PROJECT MANUAL

NIELSEN HALL
REPLACE EXTERIOR DOOR

University of Oklahoma
Facilities Management
160 Felgar St
Norman, OK 73019
OU Project No. 84-23
RFP #R-24025-24

ISSUED FOR BID
JUNE 16, 2023

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TABLE OF CONTENTS

END OF TABLE OF CONTENTS

DOCUMENT 00 0101

PROJECT TITLE PAGE

1.1 PROJECT MANUAL

A. University of Oklahoma.
   1. Facilities Management
   2. 160C Felgar St, Norman, OK 73019

B. Nielsen Hall Exterior Door Replacement
   1. OU Project No. 84-23
   2. RFP #R-24025-24

C. Issued for Bid: June 16, 2023

END OF DOCUMENT

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DOCUMENT 00 0107

SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:
   1. William R. Cooper.
   2. OK #3165.
   3. Responsible for Division 00-10.

B. Mechanical and Plumbing Engineer:
   1. Korey J. Wheeler
   2. OK #31050.
   3. Responsible for Division 20, 22, 23.

C. Electrical Engineer:
   1. Scott M. Welch.
   2. OK #23399.
   3. Responsible for Division 26, 28.

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LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Table of Contents page of the separately bound drawing set titled Issue for **BID**, dated **June 16, 2023,** as modified by subsequent Addenda and Contract modifications.

B. Drawings consist of the following Contract Drawings and other drawings of type indicated:

A1.0: GENERAL NOTES, AND LEGENDS
C1.0 SITE IMPROVEMENT PLAN
A1.0 DEMOLITION / IMPROVEMENT PLANS
A1.1 STAIR AND RAILING DETAILS

S1.00 GENERAL NOTES
S1.01 GENERAL NOTES
S1.02 STATEMENT OF SPECIAL INSPECTION
S2.01 FOUNDATION PLAN
S3.01 PARTIAL FRAMING PLAN
S5.01 SECTIONS

P1.0 PLUMBING IMPROVEMENT PLAN
M0.1 MECHANICAL IMPROVEMENT PLAN
FS1.0 FIRE SPRINKLER PLAN

E1.0 ELECTRICAL LEGEND, AND DETAILS
E2.0 POWER, LIGHTING DEMOLITION PLANS
E3.0 POWER LIGHTING IMPROVEMENT PLANS

END OF DOCUMENT

DOCUMENT 00 3100

AVAILABLE PROJECT INFORMATION

1.1 AVAILABLE PROJECT INFORMATION

A. This Document and its referenced attachments are part of the Procurement and Contracting Requirements for Project. They provide Owner's information for the Bidder's convenience and are intended to supplement rather than serve in lieu of the Bidder's own investigations. They are made available for the Bidder's convenience and information but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. Existing drawings, specifications and submittals that include information on existing conditions including previous construction at Project site may be available for viewing at the office of the Owner – contact Purchasing or the OUFM Project Manager to arrange access.

C. Permit Application: The building permit for Project has been applied for by Owner. A copy of the permit will be on display at the project site.

D. Hot-Work Permits: Application for Hot-Work Permits, if required, shall be made by the contractor through the University of Oklahoma Office of the Fire Marshall.

END OF DOCUMENT

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SECTION 01 1000

SUMMARY

PART 1 - GENERAL

1.1 PROJECT INFORMATION

A. Project Identification: Replace Exterior Door – Project 84-22 RFP R-24025-24
   1. Project Location: Nielsen Hall, 440 W. Brooks St, Norman, OK 73019

B. Owner: University of Oklahoma.

C. Architect: OU Facilities Management Department.

D. Engineers: OU Facilities Management Department.

E. Summary of work as indicated in the construction drawings.

1.2 WORK RESTRICTIONS

A. Contractor's Use of Premises: During construction, Contractor will have limited use of space indicated.
   1. Driveways, Walkways, and Entrances: Keep driveways loading areas and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles always. Do not use these areas for parking or storage of materials.
   2. Use care when accessing the site to minimize damage to existing intramural fields and grass.

B. Nonsmoking Property: Smoking or any other use of tobacco products is not permitted on University of Oklahoma property.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUBSTITUTION PROCEDURES

A. Substitutions include changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

B. Where one or more manufacturers are listed for a particular equipment item, the Contractor shall furnish the equipment as manufactured by one of the manufacturers listed. **If the Contractor desires to substitute a manufacturer not listed, he must submit his request to the Architect/Engineer in writing at least ten (10) days before bids on the project are received.** If the proposed substitute equipment is determined to be acceptable, the Architect/Engineer will list the approved substitute equipment in an addendum to the project plans/specifications and the Contractor shall base his bid on the equipment items listed.

