrical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
- M. Coordinate the installation of electrical materials and equipment above ceilings with suspension system, mechanical equipment and systems, and structural components.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

- N. Coordinate connection of electrical systems with exterior underground utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

**1.6 TEMPORARY ELECTRICITY**

- A. Furnish and install all necessary temporary power, metering, lighting or wiring that is required to insure quality workmanship everywhere.
- B. Furnish and install area distribution boxes with ground fault protection so located that the individual trades may use their own construction-type extension cords to obtain proper power and artificial lighting at all points where required by inspectors and for safety.

**1.7 DEMOLITION:**

- A. Refer to Architectural plans and specifications to determine the areas to be demolished and the extent of this demolition. Cooperate fully with the Architect.
- B. Remove power and communication services to existing building prior to its demolition.

**1.8 QUALITY ASSURANCE, STANDARDS**

- A. **General: In addition to standards specified in individual work sections, the following standards are imposed, as applicable to the work in each instance:**
  - 1. **NFPA 70, National Electrical Code**  
**The electrical installation shall conform to the requirements of the latest edition of the National Electrical Code (NEC-NFPA 70).**
  - 2. **NEMA/ANSI/ASTM**  
**Electrical material shall be built and tested in accordance with the applicable standards of the National Electrical Manufacturer's Association (NEMA); the American National Standards Institute (ANSI); and the American Society of Testing and Materials (ASTM).**
  - 3. **Underwriters' Laboratories (UL)**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

**Electrical materials shall be new and unused and shall be listed, inspected, approved and labeled by Underwriters' Laboratories, Inc., where such labeling service is available.**

- 4. NFPA-101, Life Safety Code  
OSHA Code of Federal Regulations (for construction practices)  
Applicable state and local codes/ordinances.**

**1.9 ELECTRICAL SUBMITTALS:**

- A. Refer to the Division 1 Section 01630 for submittal definitions, requirements, and procedures.
- B. Submittal of shop drawings, product data, and samples will be accepted only when submitted by the Contractor. Data submitted from subcontractors and material suppliers directly to the Architect will not be processed.

**1.10 SUBSTITUTIONS/PRIOR APPROVALS**

- A. Substitutions/Prior Approvals shall be submitted in accordance with Section 01630 and provisions thereof.
- B. Only firms regularly engaged in manufacture of electrical products of types required, whose products have been in satisfactory use in similar service for not less than 3 years, shall be utilized.
- C. Any item not specified herein but submitted for approval as a substitute for the specified item shall be accompanied by manufacturer's documentation stating/illustrating the following applicable information in addition to the specific information requested in other sections:
  - 1. Dimensions/weight.
  - 2. Electrical ratings-voltage, amperage, short circuit capability, etc.
  - 3. Construction - gauge of steel/aluminum, paint finish/application method, color, NEMA type, etc.
  - 4. Warranty.
  - 5. Local manufacturer's representative or nearest stocking distributor.
  - 6. Length of time the product has been available to the public.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

- D. Shop Drawings: Submit completion descriptive and dimensional data on the following materials which Contractor proposes to use:
1. Panelboards
  2. Lighting Fixtures
  3. **Safety Switches**
  4. **Circuit Breakers**
  5. Motor Controls
  6. **Lighting Controls**
  7. Access Control System
  8. **Detection System**
  9. **Intercom System**
- E. **Corrections or comments made on shop drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents, Plans and Project Manual. Shop Drawings will be checked for general conformance with the design concept of the project and general compliance with information given in the contract documents. Review of Shop Drawings shall not relieve the Contractor from responsibility for confirming and correlating all quantities and dimensions, coordinating work with that of all other trades, and performing work in a safe and satisfactory manner. Review of shop drawings shall not permit any deviation from Plans and Project Manual. Shop Drawings must be accompanied by signed statement from contractor, stating that he has reviewed the submittal and checked it for compliance.**
- F. **See Section 01330, for number of copies of shop drawings and product data to be submitted.**

1.11 DELIVERY, STORAGE AND HANDLING:

- A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications, adequately packaged and protected to prevent damage during shipment, storage, and handling.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

- B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.
- C. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion.

**1.12 RECORD DOCUMENTS:**

- A. Refer to the Division 1 Section 01781 for requirements.

**1.13 OPERATION AND MAINTENANCE DATA:**

- A. Refer to the Division 1 Section 01782 for procedures and requirements for preparation and submittal of maintenance manuals.

**1.14 WARRANTIES:**

- A. Refer to the Division 1 Section 01770 for procedures and submittal requirements for warranties. Refer to individual equipment Sections for warranty requirements.

**1.15 CLEANING**

- A. Refer to the Division 1 Section 01770 for general requirements for final cleaning.
- B. Clean and restore to original finish all equipment prior to final acceptance.

**1.16 GUARANTEE:**

- A. The work installed shall be kept in perfect working order for one year from date of substantial completion. Guarantee shall be based upon defective materials and/or workmanship. Furnish free of cost to the Owner materials and labor necessary to comply with this guarantee.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

**1.17 WIRING FOR EQUIPMENT BY OTHERS:**

- A. Electrical service for all equipment furnished under this Project manual shall be roughed-in and connected under this Section. It is the responsibility of the Contractor to obtain correct roughing-in dimensions and requirements for this equipment.
- B. Under other DIVISIONS, unless otherwise noted, equipment will be furnished such as: motors and magnetic motor starters. Connection/interconnection of that equipment shall be part of DIVISION 16000 and shall comply with other DIVISION 16000 Basic Material and Methods Sections.
- C. Apparatus required for controls and firestats will be furnished as specified under DIVISION 15 - Mechanical Work. Control wiring shall be furnished and installed as work under DIVISION 15 - Mechanical.

**1.18 TESTS AND BALANCING**

- A. The contractor shall conduct operating tests to demonstrate that the electrical systems are installed and will operate properly and in accordance with the requirements of this Project Manual. Tests shall be performed in the presence of the Architect's representative. The Contractor shall furnish instruments and personnel required for such tests.
- B. Contractor shall perform tests in the presence of the Architect to show that the power and lighting loads are equally divided among phases of feeders serving each piece of equipment and each panelboard.
- C. Any work and materials tested and found varying from the requirements of the Drawings and Project Manual shall be replaced by the Contractor without additional cost to the Owner.
- D. This requirement is in addition to specific tests such as high-potential tests, meggar test, phasing tests, generator testing, etc. which may be called for in other sections.

**1.19 WORKMANSHIP**

- A. Install all materials and electrical components of the work in accordance with instructions of manufacturer following the best modern construction practices and conforming with the Contract Documents. Workmanship shall be first class, in both function and appearance,

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

whether finally concealed or exposed and shall be performed by experienced workmen skilled in the type of work. As practicable, the lines of all components of the system shall be perpendicular or parallel. In general, workmanship shall conform to guidelines set forth in N.E.C.A. manuals.

**1.20 MOUNTING HEIGHTS:**

- A. Unless otherwise noted on the Drawings or required by the Architect, the following mounting heights shall apply.
- B. Upon approval of the Architect, mounting heights may be adjusted.
- C. Heights of Outlets - all heights measured from finish floor to bottom of device.
  - 1. Wall Switches 44"
  - 2. Receptacle Outlet 16"  
(General)
  - 3. Special Purpose Outlet within 12" (12 inches) of intended use
  - 4. Telephone Outlet 16"
  - 5. Bells, Buzzers, Chimes 12'-0"
  - 6. Fire Alarm Station 44"
  - 7. Fire Alarm Annunciator 80"(per ADA Requirements)  
(Gongs, Strobe, Horns) Allow sufficient space below ceiling to  
service or replace.
  - 8. Wall Mounted PIR 44"  
Occupancy Sensors
- D. Heights of Disconnect Switches, Protective Devices, Controllers, etc.:
  - 1. The mounting height of disconnect switches, circuit breakers, motor controllers, push button stations, and other similar devices and equipment will vary depending upon location and whether individually or group mounted. For convenience and safety operating levers, handles or buttons shall be mounted no more than 80 inches above the finish floor line.
- E. Panelboards shall be located so that the highest overcurrent protective device is a maximum of 72" above the floor.

**1.21 SAFETY**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

- A. It shall be the Contractor's responsibility to do all things necessary in the pursuit of the installation or testing to provide safe conditions in which to work.

**1.22 FIRESTOPPING**

- A. Firestopping of all openings in fire-rated floors, walls, and ceilings accommodating penetrating items such as cables, bus ducts, wireways, conduits, etc. shall be required as part of DIVISION 16000 work. Provide Firestop installation as required to meet ratings equal to the floor or wall being penetrated. See Section 07270
- B. Fire stop materials shall be manufactured for that purpose and shall be installed in accordance with the manufacturer's recommendation in order to provide a U.L. listed fire stop at all openings equal to or exceeding the rated floor, wall or ceiling.
- C. Plastic sleeves/pipe shall not be used within the building when penetrating a fire-resistant-rated wall, ceiling, partition, or floor.

**END OF SECTION 16010**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

**PART 1 - GENERAL**

**1.1 SCOPE**

- A. This specification is for electrical and related work particular to Crescent City Connection - New Vehicle Maintenance Facility. Coordinate with other plans and specifications sections.

**1.2 RELATED DOCUMENTS**

- A. The general provisions of the Contract, including Contract Requirements, and other Division 1 Specification sections, apply to this Section. Sections included in DIVISION 16 of the Project Manual are as follows:

SECTION 16010 - ELECTRICAL GENERAL PROVISIONS  
SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS  
SECTION 16051 - ELECTRICAL SITE WORK  
SECTION 16060 - GROUNDING AND BONDING  
SECTION 16075 - ELECTRICAL IDENTIFICATION  
SECTION 16120 - CONDUCTORS AND CABLES  
SECTION 16130 - RACEWAYS AND BOXES  
SECTION 16140 - WIRING DEVICES  
    SECTION 16145 - LIGHTING CONTROL DEVICES  
SECTION 16146 - LIGHTING CONTROLS  
    SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS  
SECTION 16420 - ENCLOSED CONTROLLERS  
SECTION 16442 - PANELBOARDS  
    SECTION 16491 - FUSES  
    SECTION 16511 - INTERIOR LIGHTING  
SECTION 16722 - INTERCOM EQUIPMENT  
SECTION  
16724 - ACCESS CONTROL SYSTEM

**1.3 DESCRIPTION OF WORK**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

- A. This Section specifies several categories of provisions for electrical work, including: (1) Certain adaptive expansions of requirements specified in DIVISION 1, (2) General performance requirements within the electrical systems as a whole, and (3) General work to be performed as electrical work because of its close association.
- B. This Project Manual and accompanying Drawings are intended to describe complete workable systems of the various types. Items of materials, work, or equipment not mentioned but normally necessary for the proper execution of this work, shall be provided as if specifically called for, at no additional cost to the Owner.

**1.4 SUMMARY OF ELECTRICAL WORK**

**A. Drawings:**

1. Refer to the Electrical Drawings for graphic representations, schedules and notations showing electrical work.
2. The Drawings show approximate locations only of feeders, branch circuits, outlets, etc., except where specific routing or dimensions are indicated. The Architect reserves the right to make reasonable changes in locations indicated before roughing-in without additional cost to the Owner.
3. Because of the small scale of the Drawings, it is not possible to indicate all of the offsets, fittings, and accessories required. The Contractor shall investigate the structural and finish conditions affecting his work and shall arrange such work accordingly, furnishing fittings, bends, junction boxes, pull boxes, access panels, and accessories required to meet such conditions.

**B. Project Manual:**

1. Refer to the DIVISION 16 Sections for the primary technical Sections of electrical work.
2. General Outline: This section of the Project Manual covers furnishing materials, equipment, constant competent supervision, special tools, test equipment, technicians, and labor necessary for installation of a complete working electrical system, all as indicated on the plans of in this Project Manual.

**C. Scope:**

1. This part of the contract includes all electrical work associated with the construction of a new Vehicle Maintenance Facility, the construction of a new fuel canopy, the installation of power and communication circuits between the two, and the demolition of the existing Vehicle Maintenance Facility complex. A new

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

electrical service from Entergy will be established for the new facility. Telephone/Data/Communications circuits shall be extended from the existing facility. Electrical service to the existing facility will be removed once the new facility is completed.

2. Phasing of the project is critical. The existing building will be operating to full capacity throughout the construction period.
3. The work shall include but not necessarily be limited to the following:
  - a. Power distribution systems - feeder & branch circuits, panels, wiring, transformers, devices, etc.
  - b. Installation of motors which are not an integral part of equipment furnished under other Divisions.
  - c. Power wiring and connections of mechanical equipment.
  - d. Service systems.
  - e. Grounding systems.
  - f. Raceway systems.
  - g. Lighting systems-fixtures/lamps/auxiliaries wiring/connections/etc.
  - h. Telephone and data system raceways.
  - i. Access Control System.
  - j. Detection System.
  - k. Intercom system.
  - l. Lighting control systems.
  - m. All required sleeves, thimbles, anchors, hangers, bolts, miscellaneous structural steel, cutting, etc., for the complete installation of the electrical systems serving the building.
  - n. Temporary electrical services for construction.

**1.5 COORDINATION OF ELECTRICAL WORK**

- A. General: Refer to the DIVISION 1 sections for general coordination requirements applicable to the entire work. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the electrical work, and in its interface with other work including utilities and mechanical work, and that such establishment is the exclusive responsibility of the Contractor.
- B. Arrange electrical work in a neat, well organized manner with exposed conduit and similar services running parallel with primary lines of the building construction, and with a minimum of 8'-0" overhead clearance or as directed by the Architect.

**16010-3**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

- C. Advise other trades of openings required in their work for the subsequent move-in of large units of electrical work (equipment).
- D. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- E. Refer to equipment Sections in Divisions 2 through 15 for rough-in requirements.
- F. Verify all dimensions by field measurements.
- G. Arrange for chases, slots, and openings in other building components to allow for electrical installations.
- H. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.
- I. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
- J. Coordinate the cutting and patching of building components to accommodate the installation of electrical equipment and materials.
- K. Where mounting heights are not detailed or dimensioned, install electrical services and overhead equipment to provide the maximum headroom possible.
- L. Install electrical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
- M. Coordinate the installation of electrical materials and equipment above ceilings with suspension system, mechanical equipment and systems, and structural components.
- N. Coordinate connection of electrical systems with exterior underground utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

**1.6      TEMPORARY ELECTRICITY**

- A. Furnish and install all necessary temporary power, metering, lighting or wiring that is required to insure quality workmanship everywhere.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

- B. Furnish and install area distribution boxes with ground fault protection so located that the individual trades may use their own construction-type extension cords to obtain proper power and artificial lighting at all points where required by inspectors and for safety.

**1.7 DEMOLITION:**

- A. Refer to Architectural plans and specifications to determine the areas to be demolished and the extent of this demolition. Cooperate fully with the Architect.
- B. Remove power and communication services to existing building prior to its demolition.

**1.8 QUALITY ASSURANCE, STANDARDS**

- A. General: In addition to standards specified in individual work sections, the following standards are imposed, as applicable to the work in each instance:

- 1. NFPA 70, National Electrical Code  
The electrical installation shall conform to the requirements of the latest edition of the National Electrical Code (NEC-NFPA 70).
- 2. NEMA/ANSI/ASTM  
Electrical material shall be built and tested in accordance with the applicable standards of the National Electrical Manufacturer's Association (NEMA); the American National Standards Institute (ANSI); and the American Society of Testing and Materials (ASTM).
- 3. Underwriters' Laboratories (UL)  
Electrical materials shall be new and unused and shall be listed, inspected, approved and labeled by Underwriters' Laboratories, Inc., where such labeling service is available.
- 4. NFPA-101, Life Safety Code  
OSHA Code of Federal Regulations (for construction practices)  
Applicable state and local codes/ordinances.

**1.9 ELECTRICAL SUBMITTALS:**

- A. Refer to the Division 1 Section 01630 for submittal definitions, requirements, and procedures.
- B. Submittal of shop drawings, product data, and samples will be accepted only when submitted by the Contractor. Data submitted from subcontractors and material suppliers directly to the Architect will not be processed.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

**1.10 SUBSTITUTIONS/PRIOR APPROVALS**

- A. Substitutions/Prior Approvals shall be submitted in accordance with Section 01630 and provisions thereof.
- B. Only firms regularly engaged in manufacture of electrical products of types required, whose products have been in satisfactory use in similar service for not less than 3 years, shall be utilized.
- C. Any item not specified herein but submitted for approval as a substitute for the specified item shall be accompanied by manufacturer's documentation stating/illustrating the following applicable information in addition to the specific information requested in other sections:
1. Dimensions/weight.
  2. Electrical ratings-voltage, amperage, short circuit capability, etc.
  3. Construction - gauge of steel/aluminum, paint finish/application method, color, NEMA type, etc.
  4. Warranty.
  5. Local manufacturer's representative or nearest stocking distributor.
  6. Length of time the product has been available to the public.
- D. Shop Drawings: Submit completion descriptive and dimensional data on the following materials which Contractor proposes to use:
1. Panelboards
  2. Lighting Fixtures
  3. Safety Switches
  4. Circuit Breakers
  5. Motor Controls
  6. Lighting Controls
  7. Access Control System
  8. Detection System
  9. Intercom System
- E. Corrections or comments made on shop drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents, Plans and Project Manual. Shop Drawings will be checked for general conformance with the design concept of the project and general compliance with information given in the contract documents. Review of Shop Drawings shall not relieve the Contractor from responsibility for confirming and correlating all quantities and dimensions, coordinating

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

work with that of all other trades, and performing work in a safe and satisfactory manner. Review of shop drawings shall not permit any deviation from Plans and Project Manual. Shop Drawings must be accompanied by signed statement from contractor, stating that he has reviewed the submittal and checked it for compliance.

F. See Section 01330, for number of copies of shop drawings and product data to be submitted.

**1.11 DELIVERY, STORAGE AND HANDLING:**

- A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications, adequately packaged and protected to prevent damage during shipment, storage, and handling.
- B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.
- C. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion.

**1.12 RECORD DOCUMENTS:**

- A. Refer to the Division 1 Section 01781 for requirements.

**1.13 OPERATION AND MAINTENANCE DATA:**

- A. Refer to the Division 1 Section 01782 for procedures and requirements for preparation and submittal of maintenance manuals.

**1.14 WARRANTIES:**

- A. Refer to the Division 1 Section 01770 for procedures and submittal requirements for warranties. Refer to individual equipment Sections for warranty requirements.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

**1.15 CLEANING**

- A. Refer to the Division 1 Section 01770 for general requirements for final cleaning.
- B. Clean and restore to original finish all equipment prior to final acceptance.

**1.16 GUARANTEE:**

- A. The work installed shall be kept in perfect working order for one year from date of substantial completion. Guarantee shall be based upon defective materials and/or workmanship. Furnish free of cost to the Owner materials and labor necessary to comply with this guarantee.

**1.17 WIRING FOR EQUIPMENT BY OTHERS:**

- A. Electrical service for all equipment furnished under this Project manual shall be roughed-in and connected under this Section. It is the responsibility of the Contractor to obtain correct roughing-in dimensions and requirements for this equipment.
- B. Under other DIVISIONS, unless otherwise noted, equipment will be furnished such as: motors and magnetic motor starters. Connection/interconnection of that equipment shall be part of DIVISION 16000 and shall comply with other DIVISION 16000 Basic Material and Methods Sections.
- C. Apparatus required for controls and firestats will be furnished as specified under DIVISION 15 - Mechanical Work. Control wiring shall be furnished and installed as work under DIVISION 15 - Mechanical.

**1.18 TESTS AND BALANCING**

- A. The contractor shall conduct operating tests to demonstrate that the electrical systems are installed and will operate properly and in accordance with the requirements of this Project Manual. Tests shall be performed in the presence of the Architect's representative. The Contractor shall furnish instruments and personnel required for such tests.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

- B. Contractor shall perform tests in the presence of the Architect to show that the power and lighting loads are equally divided among phases of feeders serving each piece of equipment and each panelboard.
- C. Any work and materials tested and found varying from the requirements of the Drawings and Project Manual shall be replaced by the Contractor without additional cost to the Owner.
- D. This requirement is in addition to specific tests such as high-potential tests, meggar test, phasing tests, generator testing, etc. which may be called for in other sections.

**1.19 WORKMANSHIP**

- A. Install all materials and electrical components of the work in accordance with instructions of manufacturer following the best modern construction practices and conforming with the Contract Documents. Workmanship shall be first class, in both function and appearance, whether finally concealed or exposed and shall be performed by experienced workmen skilled in the type of work. As practicable, the lines of all components of the system shall be perpendicular or parallel. In general, workmanship shall conform to guidelines set forth in N.E.C.A. manuals.

**1.20 MOUNTING HEIGHTS:**

- A. Unless otherwise noted on the Drawings or required by the Architect, the following mounting heights shall apply.
- B. Upon approval of the Architect, mounting heights may be adjusted.
- C. Heights of Outlets - all heights measured from finish floor to bottom of device.

- |    |   |  |
|----|---|--|
| 1. | Wall Switches   | 44"  |
| 2. | Receptacle Outlet<br>(General)  | 16"  |
| 3. | Special Purpose Outlet  | within 12" (12 inches) of intended use                               |
| 4. | Telephone Outlet  | 16"  |
| 5. | Bells, Buzzers, Chimes  | 12'-0"   |
| 6. | Fire Alarm Station  | 44"  |
| 7. | Fire Alarm Annunciator<br>(Gongs, Strobe, Horns)<br>service or replace. | 80"(per ADA Requirements)<br>Allow sufficient space below ceiling to |
| 8. | Wall Mounted PIR  | 44"  |

**16010-9**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**16010 - ELECTRICAL GENERAL PROVISIONS**

**Occupancy Sensors**

**D. Heights of Disconnect Switches, Protective Devices, Controllers, etc.:**

1. The mounting height of disconnect switches, circuit breakers, motor controllers, push button stations, and other similar devices and equipment will vary depending upon location and whether individually or group mounted. For convenience and safety operating levers, handles or buttons shall be mounted no more than 80 inches above the finish floor line.

- E. Panelboards shall be located so that the highest overcurrent protective device is a maximum of 72" above the floor.

**1.21 SAFETY**

- A. It shall be the Contractor's responsibility to do all things necessary in the pursuit of the installation or testing to provide safe conditions in which to work.

**1.22 FIRESTOPPING**

- A. Firestopping of all openings in fire-rated floors, walls, and ceilings accommodating penetrating items such as cables, bus ducts, wireways, conduits, etc. shall be required as part of DIVISION 16000 work. Provide Firestop installation as required to meet ratings equal to the floor or wall being penetrated. See Section 07270
- B. Fire stop materials shall be manufactured for that purpose and shall be installed in accordance with the manufacturer's recommendation in order to provide a U.L. listed fire stop at all openings equal to or exceeding the rated floor, wall or ceiling.
- C. Plastic sleeves/pipe shall not be used within the building when penetrating a fire-resistant-rated wall, ceiling, partition, or floor.

**END OF SECTION 16010**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes the following:

1. Supporting devices for electrical components.
2. Electrical demolition.
3. Cutting and patching.
4. Painting.

**1.3 QUALITY ASSURANCE**

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

**1.4 COORDINATION**

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS**

C. Coordinate electrical service connections to components furnished by utility companies.

1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors."

**2PART - PRODUCTS**

**2.1 SUPPORTING DEVICES**

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch- diameter slotted holes at a maximum of 2 inches o.c., in webs.

1. Channel Thickness: Selected to suit structural loading.
2. Fittings and Accessories: Products of the same manufacturer as channel supports.

E. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

F. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

G. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.

H. Expansion Anchors: Carbon-steel wedge or sleeve type.

I. Toggle Bolts: All-steel springhead type.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS**

- J. Nonmetallic Channel and Angle System: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch- (14-mm-) diameter holes at a maximum of 8 inches (203 mm) o.c., in at least one surface.
1. Fittings and Accessories: Products of the same manufacturer as channels and angles.
  2. Fittings and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.

**3PART - EXECUTION**

**3.1 ELECTRICAL EQUIPMENT INSTALLATION**

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

**3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION**

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
- B. Dry Locations: Steel materials.
- C. Support Clamps for PVC Raceways: Click-type clamp system.
- D. Selection of Supports: Comply with manufacturer's written instructions.
- E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS**

**3.3 SUPPORT INSTALLATION**

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways.  
Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
- E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- F. Install 1/4-inch- diameter or larger threaded steel hanger rods, unless otherwise indicated.
- G. For floors-on-grade, support all raceways under slab from stainless steel 1/2" rod every four (4) feet.
- H. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.
- I. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- J. Simultaneously install vertical conductor supports with conductors.
- K. Separately support cast boxes that are threaded to raceways and used for fixture support.  
Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.
- L. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
- M. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS**

N. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

1. Wood: Fasten with wood screws or screw-type nails.
2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
3. New Concrete: Concrete inserts with machine screws and bolts.
4. Existing Concrete: Expansion bolts.
5. Steel: Welded threaded studs or spring-tension clamps on steel.
  - a. Field Welding: Comply with AWS D1.1.
6. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
7. Light Steel: Sheet-metal screws.
8. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

**3.4 UTILITY COMPANY ELECTRICITY-METERING EQUIPMENT**

A. Install equipment according to utility company's written requirements. Provide grounding and empty conduits as required by utility company.

**3.5 FIRESTOPPING**

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping."

**3.6 DEMOLITION**

A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.

B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS**

- C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- D. Remove demolished material from Project site.
- E. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

**3.7 CUTTING AND PATCHING**

- A. This Article specifies the cutting and patching of electrical equipment components, and materials to include removal and legal disposal of selected materials, components, and equipment.
- B. Refer to the Division section: CUTTING AND PATCHING for general requirements for cutting and patching.
- C. Do not endanger or damage installed work through procedures and processes of cutting and patching.
- D. Arrange for repairs required to restore other work, because of damage caused as a result of electrical installation.
- E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.
- F. Perform cutting, fitting, and patching of electrical equipment and materials required to:
  - 1. uncover work to provide for installation of ill-timed work;
  - 2. remove and replace defective work not conforming to requirements of the Contract Documents;
  - 3. remove samples of installed work as specified for testing;
  - 4. upon written instructions from the Architect uncover and restore work to provide for Architect's observation of concealed work.

**3.8 FIELD QUALITY CONTROL**

- A. Inspect installed components for damage and faulty work, including the following:
  - 1. Supporting devices for electrical components.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS**

2. Electricity-metering components.
3. Raceways.
4. Building wire and connectors.

**3.9 PAINTING**

- A. Exposed conduits, supports, pull boxes, etc., shall be painted as described under other Divisions of these Specifications. The Contractor shall be responsible for having electrical items painted to the finish called for on the Drawings. Factory painted equipment shall have finish restored to Manufacturer's finish if scratched or damaged before acceptance or use by Owner.

**3.10 CLEANING AND PROTECTION**

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

**3.11 WIRING INSTALLATION**

- A. Install splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- B. Install wiring at outlets with at least 12 inches (300mm) of slack conductor at each outlet.
- C. Connect outlet and component connections to wiring systems and to ground. Tighten electrical connectors and terminals, according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

**4PART - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be paid under:

**i)Item S-16000 - Electrical per Lump Sum.**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS**

**D.3/8-inch-**

END OF SECTION 16050

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16051 - ELECTRICAL SITE WORK**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 1 Specifications sections, and Architectural/Civil Specifications apply to work of this section.
- B. This section is a Division 16 Basic Materials and Methods section, and is part of each Division 16 section making reference to electrical related work specified herein.
- C. Standards put forth by the DOTD shall be part of this section.

**1.2 DESCRIPTION OF WORK**

- A. Extent of electrical site work required by this section is indicated on drawings and/or specified in other Division 16 sections.
- B. Types of electrical site work specified in this section include the following:
  - 1. Excavating, Trenching and Backfill for Electrical Work.
  - 2. Concrete for Electrical Work:
    - a. Rough grouting in and around electrical work.
    - b. Patching concrete which has been cut to accommodate electrical work.

**1.3 PROJECT CONDITIONS**

- A. Existing Utilities: Locate and protect existing utilities and other underground work in a manner which will ensure that no damage to personnel or property or service interruption will result from excavating and backfilling.
- B. Protect property from damage which might result from excavating and backfilling.
- C. Protect persons from injury at excavations by barricades, warnings and illumination.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16051 - ELECTRICAL SITE WORK**

- D. Coordinate excavations with weather conditions, to minimize possibility of washouts, settlements and other damages and hazards.
- E. Reference Architectural Structural Civil, Mechanical, Plumbing, and Electrical site plans to locate known underground obstructions prior to digging.
- F. Contact owner personnel to find approximate locations of underground obstructions not shown on drawings. Such obstructions included, but are not limited to, existing high-mast lighting circuits.

**2PART - PRODUCTS**

**2.1 EXCAVATING FOR ELECTRICAL WORK**

- A. Backfill Materials:
- B. Subbase Material: A graded mixture of gravel and crushed stone unless otherwise specified by the DOTD.
- C. Backfill Material: Soil material suitable for compacting to required densities, and complying with AASHTO Designation M 145, group A-1, A-2-4, A-2-5, or A-3, unless otherwise specified by DOTD Standard.
- D. Drainage Fill Material: Washed and uniformly graded gravel, crushed stone or crushed slab, with 100% passing a 1-1/2" sieve and not more than 5% passing a No. 4 sieve, unless otherwise specified by DOTD standards.