C. The Architect/Engineer WILL NOT give verbal approval of any substitute materials or consider requests for substitute materials if received less than ten (10) days before bids are received.

D. Substitutions proposed shall be equivalent in such features as noise level, power requirements, metal gages, vibration attenuation, finish, appearance, certification of recognized testing agencies and standards bureaus, allowable working pressures, physical size and arrangement so far as affects installation in the available space, factory applied insulation, electrical devices, controls, access to internal parts, water and air pressure drops, operating speeds, coil face areas, fan diameters, operating efficiencies, and features and capacities specified herein.

E. If required by the Architect/Engineer, the Contractor shall provide complete samples of substitute equipment to be delivered to the Architect/Engineer for examination. Handling, storage, shipping and delivery to and from the Architect/Engineer of any sample required shall be at the cost of the Contractor.

F. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Substitution Request Form: Use **CSI Form 1.5C During the Bid Phase**
   2. Submit requests within 10 days before **bids are received**.
   3. Identify product to be replaced and show compliance with requirements for substitutions. Include a detailed comparison of significant qualities of proposed substitution with those of the Work specified, a list of changes needed to other parts of the Work required to accommodate proposed substitution, and any proposed changes in the Contract Sum or the Contract Time should the substitution be accepted.
   4. Owner will review proposed substitutions and provide notification if accepted **by Addendum**.

G. Do not submit unapproved substitutions on Shop Drawings or other submittals

H. After the submittals are approved, the Architect/Engineer will consider substitute equipment only if unusual circumstances warrant further consideration. Requests for consideration of substitutes shall be made in writing and state all applicable reasons and/or circumstances. The Contractor's presence will be required in any meetings or discussions regarding the submittals. Owner will review proposed substitutions and notify Contractor of their acceptance or rejection **by Change Order**. If necessary, Owner will request additional information or documentation for evaluation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 3000

ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION

A. Key Personnel Names: Within 5 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. List e-mail addresses and telephone numbers.

B. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.

C. Requests for Information (RFIs): On discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI. Use **AIA Document G716**.

D. Schedule and conduct progress meetings at Project site weekly. Notify Owner of meeting dates and times. Require attendance of each subcontractor or other entity concerned with current progress or involved in planning, coordination, or performance of future activities.
   1. GC Project Manager will record minutes and distribute to everyone concerned, including Owner.

1.2 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   1. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   2. The Contractor shall provide the submittals in electronic/PDF or hard-copy format. Owner will return a copy with comments as appropriate.
      a. Electronic/PDF Format: Submit PDF version electronic file to the Owner's representative for approval.
      b. Hard-Copy Format: Submit four (4) copies, bound in four (4) hard plastic, three ring binders with clear plastic envelope on cover and spline, to the Owner's representative for approval.

B. Submittal Schedule:
   1. Within twenty-one (21) calendar days after the project contract is signed or notice to proceed is issued (whichever comes first), this Contractor shall submit the required documents to the Architect/Engineer for his approval.
   2. If the submittal is not received by the Architect/Engineer within the allowed twenty-one (21) calendar day period, each item of equipment must be furnished exactly as specified. If more than one manufacturer is mentioned in the specifications, the Contractor must furnish the equipment of the first manufacturer listed.
   3. The Architect/Engineer may require resubmittals on any equipment found to be unacceptable or incomplete. Any item not resubmitted within ten (10) business days after the issue date of the resubmittal notice shall be furnished exactly as specified.
   4. Contractor shall allow for 10 business days for each round of submittal review.

C. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
   1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
   2. Each specification section shall be a separate electronic file.

3. Each submittal shall include an entire specification section (for example, submit all items included in the raceways and boxes section, not just the EMT). Submittal data shall be arranged in the same order as the specifications.
4. When utilizing catalog pages, highlight or indicate the items, accessories, and options, to be provided as part of the project.
5. Name file with unique identifier, including project identifier, Specification Section number, and revision identifier.
6. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Owner.