**3PART - EXECUTION**

**3.1 EXCAVATION, TRENCHING AND BACKFILLING**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16051 - ELECTRICAL SITE WORK**

- A. All excavating, trenching and backfilling shall be in accordance with this section, Architectural/Civil sections. Architectural/Civil Details and Plans, Electrical Plans, and DOTD standards. Any discrepancies found between one or more of the referenced documents shall be brought to the immediate attention of the Architect and Engineer.
- B. Perform all excavation of every description and of whatever substances encountered to the depths indicated on the Drawings or as otherwise specified. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or not suitable for backfill shall be removed and wasted or removed from jobsite as indicated on the drawings or as directed by Architect, at no additional cost to Owner.
- C. Sheet piling and shoring shall be done as necessary for the protection of the work and for the safety of personnel. Provide necessary pumping at all times to maintain a dry working condition in all trenches. Unless otherwise indicated, excavations shall be by open cut except that short sections of a trench may be tunnelled if, in the opinion of the Architect, the conduit can be safely and properly installed and backfill can be properly tamped in such tunnelled sections.
- D. No excavation or trenches shall be cut near or under footings without first consulting Architect.
- E. Bottom of trench shall be shaped to give substantially uniform circumferential support to lower third of each pipe. Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with adjoining pipe and to prevent sudden offset to flow line. As work progresses, interior of pipe shall be cleared of dirt and superfluous materials of every description.
- F. Wherever wet or otherwise unstable soil that is incapable of properly supporting the pipe, as determined by the Architect, is encountered in the bottom of the trench, such soil shall be removed to the depth required and the trench backfilled to the proper grade with coarse sand, fine gravel, or other suitable material, as approved by the Architect.
- G. Trenches for utilities shall be of a depth that will provide the following minimum depth of cover from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown:

24-Inch Minimum Cover - Electrical Conduit under 600 volts.  
36-Inch Minimum Cover - Electrical Conduit over 600 volts.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16051 - ELECTRICAL SITE WORK**

- H. Backfill shall be installed in layers 6" deep, adequately wetted (if approved by Architect) and tamped using materials as noted above. The surfaces shall be graded to a reasonable uniformity and the mounting over trenches left in a uniform and neat condition as approved by the Architect.
- I. Restore all hard finished surfaces such as roadway, sidewalks, grass, shrubbery, etc., removed for installation of utilities (and not shown on Drawings or specified to be reworked under other sections of the work) to their original condition using the same type as original materials.
- J. Carefully plan all work to avoid existing utilities and other interferences. Architect has not attempted to indicate all existing underground utilities. Existing utility lines to be retained that are shown on the Drawings or the locations of which are made known to the Contractor prior to excavation, as well as all utility lines uncovered during excavation operations, shall be protected from damage during excavation and backfilling and, if damaged, shall be repaired by the Contractor at his expense. Prior to doing any excavation with power tools, carefully investigate and locate any existing conduit, pipes, and other lines, so as to avoid them during excavation.

**4PART - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be paid under:

**i)Item-S-16000 - Electrical per Lump Sum.**

**END OF SECTION 16051**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16060 - GROUNDING AND BONDING**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

B. Related Sections include the following:

**1.3 SUBMITTALS**

A. Field Test Reports: Submit written test reports to include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

**1.4 QUALITY ASSURANCE**

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16060 - GROUNDING AND BONDING**

1. Comply with UL 467.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Grounding Conductors, Cables, Connectors, and Rods:
  - a. Chance/Hubbell.
  - b. Copperweld Corp.
  - c. Erico Inc.; Electrical Products Group.
  - d. Kearney/Cooper Power Systems.
  - e. O-Z/Gedney Co.; a business of the EGS Electrical Group.
  - f. Racco, Inc.; Division of Hubbell.
  - g. Thomas & Betts, Electrical.

**2.2 GROUNDING CONDUCTORS**

- A. For insulated conductors, comply with Division 16 Section "Conductors and Cables."
- B. Equipment Grounding Conductors: Insulated with green-colored insulation.
- C. Grounding Electrode Conductors: Stranded cable.
- D. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.
- E. Bare Copper Conductors: Comply with the following:
1. Solid Conductors: ASTM B 3.
  2. Assembly of Stranded Conductors: ASTM B 8.
  3. Tinned Conductors: ASTM B 33.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16060 - GROUNDING AND BONDING**

F. Copper Bonding Conductors: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, **1/4 inch** in diameter.
2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; **1-5/8 inches** wide and **1/16 inch** thick.
4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; **1-5/8 inches** wide and **1/16 inch** thick.

G. Ground Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

**2.3 CONNECTOR PRODUCTS**

- A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.
- B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.
- C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

**2.4 GROUNDING ELECTRODES**

- A. Ground Rods: Copper-clad steel.
- B. Chemical Electrodes: Copper tube, straight or L-shaped, filled with nonhazardous chemical salts, terminated with a 4/0 bare conductor. Provide handholes as specified in Division 2 Section "Underground Ducts and Utility Structures."
- C. Test Wells: Provide handles as specified in Division 2 Section "Underground Ducts and Utility Structures"

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16060 - GROUNDING AND BONDING**

**3PART - EXECUTION**

**3.1 APPLICATION**

- A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
- B. In raceways, use insulated equipment grounding conductors.
- C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.
- D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.
- E. Grounding Bus: Install on telephone backboards.
  - 1. Use insulated spacer; space **1 inch** from wall and support from wall **6 inches** above finished floor, unless otherwise indicated.
- F. Underground Grounding Conductors: Use tinned copper conductor, No. 2/0 AWG minimum. Bury at least **24 inches** below grade or bury **12 inches** above duct bank when installed as part of the duct bank.
- G. Ground Rod Clamps at Test Wells: Use bolted pressure clamps with at least two bolts.

**3.2 EQUIPMENT GROUNDING CONDUCTORS**

- A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated. Install grounding conductors in all feeders and circuits.
- B. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.
- C. Signal and Communication Systems: For telephone, alarm, controls, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to telephone backboards, terminal cabinets, and central equipment location.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16060 - GROUNDING AND BONDING**

1. Service and Central Equipment Locations: Terminate grounding conductor on a **1/4-by-2-by-12-inch** grounding bus.
2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

**3.3 INSTALLATION**

A. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.

1. Drive ground rods until tops are **2 inches** below finished floor or final grade, unless otherwise indicated.
2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.

B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16060 - GROUNDING AND BONDING**

- F. Bond interior metal piping systems and metal air ducts to equipment grounding conductors of associated pumps, fans, blowers, electric heaters, and air cleaners. Use braided-type bonding straps.
- G. Install one test well for each service at the ground rod electrically closest to the service entrance. Set top of well flush with finished grade on floor.

**3.4 CONNECTIONS**

- A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
  - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
  - 2. Make connections with clean, bare metal at points of contact.
  - 3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
- E. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A .

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16060 - GROUNDING AND BONDING**

- F. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.
- G. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.
- H. Connections at Test Wells: Use compression-type connectors on conductors and make bolted and clamped-type connections between conductors and ground rods.

**3.5 UNDERGROUND DISTRIBUTION SYSTEM GROUNDING**

- A. Duct Banks: Install a grounding conductor with at least 50 percent ampacity of the largest phase conductor in the duct bank.
- B. Manholes and Handholes: Install a driven ground rod close to wall. If necessary, install ground rod before manhole is placed and provide a No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete with a double wrapping of pressure-sensitive tape or heat-shrunk insulating sleeve from **2 inches** above to **6 inches** below concrete. Seal opening with waterproof, nonshrink grout.
- C. Connections to Manhole Components: Connect exposed-metal parts, such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.

**3.6 FIELD QUALITY CONTROL**

- A. Testing: Perform the following field quality-control testing:

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16060 - GROUNDING AND BONDING**

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.
3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
  - a. Equipment Rated 500 kVA and Less: 10 ohms.
  - b. Handhole Grounds: 10 ohms.
4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

**3.7 GRANDING AND PLANTING**

- A. Restore surface features, including vegetation, at areas disturbed by Work of this section. Reestablish original grades, unless otherwise indicated. If sod had been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching storing of dirt, cable laying, and other activities to their original condition. Include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch. Comply with Division 2 Section "Landscaping." Maintain restored surfaces. Restore disturbed paving as indicated. Coordinate this work with that of other Divisions.

**4PART - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be paid under:

**i)Item-S-16000 - Electrical per Lump Sum.**

**16060 - 8**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16060 - GROUNDING AND BONDING**

END OF SECTION 16060

**16060 - 9**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16075 - ELECTRICAL IDENTIFICATION**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes electrical identification materials and devices required to comply with ANSI C2, NFPA 70, OSHA standards, and authorities having jurisdiction.

**1.3 QUALITY ASSURANCE**

A. Comply with ANSI C2.

B. Comply with NFPA 70.

C. Comply with ANSI A13.1 and NFPA 70 for color-coding.

**2PART - PRODUCTS**

**2.1 RACEWAY AND CABLE LABELS**

A. Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

1. Color: Black letters on orange field.

2. Legend: Indicates voltage .

B. Adhesive Labels: Preprinted, flexible, self-adhesive vinyl with legend overlaminated with a clear, weather- and chemical-resistant coating.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16075 - ELECTRICAL IDENTIFICATION**

- C. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- D. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- E. Aluminum, Wraparound Marker Bands: Bands cut from 0.014-inch- thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.
- F. Plasticized Card-Stock Tags: Vinyl cloth with preprinted and field-printed legends. Orange background, unless otherwise indicated, with eyelet for fastener.
- G. Aluminum-Faced, Card-Stock Tags: Weather-resistant, 18-point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 inch thick, laminated with moisture-resistant acrylic adhesive, punched for fasteners, and preprinted with legends to suit each application.
- H. Brass or Aluminum Tags: 2 by 2 by 0.05-inch metal tags with stamped legend, punched for fastener.
- I. Underground-Line Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape.
1. Not less than 6 inches wide by 4 mils thick.
  2. Compounded for permanent direct-burial service.
  3. Embedded continuous metallic strip or core.
  4. Printed legend indicating type of underground line.

2.2 NAMEPLATES AND SIGNS

- A. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.
- B. Engraved Plastic Nameplates and Signs: Engraving stock, melamine plastic laminate, minimum 1/16 inch thick for signs up to 20 sq. in. and 1/8 inch thick for larger sizes.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16075 - ELECTRICAL IDENTIFICATION**

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.

C. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32, stainless-steel machine screws with nuts and flat and lock washers. ~~1/4-inch~~  
~~0.0396-inch~~ ~~1/4-inch~~

**2.3 MISCELLANEOUS IDENTIFICATION PRODUCTS**

A. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: ~~3/16 inch~~.
2. Tensile Strength: ~~50 lb~~ minimum.
3. Temperature Range: ~~Minus 40 to plus 185 deg F~~.
4. Color: According to color-coding.

B. Paint: Formulated for the type of surface and intended use.

1. Primer for Galvanized Metal: Single-component acrylic vehicle formulated for galvanized surfaces.
2. Primer for Concrete Masonry Units: Heavy-duty-resin block filler.
3. Primer for Concrete: Clear, alkali-resistant, binder-type sealer.
4. Enamel: Silicone-alkyd or alkyd urethane as recommended by primer manufacturer.

**3PART - EXECUTION**

**3.1 INSTALLATION**

A. All identification means, methods, colors, designations, etc. shall be approved by the owner.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16075 - ELECTRICAL IDENTIFICATION**

- B. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.
- D. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.
- E. Self-Adhesive Identification Products: Clean surfaces before applying.
- F. Color Banding Raceways and Exposed Cables: Band exposed and accessible raceways of the systems listed below:
1. Bands: Pretensioned, wraparound plastic sleeves; colored adhesive tape; or a combination of both. Make each color band **2 inches** wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
  2. Band Locations: At changes in direction, at penetrations of walls and floors, at **50-foot** maximum intervals in straight runs, and at **25-foot** maximum intervals in congested areas.
  3. Apply the following colors to the systems listed below: Verify all colors with owner.
    - a. Fire-Suppression Supervisory and Control System: Red and yellow.
    - b. Detection System: Red and blue.
    - c. Access Control System: Blue and yellow.
    - d. Mechanical and Electrical Supervisory System: Green and blue.
    - e. Telecommunication System: Green and yellow.
- G. Caution Labels for Indoor Boxes and Enclosures for Power and Lighting: Install pressure-sensitive, self-adhesive labels identifying system voltage with black letters on orange background. Install on exterior of door or cover.
- H. Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communication lines, install continuous underground warning tape located directly above line at **12 inches** below finished grade. Where width of multiple lines installed in a common trench or concrete envelope does not exceed **16 inches** overall, use a single line marker. Install line marker for underground wiring, both direct-buried cables and cables in raceway.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16075 - ELECTRICAL IDENTIFICATION**

I. Color-Coding of Secondary Phase Conductors: Color Code per NEC.

1. Factory apply color the entire length of conductors, except the following field-applied, color-coding methods may be used instead of factory-coded wire for sizes larger than No. 10 AWG:
  - a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of **6 inches** from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Use **1-inch-** wide tape in colors specified. Adjust tape bands to avoid obscuring cable identification markings.

J. Power-Circuit Identification: Metal tags or aluminum, wraparound marker bands for cables, feeders, and power circuits in vaults, pull and junction boxes, manholes, and switchboard rooms.

1. Legend: **1/4-inch-** steel letter and number stamping or embossing with legend corresponding to indicated circuit designations.
2. Tag Fasteners: Nylon cable ties.
3. Band Fasteners: Integral ears.

K. Apply identification to conductors as follows:

1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.
2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding to identify circuits' voltage and phase.
3. Multiple Control and Communication Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.

L. Apply warning, caution, and instruction signs as follows:

1. Warnings, Cautions, and Instructions: Install to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16075 - ELECTRICAL IDENTIFICATION**

2. Emergency Operation: Install engraved laminated signs with white legend on red background with minimum **3/8-inch**- high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

M. Equipment Identification Labels: Engraved plastic laminate. Install on each unit of equipment, including central or master unit of each system. This includes power, lighting, communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Unless otherwise indicated, provide a single line of text with **1/2-inch**- high lettering on **1-1/2-inch**- high label; where two lines of text are required, use labels **2 inches** high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment using mechanical fasteners:

1. Panelboards, electrical cabinets, and enclosures.
2. Access doors and panels for concealed electrical items.
3. Emergency system boxes and enclosures.
4. Disconnect switches.
5. Enclosed circuit breakers.
6. Motor starters
7. Push-button stations.
8. Power transfer equipment.
9. Contactors.
10. Remote-controlled switches.
11. Control devices.
12. Intercom System Equipment
13. Access Control System Equipment
14. Power-generating units.
15. Telephone switching equipment.
16. Detection System control panel.

**4PART - MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section will be paid under:

**i)Item-S-16000 - Electrical per Lump Sum.**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16075 - ELECTRICAL IDENTIFICATION**

END OF SECTION 16075

**16075 - 7**

**STATE PROJECT NO. 610-10-0021**  
**SPECIFICATIONS**

**SECTION 16120 - CONDUCTORS AND CABLES**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

**1.3 QUALITY ASSURANCE**

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

**2PART - PRODUCTS**

**2.1 CONDUCTORS AND CABLES**

A. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

B. Conductor Material: Copper complying with NEMA WC 5 or 7; solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.

C. Conductor Insulation Types: Type THHN-THWN complying with NEMA WC 5 or 7.

**STATE PROJECT NO. 610-10-0021  
SPECIFICATIONS**

**SECTION 16120 - CONDUCTORS AND CABLES**

D. Multiconductor Cable: Metal-clad cable, Type MC with ground wire.

**2.2 CONNECTORS AND SPLICES**

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

**3PART - EXECUTION**

**3.1 CONDUCTOR AND INSULATION APPLICATIONS**

A. Service Entrance: Type THWN, single conductors in raceway

B. Exposed Feeders: Type THHN-THWN, single conductors in raceway

C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway .

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspace: Type THHN-THWN, single conductors in raceway.

E. Exposed Branch Circuits, including in Crawlspace: Type THHN-THWN, single conductors in raceway

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway

G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.

H. Special System and Communication Circuits: Type THHN-THWN, and cables per system requirements, in raceway .

I. Class 1 Control Circuits: Type THHN-THWN, in raceway.

**STATE PROJECT NO. 610-10-0021**  
**SPECIFICATIONS**

**SECTION 16120 - CONDUCTORS AND CABLES**

**3.2 INSTALLATION**

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."
- F. Seal around cables penetrating fire-rated elements according to Division 7 Section "Through-Penetration Firestop Systems."
- G. Identify and color-code conductors and cables according to Division 16 Section "Electrical Identification."

**3.3 CONNECTIONS**

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least ~~6 inches~~ 12 inches of slack.

**3.4 FIELD QUALITY CONTROL**

- A. Testing: Perform the following field quality control testing:

**STATE PROJECT NO. 610-10-0021  
SPECIFICATIONS**

**SECTION 16120 - CONDUCTORS AND CABLES**

1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

**4PART - MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section will be paid under:

**i)Item-S-16000 - Electrical per Lump Sum.**

END OF SECTION 16120

**STATE PROJECT NO. 610-10-0021  
SPECIFICATIONS**

**SECTION 16130 - RACEWAYS AND BOXES**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Related Sections include the following:

1. Division 2 Section "Underground Ducts and Utility Structures" for exterior ductbanks, manholes, and underground utility construction.
2. Division 7 Section "Through-Penetration Firestop Systems" for firestopping materials and installation at penetrations through walls, ceilings, and other fire-rated elements.
3. Division 16 Section "Basic Electrical Materials and Methods" for supports, anchors, and identification products.
4. Division 16 Section "Electrical Identification" for identification products and methods.
5. Division 16 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

**1.3 QUALITY ASSURANCE**

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

**1.4 COORDINATION**

**STATE PROJECT NO. 610-10-0021  
SPECIFICATIONS**

**SECTION 16130 - RACEWAYS AND BOXES**

- A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

**2PART - PRODUCTS**

**2.1 METAL CONDUIT AND TUBING**

- A. Rigid Steel Conduit: ANSI C80.1.
- B. IMC: ANSI C80.6.
- C. EMT and Fittings: ANSI C80.3.
1. Fittings: Set-screw or compression type.
- D. FMC: Zinc-coated steel.
- E. LFMC: Flexible steel conduit with PVC jacket.
- F. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

**2.2 NONMETALLIC CONDUIT AND TUBING**

- A. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.
- B. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.
- C. LFNC: UL 1660.

**2.3 BOXES, ENCLOSURES, AND CABINETS**

- A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

**STATE PROJECT NO. 610-10-0021  
SPECIFICATIONS**

**SECTION 16130 - RACEWAYS AND BOXES**

- B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- C. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- D. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- E. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
  - 2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.
- F. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

**2.4 FACTORY FINISHES**

- A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting.

**3PART - EXECUTION**

**3.1 RACEWAY APPLICATION**

**A. Outdoors:**

- 1. Exposed: Rigid steel
- 2. Concealed: Rigid steel
- 3. Underground, Single Run: RNC.

**STATE PROJECT NO. 610-10-0021  
SPECIFICATIONS**

**SECTION 16130 - RACEWAYS AND BOXES**

4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment: LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R

**B. Indoors:**

1. Exposed: EMT.
2. Concealed: EMT .
3. Connection to Vibrating Equipment: FMC; except use LFMC in damp or wet locations.
4. Damp or Wet Locations: Rigid steel conduit.
5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
  - a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.
  - b. In Maintenance Shop: NEMA 12

**C. Minimum Raceway Size:** ½-inch trade size ~~¾-inch trade size~~

**D. Raceway Fittings:** Compatible with raceways and suitable for use and location.

1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

**3.2 INSTALLATION**

- A. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- B. Complete raceway installation before starting conductor installation.
- C. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."
- D. Install temporary closures to prevent foreign matter from entering raceways.
- E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.

**STATE PROJECT NO. 610-10-0021**  
**SPECIFICATIONS**

**SECTION 16130 - RACEWAYS AND BOXES**

F. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

1. Install concealed raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.

H. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches of concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in concrete.
3. Run conduit larger than 1-inch trade size parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
4. Change from nonmetallic tubing to rigid steel conduit, or IMC before rising above the floor.

I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.

1. Run parallel or banked raceways together on common supports.
2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

J. Join raceways with fittings designed and approved for that purpose and make joints tight.

K. Tighten set screws of threadless fittings with suitable tools.

L. Terminations:

1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.

**STATE PROJECT NO. 610-10-0021**  
**SPECIFICATIONS**

**SECTION 16130 - RACEWAYS AND BOXES**

2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- M. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- N. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
- O. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  2. Where otherwise required by NFPA 70.
- P. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.
- Q. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.
- R. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.
- S. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

**STATE PROJECT NO. 610-10-0021  
SPECIFICATIONS**

**SECTION 16130 - RACEWAYS AND BOXES**

**3.3 PROTECTION**

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

**3.4 CLEANING**

A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

**4PART - MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section will be paid under:

- i) **Item S-16000 - Electrical per Lump Sum.**  
**D.3/8-inch-**

END OF SECTION 16130

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16140 - WIRING DEVICES**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes the following:

1. Single and duplex receptacles, ground-fault circuit interrupters, integral surge suppression units, and isolated-ground receptacles.
2. Single- and double-pole snap switches.
3. Device wall plates.

**1.3 QUALITY ASSURANCE**

A. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

**1.4 COORDINATION**

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

**16140 - 1**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16140 - WIRING DEVICES**

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

A. Manufacturer's: Subject to compliance with requirements, provide products by one of the following:

1. Wiring Devices:
  - a. Hubbell Incorporated; Wiring Device-Kellems.
  - b. Leviton Mfg. Company Inc.
  - c. Pass & Seymour/Legrand; Wiring Devices Div.

**2.2 RECEPTACLES**

A. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498.

B. GFCI Receptacles: Straight blade, non-feed-through type, specification grade, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a ~~2-3/4-inch~~ deep outlet box without an adapter.

**2.3 PENDANT CORD/CONNECTOR DEVICES**

A. Description: Matching, locking-type plug and receptacle body connector, NEMA WD 6, Configurations L5-20P and L5-20R, Heavy-Duty grade.

1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.

**2.4 CORD AND PLUG SETS**

A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16140 - WIRING DEVICES**

1. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.
2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

**2.5 SWITCHES**

A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.

B. Snap Switches: Specification grade, quiet type.

C. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.

1. Switch: 20 A, 120/277-V ac.
2. Receptacle: NEMA WD 6, Configuration 5-15R.

**2.6 WALL PLATES**

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic ~~0.035-inch-0.04-inch-0.05-inch-0.04-inch~~
3. Material for Unfinished Spaces: Galvanized steel
4. Material for Wet Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- ~~1.2.5-inch-6 inches~~

**2.7 FINISHES**

A. Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect , unless otherwise indicated or required by NFPA 70.
2. Wiring Devices Connected to Emergency Power System: Red.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16140 - WIRING DEVICES**

**3PART - EXECUTION**

**3.1 INSTALLATION**

- A. Install devices and assemblies level, plumb, and square with building lines.
- B. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
- C. Remove wall plates and protect devices and assemblies during painting.

**3.2 IDENTIFICATION**

- A. Comply with Division 16 Section "Electrical Identification."

**3.3 CONNECTIONS**

- A. Ground equipment according to Division 16 Section "Grounding and Bonding."
- B. Connect wiring according to Division 16 Section "Conductors and Cables."
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

**3.4 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
  - 2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16140 - WIRING DEVICES**

B. Remove malfunctioning units, replace with new units, and retest as specified above.

**4PART - MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section will be paid under:

**i)Item-S-16000 - Electrical per Lump Sum.**

**END OF SECTION 16140**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16145 - LIGHTING CONTROL DEVICES**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

B. Related Sections include the following:

1. Division 16 Section "Lighting Controls" for low-voltage, manual and programmable lighting control systems.
2. Division 16 Section "Wiring Devices" for manual light switches.

**1.3 SUBMITTALS**

A. Product Data: Include dimensions and data on features, components, and ratings for lighting control devices.

**1.4 QUALITY ASSURANCE**

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for their indicated use and installation conditions by a testing agency acceptable to authorities having jurisdiction.

B. Comply with 47 CFR 15, Subparts A and B, for Class A digital devices.

C. Comply with NFPA 70.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16145 - LIGHTING CONTROL DEVICES**

**1.5 COORDINATION**

A. Coordinate features of devices specified in this Section with systems and components specified in other Sections to form an integrated system of compatible components. Match components and interconnections for optimum performance of specified functions. Include coordination with the following:

1. Division 16 Section "Lighting Controls."
2. Division 16 Section "Panelboards."

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Contactors and Relays:
  - a. Cutler-Hammer Products; Eaton Corporation.
  - b. GE Lighting Controls.
  - c. Hubbell Lighting, Inc.
  - d. Siemens Energy and Automation, Inc.
  - e. Square D Co.; Power Management Organization.
  - f. Watt Stopper, Inc. (The).
  
2. Time Switches:
  - a. Tork, Inc.
  - b. Intermatic, Inc.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16145 - LIGHTING CONTROL DEVICES**

- 3. Photoelectric Relays:
  - a. Tork, Inc.
  - b. Intermatic, Inc
  - c. Watt Stopper, Inc. (The).
- 4. Occupancy Sensors:
  - a. Hubbell Lighting, Inc.
  - b. Lithonia Control Systems.
  - c. Sensormatic
  - d. Watt Stopper, Inc. (The).

**2.2 GENERAL LIGHTING CONTROL DEVICE REQUIREMENTS**

- A. Line-Voltage Surge Protection: Include in all 120- and 277-V solid-state equipment. Comply with UL 1449 and with ANSI C62.41 for Category A locations.

**2.3 PHOTOELECTRIC RELAYS**

- A. Description: Solid state, with single-pole, double-throw dry contacts rated to operate connected relay or contactor coils or microprocessor input, and complying with UL 773A.
- B. Light-Level Monitoring Range: 0 to 3500 fc, with an adjustment for turn-on/turn-off levels.
- C. Outdoor Sealed Units: Weathertight housing, resistant to high temperatures and equipped with sun-glare shield and ice preventer.

**2.4 OCCUPANCY SENSORS**

- A. Ceiling-Mounting Units: Unit receives control power from an adjacently mounted auxiliary power and control unit, and operates power switching contacts in that unit.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16145 - LIGHTING CONTROL DEVICES**

- B. Switch-Box-Mounting Units: Unit receives power directly from switch leg of the 120- or 277-V ac circuit it controls and operates integral power switching contacts rated 800 W at 120-V ac, and 1000 W at 277-V ac, minimum.
- C. Operation: Turns lights on when room or covered area is occupied and off when unoccupied, unless otherwise indicated.
1. Time Delay for Turning Lights Off: Adjustable over a range from 1 to 30 minutes, minimum.
  2. Manual Override Switch: Turns lights off manually regardless of elapsed time delay.
- D. Auxiliary Power and Control Units: As follows:
1. Relays rated for a minimum of 20-A normal ballast load or 13-A tungsten filament or high-inrush ballast load.
  2. Sensor Power Supply: Rated to supply the number of connected sensors.
- E. Passive-Infrared Type: Detects occupancy by a combination of heat and movement in zone of coverage. Each sensor detects occupancy anywhere in an area of 900 sq. ft. by detecting occurrence of 6-inch minimum movement of any portion of a human body that presents a minimum target of 36 sq. in. to the sensor.

**2.5 MULTIPOLE CONTACTORS AND RELAYS**

- A. Description: Electrically operated, electrically held, and complying with UL 508 and NEMA ICS 2.
1. Current Rating for Switching: UL listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballasts with 15 percent or less total harmonic distortion of normal load current).
  2. Control Coil Voltage: Match control power source.

**3PART - EXECUTION**

**3.1 INSTALLATION**

- A. Install equipment level and plumb and according to manufacturer's written instructions.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16145 - LIGHTING CONTROL DEVICES**

- B. Mount lighting control devices according to manufacturer's written instructions and requirements in Division 16 Section "Basic Electrical Materials and Methods."
- C. Mounting heights indicated are to bottom of unit for suspended devices and to center of unit for wall-mounting devices.

**3.2 CONTROL WIRING INSTALLATION**

- A. Install wiring between sensing and control devices according to manufacturer's written instructions and as specified in Division 16 Section "Conductors and Cables" for low-voltage connections.
- B. Wiring Method: Install all wiring in raceway as specified in Division 16 Section "Raceways and Boxes."
- D. Bundle, train, and support wiring in enclosures.
- E. Ground equipment.
- F. Connections: Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

**3.3 IDENTIFICATION**

- A. Identify components and power and control wiring according to Division 16 Section "Electrical Identification."