D. Identify options requiring selection by Owner.

E. Provide printed descriptive literature, shop drawings, and illustrations of the equipment submitted. Only portions of catalogs that pertain to the equipment shall be included and shall indicate completely all of the specification requirements. Where catalog sheets or drawings indicate several sizes or types of construction, they shall be clearly marked to indicate the size and/or type of construction proposed to be used on this project. Complete catalogs are not acceptable as submittals.

F. Identify any deviations in features, function, and/or performance from the equipment specified. Deviations shall be clearly defined and attention directed to the item(s).

G. Partial or incomplete submittals and submittals not conforming to the requirements of this specification may not be accepted, and may be returned to the Contractor for completion and/or correction.

1.3 CONTRACTOR'S CONSTRUCTION SCHEDULE SUBMITTAL PROCEDURE

A. Submit required submittals in the following format:
1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.
3. Two paper copies.

B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
1. Submit a working electronic copy of schedule, using Microsoft Project, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

C. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections.
1. Submit electronic material and equipment submittals via email as PDF electronic files.
a. Owner will return annotated file. Annotate and retain one copy of file as an electronic project record document file.
b. Submit hard copies of full size shop drawings and samples as indicated below.

2.2 ACTION SUBMITTALS

A. Submit 1 copy of each informational submittal. Owner will return a photo copy or electronic copy with comments as appropriate.

B. Product Data: Mark each copy to show applicable products and options. Include the following:
1. Manufacturer's written recommendations, product specifications, and installation instructions.

2. Wiring diagrams showing factory-installed wiring.
3. Printed performance curves and operational range diagrams.
4. Testing by recognized testing agency.
5. Compliance with specified standards and requirements.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Submit on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches. Submit shop drawings 11x17 and smaller electronically. Submit shop drawings larger than 11x17 electronically or submit two (2) sets of hard copies. Include the following:
1. Dimensions and identification of products.
2. Fabrication and installation drawings and roughing-in and setting diagrams.
3. Wiring diagrams showing field-installed wiring.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.

D. Samples: Submit two (2) samples for review of kind, color, pattern, and texture and for a comparison of these characteristics between submittal and actual component as delivered and installed. Include name of manufacturer and product name on label.
1. If variation is inherent in material or product, submit at least 3 sets of paired units that show variations.

2.3 INFORMATIONAL SUBMITTALS

A. Informational Submittals: Submit 1 copy of each informational submittal. Owner will return a photo copy or electronic copy with comments as appropriate.

B. Qualification Data: Include lists of completed projects with project names and addresses, names and addresses of Owners, and other information specified.

C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

2.4 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Owner.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit 1 copy of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

2.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type schedule within 10 days of date established for Notice of Award.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

C. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

D. Recovery Schedule: When periodic update indicates the Work is 7 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and indicate date by which recovery will be accomplished.

2.6 HOT WORK PERMIT

A. All cutting, welding, brazing, soldering, torch applications, grinding or similar activities must have an authorized hot work permit on display before work can start. Hot Work Permit application is available for printing at the end of this section.

PART 3 - EXECUTION

3.1 SUBMITTAL REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect/Engineer.

B. Architect/Engineer will review each action submittal, make marks to indicate corrections or modifications required, will stamp each submittal with an action stamp, and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect/Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Owner will forward each submittal to appropriate party.

D. The Architect/Engineer will review and prepare a report with recommendations on the submittal and one (1) resubmittal. If the resubmittal is incomplete or in any other way unsatisfactory or unacceptable, the review of any further required resubmittals will be at the Contractors expense, otherwise the material must be furnished as specified.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

3.2 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Updating: At weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule 1 day before each regularly scheduled progress meeting.
   1. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribute copies of approved schedule to Owner, subcontractors, testing and inspecting agencies, and parties identified by Contractor with a need-to-know schedule responsibility. When revisions are made, distribute updated schedules to the same parties.

END OF SECTION

SECTION 01 4000

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

B. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements, comply with the most stringent requirement. Refer uncertainties to Owner for a decision.

C. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum. The actual installation may exceed the minimum within reasonable limits. Indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Owner for a decision.

D. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
   1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Owner.
   2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Owner.

E. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
   11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
   12. Name and signature of laboratory inspector.
   13. Recommendations on re-testing and re-inspecting.

F. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, notices, receipts for fee payments, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

G. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated.

H. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated; and where required by authorities having jurisdiction, that is acceptable to authorities.

I. Re-testing/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including re-testing and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

J. Testing Agency Responsibilities: Cooperate with Owner and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Notify Owner and Contractor of irregularities or deficiencies in the Work observed during performance of its services.
   2. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
   3. Do not perform any duties of Contractor.