**3.4 FIELD QUALITY CONTROL**

- A. Schedule visual and mechanical inspections and electrical tests with at least seven days' advance notice.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16145 - LIGHTING CONTROL DEVICES**

- B. Inspect control components for defects and physical damage, testing laboratory labeling, and nameplate compliance with the Contract Documents.
- C. Check tightness of electrical connections with torque wrench calibrated within previous six months. Use manufacturer's recommended torque values.
- D. Verify settings of photoelectric devices with photometer calibrated within previous six months.
- E. Electrical Tests: Use particular caution when testing devices containing solid-state components. Perform the following according to manufacturer's written instructions:
  - 1. Continuity tests of circuits.
  - 2. Operational Tests: Set and operate devices to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.
    - a. Include testing of devices under conditions that simulate actual operational conditions. Record control settings, operations, cues, and functional observations.
- F. Correct deficiencies, make necessary adjustments, and retest. Verify that specified requirements are met.

**3.5 ON-SITE ASSISTANCE**

- A. Occupancy Adjustments: Within one year of date of Substantial Completion, provide up to three Project site visits, when requested, to adjust light levels, make program changes, and adjust sensors and controls to suit actual conditions.

**4PART - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be paid under:

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16145 - LIGHTING CONTROL DEVICES**

**i)Item-S-16000 - Electrical per Lump Sum.**

END OF SECTION 16145

**16145 - 7**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16146 - LIGHTING CONTROLS**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes manual and programmable, low-voltage lighting controls.

B. Related Sections include the following:

1. Division 16 Section "Wiring Devices" for manual light switches.
2. Division 16 Section "Lighting Control Devices" for photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

**1.3 SUBMITTALS**

A. Product Data: Include dimensions and data on features, components, and ratings for lighting controls.

B. Shop Drawings: Detail assemblies of standard components, custom assembled for specific application on Project. Indicate dimensions, weights, arrangement of components, and clearance and access requirements.

1. Wiring Diagrams: Detail specific systems tailored to this Project and differentiate between manufacturer-installed and field-installed wiring.

C. Operational Documentation: For software and firmware.

D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16146 - LIGHTING CONTROLS**

E. Maintenance Data: For lighting control equipment and system components to include in maintenance manuals specified in Division 1. Include software operating manuals.

**1.4 QUALITY ASSURANCE**

A. Installer Qualifications: An experienced installer who is an authorized representative of the programmable lighting system manufacturer for both installation and maintenance of units required for this Project.

B. Manufacturer Qualifications: A firm experienced in manufacturing programmable lighting controls similar to those indicated for this Project and with a record of successful in-service performance.

C. Source Limitations: Obtain low-voltage lighting control system components from a single manufacturer.

1. Provide total responsibility for compatibility of system components, including those provided in this Section and in Division 16 Sections "Lighting Control Devices," and "Panelboards,"

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for their indicated use and installation conditions by a testing agency acceptable to authorities having jurisdiction.

E. Comply with 47 CFR, Subparts A and B, for Class A digital devices.

F. Comply with NFPA 70.

**1.5 COORDINATION**

A. Coordinate features of equipment and system components to form an integrated system of compatible components. Match components and interconnections for optimum performance of specified functions.

B. Coordinate lighting controls specified in this Section with work specified in other Sections, including the following:

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16146 - LIGHTING CONTROLS**

1. Division 16 Section "Lighting Control Devices."
2. Division 16 Section "Panelboards."

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Products: Subject to compliance with requirements, provide products by one of the following:
1. Cutler-Hammer Products; Eaton Corporation.
  2. GE Lighting Controls.
  3. Square D Co.; Power Management Organization.
  4. Triatek Lighting, Inc.

**2.2 GENERAL REQUIREMENTS**

- A. Expansion Capability of System: Adequate to increase the number of control functions in the future by 25 percent more than those indicated. This applies to equipment ratings, housing volumes, spare relays, terminals, and control cable conductor quantities.
- B. Line-Voltage Surge Protection: Include in all 120-V solid-state equipment. Comply with UL 1449 and with ANSI C62.41 for Category A locations.
- C. Comply with UL 916.

**2.3 FUNCTIONAL SYSTEM DESCRIPTION**

- A. A control signal from a manual switch, an internal timing and control unit, or an external sensor or other control signal source is routed to the system control module. This module processes signal according to its programming and routes an "open" or "close"

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16146 - LIGHTING CONTROLS**

command to one or more circuit breakers in the power-supply circuits to groups of lighting fixtures or other loads.

**2.4 SYSTEM COMPONENTS**

A. Control Module Description: Panelboard mounted, microprocessor based. Panelboard uses low-voltage-controlled, electrically operated, molded-case branch circuit breakers as prime power-circuit switching devices. Circuit breakers and a limited number of digital or analog, low-voltage control circuit outputs are individually controlled by control module. Control unit includes a solid-state, programmable, 365-day timing unit and receives inputs from indicated sensors and other sources. Line-voltage components and wiring are separated from low-voltage components and wiring by barriers. Control module is locally programmable. Panelboard complies with requirements in this Section and in Division 16 Section "Panelboards." Modules and their associated control panels include the following features:

1. System Memory: Nonvolatile. Reboots program and resets time automatically without errors after power outages up to 90 days' duration.
2. Automatic Time Adjustment: System automatically adjusts for leap year and daylight saving time and provides weekly routine and annual holiday scheduling.
3. Astronomic Control: Automatic adjustment of dawn and dusk switching.
4. Remote Communications Capability: Allows programming, data-gathering interrogation, status display, and controlled command override from an IBM-compatible microcomputer at a remote location over telephone or data lines. System includes modem, communications and control software, and remote computer compatibility verification for this purpose. Microcomputer is not in this Contract.
5. Local Override Capability: Manual, low-voltage control devices override programmed shutdown of lighting and override other programmed control for intervals that may be duration programmed.

B. Electrically Operated, Molded-Case Circuit Breakers: Bolt-on type with features as follows:

1. Switching Endurance Ratings: Certified by manufacturer or by a nationally recognized testing laboratory.
  - a. Minimum 20,000 open/close operations under rated load at 0.8 power factor.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16146 - LIGHTING CONTROLS**

- b. Minimum 30,000 open/close operations with load equal to circuit-breaker trip rating and consisting of 100 percent tungsten filament load.
  - c. Minimum 30,000 open/close operations with load equal to circuit-breaker trip rating and consisting of 100 percent fluorescent ballasts rated for 10 percent total harmonic distortion.
- 2. UL listing under UL 489, with UL SWD, HCAR, and HID ratings.
  - 3. Comply with requirements in Division 16 section "Panelboards".

**2.5 LOW-VOLTAGE WIRING**

- A. Low-Voltage Control Cable: Multiple conductor, color-coded, No. 18 AWG copper, minimum.
- 1. Sheath: PVC, except in plenum-type spaces use sheath listed for plenums.
  - 2. Ordinary Switch Circuits: Three conductors, unless otherwise indicated.

**3PART - EXECUTION**

**3.1 INSTALLATION**

- A. Install equipment level and plumb and according to manufacturer's written instructions.
- B. Mount control equipment according to manufacturer's written instructions and requirements in Division 16 Section "Basic Electrical Materials and Methods."
- C. Mounting heights indicated are to bottom of unit for suspended items and to center of unit for wall-mounting items.

**3.2 CONTROL WIRING INSTALLATION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16146 - LIGHTING CONTROLS**

- A. Install wiring between control devices as specified in Division 16 Section "Conductors and Cables" for low-voltage connections.
- B. Wiring Method: Install all wiring in raceway as specified in Division 16 Section "Raceways and Boxes."
- C. Bundle, train, and support wiring in enclosures.
- D. Ground equipment.
- E. Connections: Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

**3.3 IDENTIFICATION**

- A. Identify components and power and control wiring according to Division 16 Section "Electrical Identification."
- B. Label each system control module with a unique designation. Make designations on elevated components readable from floor.

**3.4 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Services: Engage a factory-authorized service representative to test, adjust, and program lighting control system.
- B. Schedule visual and mechanical inspections and electrical tests with at least seven days' advance notice.
- C. Inspect control components for defects and physical damage, testing laboratory labeling, and nameplate compliance with the Contract Documents.
- D. Check tightness of electrical connections with torque wrench calibrated within previous six months. Use manufacturer's recommended torque values.
- E. Electrical Tests: Use particular caution when testing devices containing solid-state components. Perform the following according to manufacturer's written instructions:

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16146 - LIGHTING CONTROLS**

1. Continuity tests of circuits.
  2. Operational Tests: Set and operate controls to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.
- F. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible agency and representative.
- G. Reports: Written reports of tests and observations. Record defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.

**3.5 CLEANING**

- A. Cleaning: Clean equipment and devices internally and externally using methods and materials recommended by manufacturers, and repair damaged finishes.

**3.6 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:
1. Train Owner's maintenance personnel on troubleshooting, servicing, adjusting, and maintaining equipment and schedules. Provide a minimum of eight hours' training.
  2. Training Aid: Use the approved final version of maintenance manuals as a training aid.
  3. Schedule training with Owner, through Architect, with at least seven days' advance notice.

**3.7 ON-SITE ASSISTANCE**

- A. Occupancy Adjustments: Within one year of date of Substantial Completion, provide up to three Project site visits, when requested, to adjust light levels, make program changes, and adjust sensors and controls to suit actual conditions.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16146 - LIGHTING CONTROLS**

**4PART - MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section will be paid under:

**i)Item-S-16000 - Electrical per Lump Sum.**

END OF SECTION 13845

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes individually mounted enclosed switches and circuit breakers used for the following:

1. Feeder and branch-circuit protection.
2. Motor and equipment disconnecting means.

B. Related Sections include the following:

1. Division 16 Section "Wiring Devices" for attachment plugs, receptacles, and toggle switches used for disconnecting means.
2. Division 16 Section "Fuses" for fusible devices.

**1.3 SUBMITTALS**

A. Product Data: For each type of switch, circuit breaker, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each switch and circuit breaker.

1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:
  - a. Enclosure types and details for types other than NEMA 250, Type 1.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS**

- b. Current and voltage ratings.
  - c. Short-circuit current rating.
  - d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
- C. Maintenance Data: For enclosed switches and circuit breakers and for components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Closeout Procedures," include the following:
- 1. Routine maintenance requirements for components.
  - 2. Manufacturer's written instructions for testing and adjusting switches and circuit breakers.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA AB 1 and NEMA KS 1.
- C. Comply with NFPA 70.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
- 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
  - 2. ~~6600 feet~~

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS**

**1.6 COORDINATION**

- A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fusible Switches:
  - a. Eaton Corp.; Cutler-Hammer Products.
  - b. General Electric Co.; Electrical Distribution & Control Division.
  - c. Siemens Energy & Automation, Inc.
  - d. Square D Co.

**2.2 ENCLOSED SWITCHES**

- A. Enclosed, Nonfusible Switch: Unless noted otherwise, NEMA KS 1, Type HD, with lockable handle.
- B. Enclosed, Fusible Switch, 800 A and Smaller: Unless noted otherwise, NEMA KS 1, Type HD, with clips to accommodate specified fuses, lockable handle with two padlocks, and interlocked with cover in closed position.

**2.3 ENCLOSURES**

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. In Maintenance Shop: NEMA 12.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS**

**2.4 FACTORY FINISHES**

- A. Finish: Manufacturer's standard ANSI Grey 49 paint applied to factory-assembled and -tested enclosures before shipping.

**3PART - EXECUTION**

**3.1 EXAMINATION**

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.

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

**3.3 IDENTIFICATION**

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section Electrical Identification."

**3.4 CONNECTIONS**

- A. Install equipment grounding connections for switches with ground continuity to main electrical ground bus.
- B. Install power wiring. Install wiring between switches and circuit breakers, and control and indication devices.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

**3.5 FIELD QUALITY CONTROL**

- A. Prepare for acceptance tests as follows:

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS**

1. Test insulation resistance for each enclosed switch, component, and control circuit.
  2. Test continuity of each line- and load-side circuit.
- B. Testing: After installing enclosed switches and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

3.6 CLEANING

- A. On completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

4PART - MEASUREMENT AND PAYMENT

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be paid under:

**i)Item S-16000 - Electrical per Lump Sum.**

**D.3/8-inch-**

END OF SECTION 16410

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16420 - ENCLOSED CONTROLLERS**

**1PART - GENERAL**

**1.1 SUMMARY**

A. This Section includes ac, enclosed controllers rated 600 V and less, of the following types:

1. Across-the-line, manual and magnetic controllers.

**1.2 SUBMITTALS**

A. Product Data: For each type of enclosed controller.

B. Shop Drawings: For each enclosed controller.

1. Include wiring diagrams.
2. Manufacturer Seismic Qualification Certification: Submit certification that enclosed controllers, accessories, and components will withstand seismic forces defined in Division 16 Section "Electrical Supports and Seismic Restraints."

C. Field quality-control test reports.

D. Operation and maintenance data.

E. Load-current and overload-relay heater list.

F. Load-current and list of settings of adjustable overload relays.

**1.3 QUALITY ASSURANCE**

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16420 - ENCLOSED CONTROLLERS**

B. Comply with NFPA 70.

**1.4 COORDINATION**

- A. Coordinate features of enclosed controllers and accessory devices with pilot devices and control circuits to which they connect.
- B. Coordinate features, accessories, and functions of each enclosed controller with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. ABB Power Distribution, Inc.; ABB Control, Inc. Subsidiary.
  - 2. Eaton Corporation; Cutler-Hammer Products.
  - 3. General Electrical Company; GE Industrial Systems.
  - 4. Rockwell Automation; Allen-Bradley Co.; Industrial Control Group.
  - 5. Siemens/Furnas Controls.
  - 6. Square D.

**2.2 ACROSS-THE-LINE ENCLOSED CONTROLLERS**

- A. Manual Controller: NEMA ICS 2, general purpose, Class A, with "quick-make, quick-break" toggle or pushbutton action, and marked to show whether unit is "OFF," "ON," or "TRIPPED."

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16420 - ENCLOSED CONTROLLERS**

1. Overload Relay: Ambient-compensated type with inverse-time-current characteristics and NEMA ICS 2, Class 10 tripping characteristics. Relays shall have heaters and sensors in each phase, matched to nameplate, full-load current of specific motor to which they connect and shall have appropriate adjustment for duty cycle.
- B. Magnetic Controller: NEMA ICS 2, Class A, full voltage, nonreversing, across the line, unless otherwise indicated.
  1. Control Circuit: 120 V; obtained from integral control power transformer with a control power of sufficient capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.
  2. Overload Relay: Ambient-compensated type with inverse-time-current characteristic and NEMA ICS 2, Class **10** tripping characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle.
- C. Combination Magnetic Controller: Factory-assembled combination controller and disconnect switch.
  1. Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by an NRTL.