K. Associated Services: Cooperate with testing agencies and provide reasonable auxiliary services as requested. Provide the following:
   1. Access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
   4. Facilities for storage and field curing of test samples.
   5. Security and protection for samples and for testing and inspecting equipment.

L. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

M. Special Tests and Inspections: At Owner’s direction, engage a qualified testing/inspection agent to conduct special tests and inspections required by authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

B. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 01 4200

REFERENCES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

B. Abbreviations and Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
10. AF&PA - American Forest & Paper Association; www.afandpa.org.
11. AGA - American Gas Association; www.aga.org.
12. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
14. AI - Asphalt Institute; www.asphaltinstitute.org.
15. AIA - American Institute of Architects (The); www.aia.org.
16. AISC - American Institute of Steel Construction; www.aisc.org.
17. AISI - American Iron and Steel Institute; www.steel.org.
18. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
19. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
20. ANSI - American National Standards Institute; www.ansi.org.
21. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
22. APA - APA - The Engineered Wood Association; www.apawood.org.
23. APA - Architectural Precast Association; www.archprecast.org.
24. API - American Petroleum Institute; www.api.org.
25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
26. ARI - American Refrigeration Institute; (See AHRI).
27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
28. ASCE - American Society of Civil Engineers; www.asce.org.
29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
31. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWEA - American Wind Energy Association; www.awea.org.
37. AWI - Architectural Woodwork Institute; www.awinet.org.
38. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.

39. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
40. AWS - American Welding Society; www.aws.org.
41. AWWA - American Water Works Association; www.awwa.org.
42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
43. BIA - Brick Industry Association (The); www.gobrick.com.
44. BICSI - BICSI, Inc.; www.bicsi.org.
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
47. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
48. CDA - Copper Development Association; www.copper.org.
49. CEA - Canadian Electricity Association; www.electricity.ca.
50. CEA - Consumer Electronics Association; www.ce.org.
51. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
52. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
53. CGA - Compressed Gas Association; www.cganet.com.
54. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
55. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
56. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
57. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
58. CPA - Composite Panel Association; www.pbmdf.com.
59. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
60. CRRC - Cool Roof Rating Council; www.coolroofs.org.
61. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
62. CSA - Canadian Standards Association; www.csa.ca.
63. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
64. CSI - Construction Specifications Institute (The); www.csinet.org.
65. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
66. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
67. CWC - Composite Wood Council; (See CPA).
68. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
69. DHI - Door and Hardware Institute; www.dhi.org.
70. ECA - Electronic Components Association; (See ECIA).
71. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
72. ECIA ? Electronic Components Industry Association; www.eciaonline.org
73. EIA - Electronic Industries Alliance; (See TIA).
74. EIMA - EIFS Industry Members Association; www.eima.com.
75. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
77. ESTA - Entertainment Services and Technology Association; (See PLASA).
78. EVO - Efficiency Valuation Organization; www.evo-world.org.
79. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
81. FM Approvals - FM Approvals LLC; www.fmglobal.com.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
83. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridaroof.com.
84. FSA - Fluid Sealing Association; www.fluidsealing.com.
85. FSC - Forest Stewardship Council U.S.; www.fscus.org.
86. GA - Gypsum Association; www.gypsum.org.
87. GANA - Glass Association of North America; www.glasswebsite.com.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.

90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
92. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
93. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
94. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
95. IAS - International Accreditation Service; www.iasonline.org.
96. IAS - International Approval Services; (See CSA).
97. ICBO - International Conference of Building Officials; (See ICC).
98. ICC - International Code Council; www.iccsafe.org.
99. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
100. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
101. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
102. IEC - International Electrotechnical Commission; www.iec.ch.
103. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
104. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
105. IESNA - Illuminating Engineering Society of North America; (See IES).
106. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
107. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
108. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
109. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
110. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
111. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
112. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
113. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
114. ISO - International Organization for Standardization; www.iso.org.
115. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
116. ITU - International Telecommunication Union; www.itu.int/home.
117. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
118. LMA - Laminating Materials Association; (See CPA).
119. LPI - Lightning Protection Institute; www.lightning.org.
120. MBMA - Metal Building Manufacturers Association; www.mbma.com.
121. MCA - Metal Construction Association; www.metalconstruction.org.
122. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
123. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
124. MHIA - Material Handling Industry of America; www.mhia.org.
125. MIA - Marble Institute of America; www.marble-institute.com.
126. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
127. MPI - Master Painters Institute; www.paintinfo.com.
128. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
129. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
130. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
131. NADCA - National Air Duct Cleaners Association; www.nadca.com.
132. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
133. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
134. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
135. NCMA - National Concrete Masonry Association; www.ncma.org.
136. NEBB - National Environmental Balancing Bureau; www.nebb.org.
137. NECA - National Electrical Contractors Association; www.necanet.org.
138. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
139. NEMA - National Electrical Manufacturers Association; www.nema.org.
140. NETA - InterNational Electrical Testing Association; www.netaworld.org.