**2.3 ENCLOSURES**

- A. Description: Surface-mounting cabinets as indicated. NEMA 250, Type 12, unless otherwise indicated.

**2.4 ACCESSORIES**

- A. Devices shall be factory installed in controller enclosure, unless otherwise indicated.
- B. Green “Run”, Pilot Light, and Hand-Off-Auto Selector Switch: NEMA ICS 2, heavy-duty type. Provide Flush in enclosure.

**3PART - EXECUTION**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16420 - ENCLOSED CONTROLLERS**

**3.1 APPLICATIONS**

- A. Select features of each enclosed controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, controller, and load; and configuration of pilot device and control circuit affecting controller functions.

**3.2 INSTALLATION**

- A. For control equipment at walls, bolt units to wall or mount on lightweight structural-steel channels bolted to wall.
- B. Enclosed Controller Fuses: Install fuses in each fusible switch. Comply with requirements in Division 16 Section "Fuses."

**3.3 IDENTIFICATION**

- A. Identify enclosed controller, components, and control wiring according to Division 16 Section "Electrical Identification."

**3.4 CONTROL WIRING INSTALLATION**

- A. Install wiring between enclosed controllers according to Division 16 Section "Conductors and Cables." Bundle, train, and support wiring in enclosures.

**3.5 FIELD QUALITY CONTROL**

- A. Prepare for acceptance tests as follows:
  - 1. Test insulation resistance for each enclosed controller element, bus, component, connecting supply, feeder, and control circuit.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16420 - ENCLOSED CONTROLLERS**

2. Test continuity of each circuit.
- B. Perform the following field tests and inspections and prepare test reports:
  1. Perform each electrical test and visual and mechanical inspection, except optional tests, stated in NETA ATS, "Motor Control - Motor Starters." Certify compliance with test parameters.
  2. Correct malfunctioning units and retest to demonstrate compliance; otherwise, replace with new units and retest.

**4PART - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be paid under:

**i)Item-S-16000 - Electrical per Lump Sum.**

END OF SECTION 16420

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16442 - PANELBOARDS**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

B. Section 16146, "Lighting Controls".

**1.2 SUMMARY**

A. This Section includes load centers and panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:

1. Lighting and appliance branch-circuit panelboards.
2. Distribution panelboards.

**1.3 SUBMITTALS**

A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
  - a. Enclosure types and details for types other than NEMA 250, Type 1.
  - b. Bus configuration, current, and voltage ratings.
  - c. Short-circuit current rating of panelboards and overcurrent protective devices.
  - d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16442 - PANELBOARDS**

2. Wiring Diagrams: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.
- C. Maintenance Data: For panelboards and components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Contract Closeout," include the following:
  1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
  2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

**1.4 QUALITY ASSURANCE**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.

**1.5 COORDINATION**

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

**1.6 EXTRA MATERIALS**

- A. Keys: Two spares of each type of panelboard cabinet lock.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16442 - PANELBOARDS**

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:
  - a. Eaton Corp.; Cutler-Hammer Products.
  - b. General Electric Co.; Electrical Distribution & Control Div.
  - c. Siemens Energy & Automation, Inc.
  - d. Square D Co.

**2.2 FABRICATION AND FEATURES**

A. Enclosures: Flush- and surface-mounted cabinets. NEMA PB 1, Type 1, to meet environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. In Maintenance Shop: NEMA 12

B. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

C. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.

D. Bus: Hard-drawn copper, 98 percent conductivity .

E. Main and Neutral Lugs: Mechanical type suitable for use with conductor material.

F. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.

G. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches.

H. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

I. Gutter Barrier: Arrange to isolate individual panel sections.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16442 - PANELBOARDS**

- J. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

**2.3 PANELBOARD SHORT-CIRCUIT RATING**

- A. Fully rated to interrupt symmetrical short-circuit current available at terminals.

**2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS**

- A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- B. Doors: Front mounted with concealed hinges; secured with flush latch with tumbler lock; keyed alike.

**2.5 DISTRIBUTION PANELBOARDS**

- A. Doors: Front mounted, secured with vault-type latch with tumbler lock; keyed alike.
- B. Main Overcurrent Protective Devices: Circuit breaker .
- C. Branch overcurrent protective devices shall be one of the following:
1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
  2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

**2.6 OVERCURRENT PROTECTIVE DEVICES**

- A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16442 - PANELBOARDS**

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- B. Molded-Case Circuit-Breaker Features and Accessories. Standard frame sizes, trip ratings, and number of poles.
  1. Lugs: Mechanical style, suitable for number, size, trip ratings, and material of conductors.
  2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment, type HID for HID light loads.

**2.7 LOAD CENTERS**

- A. Overcurrent Protective Devices: Plug-in, full-module circuit breaker.
- B. Conductor Connectors: Mechanical type for main, neutral, and ground lugs and buses.
- C. Bus Material: Copper.

**3PART - EXECUTION**

**3.1 INSTALLATION**

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Mounting Heights: Top of trim 74 inches above finished floor, unless otherwise indicated.
- C. Mounting: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.
- D. Circuit Directory: Create a directory to indicate installed circuit loads . Use a computer or typewriter to create directory; handwritten directories are not acceptable.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16442 - PANELBOARDS**

- E. Install filler plates in unused spaces.
- F. Provision for Future Circuits at Flush Panelboards: Stub two 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future.
- G. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

**3.2 IDENTIFICATION**

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section Electrical Identification."
- B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

**3.3 CONNECTIONS**

- A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.
- B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

**3.4 FIELD QUALITY CONTROL**

- A. Prepare for acceptance tests as follows:
  - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
  - 2. Test continuity of each circuit.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16442 - PANELBOARDS**

- B. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

**3.5 CLEANING**

- A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

**4PART - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be paid under:

**i)Item S-16000 - Electrical per Lump Sum.**

**D.3/8-inch-~~END OF SECTION 16442~~**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16491 - FUSES**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes cartridge fuses, rated 600 V and less, for use in switches, panelboards, switchboards, controllers, and motor-control centers; and spare fuse cabinets.

**1.3 SUBMITTALS**

A. Product Data: Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings for each fuse type indicated.

**1.4 QUALITY ASSURANCE**

A. Source Limitations: Provide fuses from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NEMA FU 1.

D. Comply with NFPA 70.

**1.5 PROJECT CONDITIONS**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16491 - FUSES**

- A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

**1.6 COORDINATION**

- A. Coordinate fuse ratings with equipment nameplate limitations of maximum fuse size.

**1.7 EXTRA MATERIALS**

- A. Furnish extra materials described below that match products installed and that are packaged in original cartons or containers and identified with labels describing contents.

1. Fuses: Quantity equal to 10% percent of each fuse type and size, but not fewer than one of each type and size.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Industries, Inc.; Bussmann Div.
2. General Electric Co.; Wiring Devices Div.
3. Gould Shawmut.

**2.2 CARTRIDGE FUSES**

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

**2.3 SPARE FUSE CABINET**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16491 - FUSES**

- A. Cabinet: Provide wall-mounted, 0.05-inch- thick steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
  2. Finish: Gray, baked enamel.
  3. Identification: "SPARE FUSES" in 1-1/2-inch- high letters on exterior of door.
  4. Fuse Pullers: For each size fuse.
  5. Location: Mount by work benches or per owner's instruction.

**3PART - EXECUTION**

**3.1 EXAMINATION**

- A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 FUSE APPLICATIONS**

- A. Motor Branch Circuits: Class RK5, time delay.
- B. Other Branch Circuits: Class RK5, time delay.

**3.3 INSTALLATION**

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16491 - FUSES**

3.4 IDENTIFICATION

A. Install labels indicating fuse replacement information on inside door of each fused switch.

4PART - MEASUREMENT AND PAYMENT

A. Work under this section will not be measured for payment.

B. Payment for work under this section will be paid under:

i) **Item S-16000 - Electrical per Lump Sum.**

**D. ~~3/8-inch-~~**

END OF SECTION 16491

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16511 - INTERIOR LIGHTING**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes the following:

1. Interior lighting fixtures with lamps and ballasts.
2. Lighting fixtures mounted on exterior building surfaces.
3. Emergency lighting units.
4. Exit signs.

B. Related Sections include the following:

1. Division 16 Section "Lighting Control Devices" for automatic control of lighting, including photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
2. Division 16 section "Lighting Controls" for manual or programmable control systems employing low-voltage control wiring.

**1.3 SUBMITTALS**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16511 - INTERIOR LIGHTING**

A. Product Data: For each type of lighting fixture scheduled, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of fixture, including dimensions and verification of indicated parameters.
2. Emergency lighting unit battery and charger.
3. Fluorescent and high-intensity-discharge ballasts.
4. Lamps.

B. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1. Catalog data for each fixture. Include the diffuser, ballast, and lamps installed in that fixture.

**1.4 QUALITY ASSURANCE**

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

C. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

**1.5 COORDINATION**

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

**1.6 WARRANTY**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16511 - INTERIOR LIGHTING**

A. Special Warranty for Fluorescent Ballasts: Manufacturer's standard form in which ballast manufacturer agrees to repair or replace ballasts that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Electronic Ballasts: Five years from date of Substantial Completion.

B. Manufacturer's Special Warranty for T8 Fluorescent Lamps: Manufacturer's standard form, made out to Owner and signed by lamp manufacturer agreeing to replace lamps that fail in materials or workmanship, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: One year from date of Substantial Completion.

C. Special Warranty for Emergency Lighting Unit Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.

**2PART - PRODUCTS**

**2.1 FIXTURES AND COMPONENTS, GENERAL**

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16511 - INTERIOR LIGHTING**

- B. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
- C. HID Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5B.
- D. Metal Parts: Free of burrs and sharp corners and edges.
- E. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- G. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
1. White Surfaces: 85 percent.
  2. Specular Surfaces: 83 percent.
  3. Diffusing Specular Surfaces: 75 percent.
  4. Laminated Silver Metallized Film: 90 percent.
- H. Plastic Diffusers, Covers, and Globes:
1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
    - a. Lens Thickness: At least **0.125 inch** minimum unless different thickness is scheduled.
    - b. UV stabilized.
  2. Glass: Annealed crystal glass, unless otherwise indicated.

**2.2 FLUORESCENT LAMP BALLASTS**

- A. Description: Include the following features, unless otherwise indicated:

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16511 - INTERIOR LIGHTING**

1. Designed for type and quantity of lamps indicated at full light output except for emergency lamps powered by in-fixture battery-packs.
2. Externally fused with slow-blow type rated between 2.65 and 3.0 times the line current.

B. Electronic ballasts for linear lamps shall include the following features, unless otherwise indicated:

1. Operate lamps in instant start mode.
2. Operate multiple lamps as parallel circuit, operating remaining lamp(s) at full light output upon failure of other lamp(s) connected to the same ballast.
3. Individual ballasts specifically designed and UL Listed are to operate one, two, three, or four lamps as scheduled on the drawings.
4. Operate the lamps at rated lumen output and life specified by lamp manufacturers.
5. Operate lamps at a frequency higher than 20 kHz.
6. Operate a rated circuit voltage (120 or 277 VAC) at a input frequency of 60 Hz, and tolerate +/- 10% voltage variation without damage to the ballast, and maintain light output at +/- 10% voltage variation.
7. Comply with EMI and RFI limits set by the FCC (CRF 47 Part 18) for non-consumer applications and not interfere with normal electrical equipment.
8. Power factor shall be not less than 0.95.
9. Total harmonic distortion shall be less than 10%.
10. Lamp Crest Factor shall be 0.7 or less.
11. Ballast Factor shall be greater than 0.85.
12. Sound rating shall be "A".
13. Withstand transients shall be as specified by ANSI C.62.41 for location category A.
14. Shall comply with applicable ANSI standards.
15. Shall be CBM certified.
16. Shall be provided with three (5) year parts and labor warranty.

C. Ballasts for Low-Temperature Environments:

1. Temperatures 0 deg F (Minus 17 deg C) and Higher: Electronic type rated for 0 deg starting temperature.

~~1. 0 deg F~~

**2.3 HIGH-INTENSITY-DISCHARGE LAMP BALLASTS**

A. General: Comply with NEMA C82.4 and UL 1029. Shall include the following features, unless otherwise indicated.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16511 - INTERIOR LIGHTING**

1. Type: Constant-wattage autotransformer or regulating high-power-factor type.
  2. Minimum Starting Temperature: Minus 22 deg F Minus 30 deg C for single-lamp ballasts.
  3. Normal Ambient Operating Temperature: 104 deg F 40 deg C.
  4. Open-circuit operation that will not reduce average life.
- B. Low-Noise Ballasts: Manufacturers' standard epoxy-encapsulated models designed to minimize audible fixture noise.

**2.4 EXIT SIGNS**

- A. General: Comply with UL 924; for sign colors and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
1. Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum of rated lamp life.
- C. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.
  2. Charger: Fully automatic, solid-state type with sealed transfer relay.
  3. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

**2.5 EMERGENCY LIGHTING UNITS**

- A. General: Self-contained units complying with UL 924.
1. Battery: Sealed, maintenance-free, lead-acid type with minimum 10-year nominal life and special warranty.
  2. Charger: Fully automatic, solid-state type with sealed transfer relay.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16511 - INTERIOR LIGHTING**

3. Operation: Relay automatically turns lamp on when power supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Integral Time-Delay Relay: Holds unit on for fixed interval when power is restored after an outage; time delay permits high-intensity-discharge lamps to restrike and develop adequate output.

**2.6 FLUORESCENT EMERGENCY LIGHTING FIXTURES**

- A. Internal Type: Self-contained, modular, battery-inverter unit factory mounted within fixture body. Comply with UL 924.
1. Emergency Connection: Operate one fluorescent lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
  2. Test Switch and Light-Emitting-Diode Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
  3. Battery: Sealed, maintenance-free, nickel-cadmium type with minimum seven-year nominal life.
  4. Charger: Fully automatic, solid-state, constant-current type.

**2.7 FLUORESCENT LAMPS**

- A. T8 rapid-start low-mercury lamps, rated 32 W maximum, 2850 initial lumens (minimum), CRI of 75 (minimum), color temperature of 3500 K, and average rated life of 20,000 hours, unless otherwise indicated.

**2.8 HIGH-INTENSITY-DISCHARGE LAMPS**

- A. Metal-Halide Lamps: ANSI C78.1372, wattage and burning position as scheduled, CRI 65 (minimum), and color temperature 4000 .