141. NFHS - National Federation of State High School Associations; www.nfhs.org.
142. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
143. NFPA - NFPA International; (See NFPA).
144. NFRC - National Fenestration Rating Council; www.nfrc.org.
145. NHLA - National Hardwood Lumber Association; www.nhla.com.
146. NLGA - National Lumber Grades Authority; www.nlga.org.
147. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
148. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
149. NRCA - National Roofing Contractors Association; www.nrca.net.
150. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
151. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
152. NSPE - National Society of Professional Engineers; www.nspe.org.
153. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
154. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
155. NWFA - National Wood Flooring Association; www.nwfa.org.
156. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
157. PDI - Plumbing & Drainage Institute; www.pdionline.org.
158. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
159. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
160. RFCI - Resilient Floor Covering Institute; www.rfci.com.
161. RIS - Redwood Inspection Service; www.redwoodinspection.com.
162. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
163. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
164. SDI - Steel Deck Institute; www.sdi.org.
165. SDI - Steel Door Institute; www.steeldoor.org.
166. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
167. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
168. SIA - Security Industry Association; www.siaonline.org.
169. SJI - Steel Joist Institute; www.steeljoist.org.
170. SMA - Screen Manufacturers Association; www.smainfo.org.
171. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
172. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
173. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
174. SPIB - Southern Pine Inspection Bureau; www.spib.org.
175. SPRI - Single Ply Roofing Industry; www.spri.org.
176. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
177. SSINA - Specialty Steel Industry of North America; www.ssina.com.
178. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
179. STI - Steel Tank Institute; www.steeltank.com.
180. SWI - Steel Window Institute; www.steelwindows.com.
181. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
182. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
183. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
184. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
185. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
186. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
187. TMS - The Masonry Society; www.masonrysociety.org.
188. TPI - Truss Plate Institute; www.tpinst.org.
189. TPI - Turfgrass Producers International; www.turfgrasssod.org.
190. TRI - Tile Roofing Institute; (Formerly: National Tile Roofing Manufacturing Association); www.tileroofing.org.
191. UBC - Uniform Building Code; (See ICC).
192. UL - Underwriters Laboratories Inc.; www.ul.com.
193. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
194. USAV - USA Volleyball; www.usavolleyball.org.

195. USGBC - U.S. Green Building Council; www.usgbc.org.
196. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
197. WASTEC - Waste Equipment Technology Association; www.wastec.org.
198. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
199. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
200. WDMA - Window & Door Manufacturers Association; www.wdma.com.
201. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
202. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
203. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
204. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.
1. DIN - Deutsches Institut f?r Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 5000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Use Charges: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated.

B. Water and Electric Construction Power: Available from Owner's existing system without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

D. Accessible Temporary Egress: Comply with applicable provisions in ICC A117.1.

PART 2 - PRODUCTS

2.1 MATERIALS – NOT USED

2.2 TEMPORARY FACILITIES

A. Provide field offices, storage and fabrication sheds, and other support facilities as necessary for construction operations and as approved by Owner. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
   1. Arrange with Owner for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
   1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Heating and/or cooling: Provide temporary heating and/or cooling required for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

D. Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

3.2 SUPPORT FACILITIES INSTALLATION

A. Install project identification and other signs in locations approved by Owner to inform the public and persons seeking entrance to Project.

B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

C. Use of Owner's existing elevators is contingent upon approval by Owner's Project Manager. If elevator usage is permitted, elevators shall be cleaned and maintained in a condition acceptable to Owner. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

D. Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

E. Install and maintain temporary fire-protection facilities. Comply with NFPA 241.

3.4 MOISTURE AND MOLD CONTROL

A. Before installation of weather barriers, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.
   1. Protect stored and installed material from flowing or standing water.
   2. Remove standing water from decks.
   3. Keep deck openings covered or dammed.