**2.9 FIXTURE SUPPORT COMPONENTS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16511 - INTERIOR LIGHTING**

- A. Comply with Division 16 Section "Basic Electrical Materials and Methods" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: **1/2-inch** steel tubing with swivel ball fittings and ceiling canopy.  
Finish same as fixture.
- C. Twin-Stem Hangers: Two, **1/2-inch** steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated, **12 gage**.
- E. Wires For Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, **12 gage**.
- F. Rod Hangers: **3/16-inch**- minimum diameter, cadmium-plated, threaded steel rod.
- G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

**2.10 FINISHES**

- A. Fixtures: Manufacturers' standard, unless otherwise indicated.
  - 1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.
  - 2. Metallic Finish: Corrosion resistant.

**2.11 SOURCE QUALITY CONTROL**

- A. Factory test fixtures with ballasts and lamps, certify results for electrical ratings and photometric data.

**3PART - EXECUTION**

**3.1 INSTALLATION**

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16511 - INTERIOR LIGHTING**

A. Fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Support for Fixtures in or on Grid-Type Suspended Ceilings: Use grid for support.

1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than **6 inches** from fixture corners.
2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
3. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.

C. Suspended Fixture Support: As follows:

1. Pendants and Rods: Where longer than **48 inches**, brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
4. Continuous Rows: Suspend from cable.

D. Adjust aimable fixtures to provide required light intensities.

**3.2 CONNECTIONS**

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

**3.3 FIELD QUALITY CONTROL**

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Verify normal operation of each fixture after installation.

C. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify normal transfer to battery power source and retransfer to normal.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16511 - INTERIOR LIGHTING**

- D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.
- E. Corroded Fixtures: During warranty period, replace fixtures that show any signs of corrosion.

**4PART - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be paid under:

**i)Item-S-16000 - Electrical per Lump Sum.**

**END OF SECTION 16511**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16722 - INTERCOMMUNICATION EQUIPMENT**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. This Section includes direct-connected, manually switched, voice intercommunication equipment independent of telephone equipment.

**1.3 SUBMITTALS**

A. Product Data: For the following:

1. Master stations.
2. Door Stations.
3. All-call amplifier.
4. Intercommunication amplifier.

B. Shop Drawings:

1. Equipment Details: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location of each field connection.
2. Master-Station Details: Scaled drawings for built-in equipment.
3. Wiring Diagrams: Power, signal, and control wiring. Include the following:
  - a. Identify terminals to facilitate installation, operation, and maintenance.
  - b. Single-line diagram showing interconnection of components.
  - c. Cabling diagram showing cable routing.

C. Field quality-control test reports.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16722 - INTERCOMMUNICATION EQUIPMENT**

D. Operation and maintenance data: Provide manufacture's standard documents.

**1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.
- D. Comply with UL 50.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Aiphone Corporation.
  - 2. Bogen Communications International, Inc.
  - 3. Dukane Corporation; Communications Systems Div.
  - 4. Executone Information Systems, Inc.
  - 5. Federal Signal Corporation; Electrical Products Division.
  - 6. Rauland-Borg Corporation.

**2.2 FUNCTIONAL DESCRIPTION OF MANUALLY SWITCHED SYSTEMS**

- A. Master Station: Capable of the following:

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16722 - INTERCOMMUNICATION EQUIPMENT**

1. Communicating selectively with other master and door stations by actuating selector switches.
2. Communicating simultaneously with all other stations by actuating a single all-call switch.
3. Communicating with individual stations in privacy.
4. Including other master-station connections in a multiple-station conference call.
5. Accessing separate paging speakers or groups of paging speakers by actuating selector switches.
6. Overriding any conversation by a designated master station.

B. Door Station: Capable of the following:

1. Communicating hands free.
2. Calling master station by actuating call switch.
3. Returning a busy signal to indicate that station is already in use.
4. Being free of noise and distortion during operation and when in standby mode.

**2.3 EQUIPMENT AND MATERIALS**

- A. Coordinate features to form an integrated system. Match components and interconnections for optimum performance of specified functions.
- B. Expansion Capability: Increase number of stations in the future by **25** percent above those indicated without adding any internal or external components or main trunk cable conductors.
- C. Equipment: Modular type using solid-state components, fully rated for continuous duty, unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.
- D. Waterproof Equipment: Listed and labeled for duty outdoors or in wet locations.

**2.4 MASTER STATION FOR MANUALLY SWITCHED SYSTEMS**

- A. Station-Selector and Talk-Listen Switches: Heavy-duty type with gold-plated contacts rated for five million operations.
- B. Volume Control: Regulates incoming-call volume.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16722 - INTERCOMMUNICATION EQUIPMENT**

- C. Light Annunciation: Identifies calling stations and stations in use. Light remains on until call is answered.
- D. Tone Annunciation: Momentary audible tone signal announces incoming calls.
- E. Speaker Microphone: Transmits and receives calls.
- 1. Minimum Speaker Sensitivity: TIA/EIA SE-103 pressure rating of 40 dB.
- F. Central-Control Cabinet: Comply with TIA/EIA-310-D. Lockable, ventilated metal cabinet houses terminal strips, power supplies, amplifiers, system volume control, and auxiliary equipment.

**2.5 DOOR STATIONS**

- A. Mounting: surface, unless otherwise indicated, and suitable for mounting conditions indicated.
- B. Faceplate: Stainless steel or anodized aluminum with tamperproof mounting screws.
- C. Back Box:: By same manufacturer of, and specifically designed for, the supplied door station.
- D. Speaker: Comply with TIA/EIA SE-103. 3-inch (76-mm), 2.3-oz. (65-g) minimum, permanent magnet.
- E. Recurring momentary tone announces incoming calls.
- F. Call Switch: Mount on faceplate. Permits a call to master station.

**2.6 ALL-CALL AMPLIFIER**

- A. Comply with TIA/EIA SE-101-A.
- B. Output Power: At least 0.5-W RMS for each station and speaker connected in all-call mode of operation, plus an allowance for future stations.
- C. Total Harmonic Distortion: Less than 5 percent at rated output power with load equivalent to quantity of stations connected in all-call mode of operation.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16722 - INTERCOMMUNICATION EQUIPMENT**

- D. Minimum Signal-to-Noise Ratio: 45 dB, at rated output.
- E. Frequency Response: Within plus or minus 3 dB from 70 to 12,000 Hz.
- F. Output Regulation: Maintains output level within 2 dB from full to no load.
- G. Input Sensitivity: Compatible with master stations and central equipment so amplifier delivers full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on master station, speaker microphone, or handset transmitter.
- H. Amplifier Protection: Prevents damage from shorted or open output.

**2.7 INTERCOMMUNICATION AMPLIFIER**

- A. Comply with TIA/EIA SE-101-A.
- B. Minimum Output Power: 2-W RMS and adequate for all functions.
- C. Total Harmonic Distortion: Less than 5 percent at rated output power with load equivalent to 1 station connected to output terminals.
- D. Minimum Signal-to-Noise Ratio: 45 dB, at rated output.
- E. Frequency Response: Within plus or minus 3 dB from 70 to 10,000 Hz.
- F. Output Regulation: Maintains output level within 2 dB from full to no load.
- G. Input Sensitivity: Matched to input circuit and providing full-rated output with sound-pressure level of not more than 10 dynes/sq. cm impinging on master stations, speaker microphones, or handset transmitters.
- H. Amplifier Protection: Prevents damage from shorted or open output.

**2.8 CONDUCTORS AND CABLES**

- A. Conductors: Jacketed, twisted pair and twisted multipair, untinned solid copper. Sizes as recommended by system manufacturer, but not smaller than No. 22 AWG.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16722 - INTERCOMMUNICATION EQUIPMENT**

- B. Insulation: Thermoplastic, not less than 1/32 inch (0.8 mm) thick.
- C. Shielding: For speaker-microphone leads and elsewhere where recommended by manufacturer; No. 34 AWG tinned, soft-copper strands formed into a braid or equivalent foil.
  - 1. Minimum Shielding Coverage on Conductors: 60 percent.
- D. Plenum Cable: Listed and labeled for plenum installation.
- E. Per manufacturer's installation instructions.

**3PART - EXECUTION**

**3.1 INSTALLATION**

- A. Wiring Method: Install wiring in raceways except within consoles, desks, and counters. Conceal cables and raceways except in unfinished spaces.
- B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Use lacing bars in cabinets.
- C. Control-Circuit Wiring: Install number and size of conductors as recommended by system manufacturer for control functions indicated.
- D. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches (300 mm) for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16722 - INTERCOMMUNICATION EQUIPMENT**

- E. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
- F. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
- G. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.
- H. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.
- I. Connect wiring according to Division 16 Section "Conductors and Cables."

**3.2 GROUNDING**

- A. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- B. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.
- C. Install grounding electrodes as specified in Division 16 Section "Grounding and Bonding."

**3.3 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Schedule tests with at least seven days' advance notice of test performance.
  - 2. After installing intercommunication equipment and after electrical circuitry has been energized, test for compliance with requirements.
  - 3. Operational Test: Test originating station-to-station, all-call, and page messages at each intercommunication station. Verify proper routing and volume levels and that system is free of noise and distortion. Test each available message path from each station on system.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16722 - INTERCOMMUNICATION EQUIPMENT**

4. Frequency Response Test: Determine frequency response of two transmission paths, including all-call and paging, by transmitting and recording audio tones. Minimum acceptable performance is within 3 dB from 150 to 2500 Hz.
  5. Signal-to-Noise Ratio Test: Measure signal-to-noise ratio of complete system at normal gain settings, as follows:
    - a. Disconnect speaker microphone and replace it in the circuit with a signal generator using a 1000-Hz signal. Measure signal-to-noise ratio at paging speakers.
    - b. Repeat test for four speaker microphones and for each separately controlled zone of paging loudspeakers.
    - c. Minimum acceptable ratio is 35 dB.
  6. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 150, 200, 400, 1000, and 2500 Hz into each paging and all-call amplifier, and a minimum of 2 selected intercommunication amplifiers. For each frequency, measure distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is 5 percent total harmonics.
  7. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at three locations in each paging zone. Maximum permissible variation in level is plus or minus 3 dB; in levels between adjacent zones, plus or minus 5 dB.
  8. Power Output Test: Measure electrical power output of each paging amplifier at normal gain settings of 150, 1000, and 2500 Hz. Maximum variation in power output at these frequencies is plus or minus 3 dB.
  9. Signal Ground Test: Measure and report ground resistance at system signal ground. Comply with testing requirements in Division 16 Section "Grounding and Bonding."
- B. Retesting: Correct deficiencies and retest. Prepare a written record of tests.
- C. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.
- D. Prepare written test reports.
1. Include a record of final speaker-line matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16722 - INTERCOMMUNICATION EQUIPMENT**

**3.4      STARTUP SERVICE**

A. Complete installation and startup checks according to manufacturer's written instructions.

**3.5      ADJUSTING**

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose, without additional cost.

**3.6      DEMONSTRATION**

A. Provide four (4) hours training to owner's maintenance personnel on operating equipment troubleshooting, servicing, and maintaining equipment.

**4PART - MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section will be paid under:

**i)Item-S-16000 - Electrical per Lump Sum.**

END OF SECTION 16722

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16724 - ACCESS CONTROL SYSTEM**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the contract, including general and supplementary conditions and Division 1 specification sections, apply to this Section.
- B. The complete installation is to conform to the applicable sections of NFPA 101 and the National Electrical Code.

**1.2 SUMMARY**

- A. This section includes Access Control components including, but not limited to, system controllers, card readers, network interfaces, and all other equipment required to provide a fully functional Access Control system as illustrated on the drawings and as specified herein.
- B. Work covered by this specification section includes the furnishing of labor, equipment, materials, and complete operational performance required for installation of the Access Control System as shown on the drawings, as specified, and as directed by the Architect/Engineer.
- C. The work covered by this section of the specification shall be coordinated with the related work as specified elsewhere under the project specifications.
- D. The system shall be 100% compatible and communicate with the existing card key system in the Administration Building.

**1.3 QUALITY ASSURANCE**

- A. All Access Control system products provided shall be warranted free from defects in material and workmanship for a period of one year from the date of final system acceptance.

**1.4 SUBMITTALS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16724 - ACCESS CONTROL SYSTEM**

A. Submit the following according to conditions of contract and Division 1 specification sections.

1. Product data for system components. Include list of materials.
2. Riser diagram showing all component interconnections. Label inputs and outputs of each piece of equipment. Indicate where no connection is made. Specify each cable that connects the equipment together.
3. Equipment mounting details.

**2PART - PRODUCTS**

**2.1 ACCESS CONTROL SOFTWARE**

A. Modify existing software as necessary to support the additional doors, users, etc. as required for a fully functional system.

**2.2 SYSTEM CONTROLLER**

A. System controller shall be modular and configurable, allowing for the installation of input cards, output cards, or reader cards (mix and match) per the system requirements.

B. System controller shall be scalable and expandable.

C. System controller shall support standard wiegand card reader protocol.

D. Card Reader Modules: Each shall support all inputs and outputs required for 2 doors, including door status inputs, request-to-exit inputs, door lock outputs (dry contact), and reader inputs.

E. Input and Output modules shall provide for dry contact monitoring and outputs for programmable input/output control as necessary.

F. Alarms shall be configurable to initiate a set of outputs.

G. Controller shall be capable of supporting an ethernet communication card allowing it to reside on a LAN / WAN.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16724 - ACCESS CONTROL SYSTEM**

- H. Controller shall support a minimum of 2000 card holders.
- I. Provide battery back-up for 4 hours.
- J. LAN / WAN Operation (future): The controller shall communicate continuously with the host PC (file server) via the owner's LAN / WAN.

**2.3 CARD READERS**

- A. Reader shall be wiegand type, compatible with existing, issued cards and shall communicate with the controller via standard wiegand protocol.
- B. Card reader shall be weatherproof.

**3PART - EXECUTION**

**3.1 EQUIPMENT INSTALLATION**

- A. Furnish and install a complete system as described herein and as shown on the plans; to be wired, connected, and left in first class operating condition.

**3.2 CONDUCTOR AND CABLE INSTALLATION**

- A. Install wiring in metal raceway according to electrical specifications. Conceal raceway except in unfinished spaces and as indicated.
- B. Install conductors in enclosures parallel with or at right angles to the sides and back of the enclosure. Bundle, lace, and train the conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the wiring diagrams of the system. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- C. Use numbered terminal strips in junction, pull or outlet boxes, cabinets, or equipment enclosures where any circuit tap is made.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16724 - ACCESS CONTROL SYSTEM**

- D. Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction (AHJ) and shall be installed in accordance with the appropriate articles from the current approved edition of the National Electric Code.
- E. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
- F. Pulling Cable: Do not exceed manufacturer's recommended pulling tensions. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
- G. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

**3.3      GROUNDING**

- A. Ground equipment and cable shields as specified by the equipment manufacturer.

**3.4      FIELD QUALITY CONTROL**

- A. Provide the services of a factory-authorized service representative to make final program changes as necessary for a fully functional system.
- B. Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the specifications and complies with applicable standards.
- C. Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit log to the owner upon the satisfactory completion of tests.

**3.5      TRAINING**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16724 - ACCESS CONTROL SYSTEM**

- A. Provide the services of a factory-authorized service representative to demonstrate the system and train owner's maintenance personnel.
- B. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of 24 hours training on system operation and maintenance.

3.6      **ON-SITE ASSISTANCE**

- A. Occupancy Adjustments: When requested by Owner within one year of date of Substantial Completion, provide on-site assistance in tuning and adjusting the system to suit actual occupied conditions and to optimize performance. Provide up to two adjustments at Project site for this purpose, without additional cost.

**4PART - MEASUREMENT AND PAYMENT**

- A. Work under this section will not be measured for payment.
- B. Payment for work under this section will be paid under:

- i) **Item-S-16000 - Electrical per Lump Sum.**
  - ii)

END OF SECTION 16724

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

**1PART - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes wire, cable, connecting devices, installation, and testing for wiring systems to be used as signal pathways for voice and high-speed data transmission.

**1.3 DEFINITIONS**

- A. EMI: Electromagnetic interference.
- B. IDC: Insulation displacement connector.
- C. LAN: Local area network.
- D. PVC: Polyvinyl chloride.
- E. STP: Shielded twisted pair.
- F. UTP: Unshielded twisted pair.

**1.4 SUBMITTALS**

- A. Product Data: Include data on features, ratings, and performance for each component specified.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

- B. Shop Drawings: Include dimensioned plan and elevation views of each individual component. Show equipment assemblies, method of field assembly, workspace requirements, and access for cable connections.
1. System labeling schedules, including electronic copy of labeling schedules, as specified in Part 3, in software and format selected by Owner.
  2. Wiring diagrams. Show typical wiring schematics including the following:
    - a. Workstation outlets, jacks, and jack assemblies.
    - b. Patch cords.
    - c. Patch panels.
    - d. Fiber-optic boxes.
- C. Cable Administration Drawings: As specified in Part 3.
- D. Samples: For workstation outlets, jacks, jack assemblies, and faceplates for color selection and evaluation of technical features.
- E. Product Certificates: For each type of cable, connector, and terminal equipment, signed by product manufacturer.
- F. Qualification Data: For Installer.
- G. Field quality-control test reports.
- H. Operation and Maintenance Data: For voice and data communication cabling to include in emergency, operation, and maintenance manuals.

1.5 **QUALITY ASSURANCE**

- A. Installer Qualifications: System installer must have on staff a registered communication distribution designer certified by Building Industry Consulting Service International.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

- B. Source Limitations: Obtain all products except twisted-pair cables through one source from a single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NFPA 70.

**1.6 COORDINATION**

- A. Coordinate layout and installation of voice and data communication cabling with Owner's telecommunications and LAN equipment suppliers. Coordinate service entrance arrangement with local exchange carrier.
  - 1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
  - 2. Record agreements reached in meetings and distribute to other participants.
  - 3. Adjust arrangements and locations of distribution frames and cross-connect and patch panels in equipment rooms and wiring closets to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

**2PART - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cable:

- a. Belden Inc.; Electronics Division.
- b. Berk-Tek; an Alcatel Company.
- c. Brand-Rex Co.; Unit of BICC Cables Corp.
- d. Champlain Cable Corporation.
- e. Chromatic Technologies, Incorporated.
- f. General Cable Corporation.
- g. HeLix/HiTemp Cables, Inc.
- h. ICC.
- i. Lucent Technologies; Global Service Provider.
- j. Mohawk/CDT; a division of Cable Design Technologies.
- k. Montrose/CDT; a division of Cable Design Technologies.
- l. Optical Cable Corporation.
- m. Panduit Corp.
- n. Prestolite Wire Corp.
- o. Remeo Products Corp.
- p. Siecor.
- q. Superior Essex; Superior Telecommunications Inc.

2. Terminal and Connector Components and Distribution Racks:

- a. AMP Incorporated; a Tyco International Ltd. Company.
- b. Hubbell Premise Wiring.
- c. Leviton Telecom.
- d. Lucent Technologies; Global Service Provider.
- e. Panduit Corp.
- f. Thomas & Betts Corporation.

2.2 SYSTEM REQUIREMENTS

A. General: Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

- B. Expansion Capability: Unless otherwise indicated, provide spare fibers and conductor pairs in cables, positions in cross-connect and patch panels, and terminal strips to accommodate 20 percent future increase in active workstations.

**2.3 MOUNTING ELEMENTS**

- A. Raceways and Boxes: Comply with Division 16 Section "Raceways and Boxes."
- B. Backboards: 3/4-inch, interior-grade, fire-retardant-treated plywood.
- C. Distribution Racks: Freestanding and wall-mounting, modular-steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
1. Approximate Module Dimensions: 84 inches high by 22 inches wide.
  2. Finish: Baked-polyester powder coat.

**2.4 TWISTED-PAIR CABLES, CONNECTORS, AND TERMINAL EQUIPMENT**

- A. Cables: Listed as complying with Category 5e of TIA/EIA-568-A.
- B. Conductors: Solid copper.
- C. UTP Cable: Comply with TIA/EIA-568-A. Four, thermoplastic-insulated, individually twisted pairs of conductors; No. 24 AWG, color-coded; enclosed in PVC jacket.
- D. STP Workstation Cable: Comply with TIA/EIA-568-A. Two, thermoplastic-insulated, individually twisted pairs of conductors; No. 22 AWG, color-coded, overall aluminum and polyester shield and No. 22 AWG, tinned-copper drain wire; enclosed in PVC jacket.
- E. UTP and STP Plenum Cable: Listed for use in air-handling spaces. Features are as specified for cables, conductors, UTP cable, and STP workstation cable except materials are modified as required for listing.
- F. UTP Cable Connecting Hardware: Comply with TIA/EIA-568-A. IDC type, using modules designed for punch-down caps or tools.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

1. IDC Terminal Block Modules: Integral with connector bodies, including plugs and jacks where indicated.
  2. IDC Connecting Hardware: Consistent throughout Project.
- G. STP Cable Connecting Hardware: Comply with TIA/EIA-568-A for connectors, plugs, and jack assemblies.
- H. Cross-Connect Panel: Modular array of IDC terminal blocks arranged to terminate building cables and permit interconnection between cables.
1. Number of Terminals per Field: One for each conductor in assigned cables.
  2. Mounting: **[Backboard] [Rack]**.
- I. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
1. Number of Jacks per Field: **[One for each four-pair UTP cable or two-pair STP cable indicated] [One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to satisfy specified expansion criteria]**.
  2. Mounting: **[Backboard] [Rack]**.
- J. Jacks and Jack Assemblies for UTP Cable: Modular, color-coded, RJ-45 receptacle units with integral IDC-type terminals. Use keyed jacks for data service.
- K. UTP Patch Cords: Four-pair cables in 48-inch lengths, terminated with RJ-45 plug at each end. Use keyed plugs for data service.
- L. STP Patch Cords: Two-pair cables in 48-inch lengths, terminated with STP plug connectors at both ends. Match plug connectors with patch-panel connectors.
- M. Workstation Outlets: Dual jack-connector assemblies mounted in single or multigang faceplate.
1. Faceplate: High-impact plastic; color as selected by Architect.
  2. Mounting: Flush, unless otherwise indicated.
  3. Legend: Factory labeled, top jack "Voice" and bottom jack "Data," by silk-screening or engraving.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

**2.5 FIBER-OPTIC CABLES, CONNECTORS, AND TERMINAL EQUIPMENT**

A. Cables: Factory fabricated, jacketed, low loss, glass type, fiber optic, multimode, graded index, operating at 850 and 1300 nm.

1. Workstation, Strands per Cable: Two.
2. Backbone, Strands per Cable: 12, unless otherwise indicated.
3. Dimensions: 62.5-micrometer core diameter; 125-micrometer cladding diameter.
4. Maximum Attenuation: Minus 3.75 dB/km at 850 nm; minus 1.5 dB/km at 1300 nm.
5. Minimum Modal Bandwidth: 160 MHz/km at 850 nm; 500 MHz/km at 1300 nm.
6. Operating Temperature Range: Minus 20 to plus 70 deg C.

B. Plenum Cable: Listed for use in plenums.

C. Cable Connectors: Quick-connect, simplex- and duplex-type SC couplers with self-centering, axial alignment mechanisms. Insertion loss not more than 0.7 dB.

D. Patch Panel: Modular panels housing multiple-numbered, duplex cable connectors.

1. Permanent Connection: Permanently connect one end of each connector module to installed cable fiber.
2. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to satisfy specified expansion criteria.
3. Mounting: **[Backboard]** **[Rack]**.

E. Patch Cords: Dual fiber cables in 36-inch lengths.

1. Terminations: Two duplex connectors arranged to mate with patch-panel connectors, one at each end of each fiber in cord.

F. Workstation Outlets: Flush dual fiber-optic connector assemblies mounted in two-gang faceplate with flush dual RJ-45 jack assembly.

1. Faceplate: High-impact plastic; color as selected by Architect.
2. Mounting: Flush, unless otherwise indicated.
3. Legend: Factory labeled, fiber-optic connectors "Data" and RJ-45 jacks "Voice," by engraving.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

**2.6 IDENTIFICATION PRODUCTS**

A. Comply with Division 16 Section "[**Basic Electrical Materials and Methods**] [**Electrical Identification**]" and the following:

1. Cable Labels: Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations.

**3PART - EXECUTION**

**3.1 EXAMINATION**

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 APPLICATION OF MEDIA**

- A. Backbone Cable for Data Service: Use [**UTP Category 5**] [**fiber-optic**] cable for runs between equipment rooms and wiring closets and for runs between wiring closets.
- B. Backbone Cable for Voice Service: Use UTP Category 5e cable for runs between equipment rooms and wiring closets and for runs between wiring closets.
- C. Horizontal Cable for Data Service: Use [**UTP Category 5e**] [**STP Category 5**] [**fiber-optic**] cable for runs between wiring closets and workstation outlets.
- D. Horizontal Cable for Voice Service: Use UTP Category 5e cable for runs between wiring closets and workstation outlets.

**3.3 INSTALLATION**

A. Wiring Method: Install wiring[ **and optical fiber**] in raceway and cable tray except within consoles, cabinets, desks, and counters. Conceal raceway and wiring except in unfinished spaces.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

- B. Wiring Method: Install wiring[ **and optical fiber**] in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
- C. Install cables using techniques, practices, and methods that are consistent with Category 5e rating of components and that ensure Category 5e performance of completed and linked signal paths, end to end.
- D. Install cables without damaging conductors, shield, or jacket.
- E. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by manufacturer.
- F. Pull cables without exceeding cable manufacturer's recommended pulling tensions.
1. Pull cables simultaneously if more than one is being installed in same raceway.
  2. Use pulling compound or lubricant if necessary. Use compounds that will not damage conductor or insulation.
  3. Use pulling means, including fish tape, cable, rope, and basket-weave wire or cable grips, that will not damage media or raceway.
- G. Install exposed cables parallel and perpendicular to surfaces or exposed structural members and follow surface contours where possible.
- H. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
- I. Wiring within Wiring Closets and Enclosures: Provide conductors of adequate length. Train conductors to terminal points with no excess. Use lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
- J. Separation of Wires: Comply with TIA/EIA-569-A rules for separating unshielded copper voice and data communication cabling from potential EMI sources, including electrical power lines and equipment.

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

K. Make splices, taps, and terminations only at indicated outlets, terminals, and cross-connect and patch panels.

L. Use splice and tap connectors compatible with media types.

**3.4 GROUNDING**

A. Comply with Division 16 Section "Grounding and Bonding."

B. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

C. Bond shields and drain conductors to ground at only one point in each circuit.

D. Signal Ground Terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.

E. Signal Ground Bus: Mount on wall of main equipment room with standoff insulators.

F. Signal Ground Backbone Cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.

**3.5 INSTALLATION IN EQUIPMENT ROOMS AND WIRING CLOSETS**

A. Install plywood backboards on walls of equipment rooms and wiring closets from floor to ceiling.

B. Mount patch panels, terminal strips, and other connecting hardware on backboards, unless otherwise indicated.

C. Group connecting hardware for cables into separate logical fields.

D. Use patch panels to terminate cables entering the space, unless otherwise indicated.

**3.6 INSTALLATION STANDARDS**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

A. Comply with requirements in TIA/EIA-568-A and TIA/EIA-569-A.

**3.7 IDENTIFICATION**

A. In addition to requirements in this Article, comply with applicable requirements in Division 16 Section "Electrical Identification" and TIA/EIA-606.

B. System: Use a unique, three-syllable, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with same designation. Use logical and systematic designations for facility's architectural arrangement.

1. First syllable identifies and locates equipment room or wiring closet where cables originate.
2. Second syllable identifies and locates cross-connect- or patch-panel field in which cables terminate.
3. Third syllable designates type of media (copper or fiber) and position occupied by cable pairs or fibers in field.

C. Workstation: Label cables within outlet boxes.

D. Distribution Racks and Frames: Label each unit and field within that unit.

E. Within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

F. Cables, General: Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

G. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.

H. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project, in software and format selected by Owner.

**STATE PROJECT NO. 610-01-0021**  
**SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

- I. Cable Administration Drawings: Show building floor plans with cable administration point labeling. Identify labeling convention and show labels for telecommunications closets, **[backbone pathways and cables,] [entrance pathways and cables,]** terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606. Furnish electronic record of all drawings, in software and format selected by Owner.

**3.8 FIELD QUALITY CONTROL**

A. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.
2. Copper Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use Class 2, bidirectional, Category 5 tester. Test for faulty connectors, splices, and terminations. Test according to TIA/EIA-TSB67, "Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems." Link performance for UTP cables must meet minimum criteria of TIA/EIA-568-A.
3. Fiber-Optic Cable Procedures: Perform each visual and mechanical inspection and electrical test, including optional procedures, stated in NETA ATS, Section 7.25. Certify compliance with test parameters and manufacturer's written recommendations. Test optical performance with optical power meter capable of generating light at all appropriate wavelengths.

B. Remove malfunctioning units, replace with new units, and retest as specified above.

**3.9 DEMONSTRATION**

- A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and extending wiring to establish new workstation outlets. Refer to Division 1 Section **"Closeout Procedures Demonstration and Training."**

**STATE PROJECT NO. 610-01-0021  
SPECIFICATIONS**

**SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING**

**4PART - MEASUREMENT AND PAYMENT**

A. Work under this section will not be measured for payment.

B. Payment for work under this section will be paid under:

**i)Item-S-16000 - Electrical Lump Sum.**

END OF SECTION 16750