B. After installation of weather barriers but before full enclosure and conditioning of building, protect as follows:
   1. Do not load or install drywall or porous materials into partially enclosed building.
   2. Discard water-damaged material.
   3. Do not install material that is wet.
   4. Discard, replace, or clean stored or installed material that begins to grow mold.
   5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion.

C. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period.

END OF SECTION

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SECTION 01 6000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

B. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced.
   1. Show compliance with requirements for comparable product requests.
   2. Architect will review the proposed product and notify Contractor of its acceptance or rejection.

C. Basis-of-Design Product Specification Submittal: Show compliance with requirements.

D. Compatibility of Options: If Contractor is given option of selecting between two or more products, select product compatible with products previously selected.

E. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. Deliver products to Project site in manufacturer's original sealed container or packaging, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   3. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
   4. Store materials in a manner that will not endanger Project structure.
   5. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

F. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. Provide products that comply with the Contract Documents, are undamaged, and, unless otherwise indicated, are new at the time of installation.
   1. Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.
   2. Where products are accompanied by the term "as selected," Architect will make selection.
   3. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Where the following headings are used to list products or manufacturers, the Contractor's options for product selection are as follows:
   1. Products:
      a. Where requirements include "one of the following," provide one of the products listed that complies with requirements.
      b. Where requirements do not include "one of the following," provide one of the products listed that complies with requirements or a comparable product.

2. Manufacturers:
    a. Where requirements include "one of the following," provide a product that complies with requirements by one of the listed manufacturers.
    b. Where requirements do not include "one of the following," provide a product that complies with requirements by one of the listed manufacturers or another manufacturer.
3. Basis-of-Design Product: Provide the product named, or indicated on the Drawings, or a comparable product by one of the listed manufacturers.

C. Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

D. Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Architect will consider Contractor's request for comparable product when the following conditions are satisfied:
1. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications.
3. List of similar installations for completed projects, if requested.
4. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 7000

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 EXECUTION REQUIREMENTS

A. Cutting and Patching:
   1. Structural Elements: When cutting and patching structural elements, notify Owner of locations and details of cutting and await directions from Owner before proceeding. Shore, brace, and support structural elements during cutting and patching.
   2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.
   3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Owner's opinion, reduce the building's aesthetic qualities.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.2 CLOSEOUT SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

C. Operation and Maintenance Data: Submit **2 copies** of manual.

D. PDF Electronic File: Assemble manual into a composite electronically indexed file. Submit on digital media.

E. Record Drawings: Submit 2 set(s) of marked-up record prints.

F. Record Digital Data Files: Submit data file and 1 set(s) of plots.

G. Record Product Data: Submit 2 paper copies and 1 electronic .pdf file of each submittal.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

A. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.

B. Submittals Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:
   1. Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   2. Submit closeout submittals specified in other sections, including project record documents, operation and maintenance manuals, property surveys, similar final record information, warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   3. Submit maintenance material submittals specified in other sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner.
   4. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:
   1. Advise Owner of pending insurance changeover requirements.
   2. Make final changeover of permanent locks and deliver keys to Owner.
   3. Complete startup and testing of systems and equipment.
   4. Perform preventive maintenance on equipment used prior to Substantial Completion.
   5. Advise Owner of changeover in heat and other utilities.
   6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
   7. Remove temporary facilities and controls.
   8. Complete final cleaning requirements, including touchup painting.
   9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Owner will proceed with inspection or advise Contractor of unfulfilled requirements. Owner will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

1.4 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting inspection for determining final completion, complete the following:
   1. Submit a final Application for Payment.
   2. Submit certified copy of Owner's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Owner. Certified copy of the list shall state that each item has been completed or otherwise resolved.
   3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
   4. Submit pest-control final inspection report.

B. Submit a written request for final inspection for acceptance. On receipt of request, Owner will either proceed with inspection or notify Contractor of unfulfilled requirements. Owner will prepare final Certificate for Payment after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.
   1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

B. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
   1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

2.2 OPERATION AND MAINTENANCE DOCUMENTATION

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize manual into separate sections for each system and subsystem, and separate sections for each piece of equipment not part of a system.

C. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Include the following:
   1. Manufacturer's operation and maintenance documentation.
   2. Maintenance and service schedules.
   3. Maintenance service contracts. Include name and telephone number of service agent.
   4. Emergency instructions.
   5. Spare parts list and local sources of maintenance materials.
   6. Wiring diagrams.
   7. Copies of warranties. Include procedures to follow and required notifications for warranty claims

2.3 RECORD DRAWINGS

A. Record Prints: Maintain a set of prints of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued. Mark to show actual installation where installation varies from that shown originally. Accurately record information in an acceptable drawing technique.
   1. Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Owner. When authorized, prepare a full set of corrected digital data files of the Contract Drawings compatible with AutoCAD Release 2000.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

B. Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Verify compatibility with and suitability of substrates.
   2. Examine roughing-in for mechanical and electrical systems.
   3. Examine walls, floors, and roofs for suitable conditions.

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

D. Take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.

E. Verify space requirements and dimensions of items shown diagrammatically on Drawings.

F. Surface and Substrate Preparation: Comply with manufacturer's written recommendations for preparation of substrates to receive subsequent work.

3.2 CONSTRUCTION LAYOUT AND FIELD ENGINEERING

A. Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks.

3.3 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations.

C. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

D. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.

E. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Owner.

F. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

G. Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CUTTING AND PATCHING

A. Provide temporary support of work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

D. Cutting: Cut in-place construction using methods least likely to damage elements retained or adjoining construction.
   1. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

E. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
   1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction in a manner that will minimize evidence of patching and refinishing.
   2. Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance.
   3. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

3.5 CLEANING

A. Clean Project site and work areas daily, including common areas. Dispose of materials lawfully.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
   3. Remove debris from concealed spaces before enclosing the space.

B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:
   1. Clean Project site, yard, and grounds, in areas disturbed by construction activities. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   2. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.
   3. Remove labels that are not permanent.
   4. Clean transparent materials, including mirrors. Remove excess glazing compounds.
   5. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Sweep concrete floors broom clean.
   6. Vacuum carpeted surfaces and wax resilient flooring.
   7. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and foreign substances. Clean plumbing fixtures. Clean light fixtures, lamps, globes, and reflectors.

3.6 OPERATION AND MAINTENANCE MANUAL PREPARATION

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

B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
   1. Prepare supplementary text if manufacturers' standard printed data are unavailable and where the information is necessary for proper operation and maintenance of equipment or systems.

C. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams.

3.7 DEMONSTRATION AND TRAINING

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include a detailed review of the following:
   1. Include instruction for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

END OF SECTION

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SECTION 01 7419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Contractor shall provide for and haul off a roll off construction waste dumpster. The Contractor shall coordinate with OU Facility Management on the location of the construction waste dumpster.

B. Action Submittals:
   1. Waste Management Plan: Submit plan within 5 days of date established for commencement of the Work that maximizes salvage and recycling of materials.

C. Informational Submittals:
   1. Waste Reduction Progress Reports: Submit concurrent with each Application for Payment. Include total quantity of waste, total quantity of waste salvaged and recycled, and percentage of total waste salvaged and recycled.
   2. Records of Donations and Sales: Receipts for salvageable waste donated or sold to individuals and organizations. Indicate whether organization is tax exempt.
   3. Recycling and Processing Facility Records: Manifests, weight tickets, receipts, and invoices.
   4. Landfill and Incinerator Disposal Records: Manifests, weight tickets, receipts, and invoices.
   5. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations.

D. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

E. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 3000 "Administrative Requirements." Review methods and procedures related to waste management.

F. Waste Management Plan: Develop a waste management plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
   1. Salvaged Materials for Reuse: Identify materials that will be salvaged and reused.
   2. Salvaged Materials for Sale: Identify materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
   3. Salvaged Materials for Donation: Identify materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
   4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
   5. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

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

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
   1. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Owner's Use: Clean salvaged items and store in a secure area until delivery to Owner.

B. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

C. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs.

D. Plumbing Fixtures: Separate by type and size.

E. Lighting Fixtures: Separate lamps by type and protect from breakage.

3.3 RECYCLING WASTE

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

B. Packaging:
   1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
   2. Polystyrene Packaging: Separate and bag materials.
   3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.

3.4 DISPOSAL OF WASTE

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

B. Do not burn waste materials.

END OF SECTION

SECTION 02 4119

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Items indicated to be removed and salvaged remain Owner's property. Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner. Include fasteners or brackets needed for reattachment elsewhere.

B. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements. Submit before Work begins.

C. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

D. It is not expected that hazardous materials will be encountered in the Work. If hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with EPA regulations and with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 DEMOLITION

A. Maintain services/systems indicated to remain and protect them against damage during selective demolition operations. Before proceeding with demolition, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of the building.

B. Locate, identify, shut off, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished. Whenever work involves chipping, saw cutting, or core drilling through concrete slabs, bituminous asphalt or other impervious surfaces, the location of existing utilities must be coordinated with OU utility and FM departments in addition to location and depth verification by a third party, independent, private locating company. The third party, independent, private locating company must locate utilities and depth of utilities by use of Ground Penetrating Radar (GPR), X-ray, bore scope, or ultrasound prior to the start of demolition and construction. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the Contractor from meeting this requirement.

C. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

D. Perform demolition in a manner that maximizes salvage and recycling of materials.

1. Dismantle existing construction and separate materials.

2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

E. Protect walls, ceilings, floors, and other existing finish work that are to remain. Erect and maintain dustproof partitions. Cover and protect furniture, furnishings, and equipment that have not been removed.

F. Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

G. Provide temporary weather protection to prevent water leakage and damage to structure and interior areas.

H. Requirements for Building Reuse:

1. Maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.

2. Maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling systems) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.

I. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction.

J. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill. Do not burn demolished materials.

K. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for other steel items not defined as structural steel.
2. Section 055116 Section “Metal Floor Plate Stairs.”
3. Section 055119 “Metal Grating Stairs.”
4. Section 055213 “Pipe and Tube Railings.”
5. Section 055313 “Bar Gratings.”
6. Section 099113 "Exterior Painting" for surface-preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches (38 mm).
2. Welded built-up members with plates thicker than 2 inches (50 mm).
3. Column base plates thicker than 2 inches (50 mm).

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

D. Erection Sequence: The steel erector shall be responsible for submitting an erection sequence plan with details for approval by the Architect-Engineer prior to erection of steel. The submittal shall include proposed method of lifting, securing and bracing structural steel necessary to accommodate erection and in place forces that may be imposed on partially completed structure and be within allowable stresses. Should additional framing or bracing or anchorage not shown on the plans be required to accommodate the imposed loads, the fabricator shall furnish the materials and labor required at no additional cost to the Owner.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator and testing agency.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shop primers.
5. Nonshrink grout.

F. Survey of existing conditions.

G. Source quality-control reports.

H. Field quality-control and special inspection reports.

1.8 QU ALITY ASSURANCE

A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE or who can show a minimum of five (5) years experience of similarsize and type projects .

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using information provided on contract drawings.
2. Use Load and Resistance Factor Design; data are given at factored-load level.

B. Moment Connections: As detailed on the contract drawings..

C. Construction: Moment connections and vraced to existing structure.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles-Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.

1. Weight Class: Standard, Extra strong, or Double-extra strong as indicated on contract drawings.
2. Finish: Black**..**

F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain.

C. Threaded Rods: ASTM A 36/A 36M.

1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened, carbon steel.
3. Finish: Plain.

2.4 PRIMER

A. Primer: Comply with Section 099123 "Interior Painting."

B. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.

C. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

D. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20] [ASTM A 780/A 780M.

2.5 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.

4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened..

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

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

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. The temporary supports shall be sufficient to secure the bare structural steel framing or any portion thereof against loads that are likely to be encountered during erection, including those due to wind and those that result from erection operations. Do not remove temporary supports until the installation of all structural elements is complete and has been accepted as complete by the Structural Engineer. For the purposes of this paragraph, “all structural elements” include the following: foundations, concrete walls and their connections to foundations and slabs, load-bearing CMU walls, structural steel, steel connections, permanent bracing, steel joists, joist bridging, roof deck and floor deck.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates: Clean concrete-bearing surfaces of bond-reducing materials and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Torque post-installed anchor rods in accordance with manufacturer’s written instruction after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1].

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.

b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

E. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

F. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION 05 12 00

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
2. Metal Floor Plate and Supports
3. Metal bollards.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Requirements:

1. Section 051200 "Structural Steel Framing."
2. Section 055116 “Metal Floor Plate Stairs”
3. Section 055119 “Metal Grating Stairs”
4. Section 055213 “Pipe and Tube Railings”
5. Section 055313 “Bar Gratings”
6. Section 099113 "Exterior Painting" for surface-preparation and priming requirements.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that

are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Paint products.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
2. Metal floor plate and supports.
3. Metal bollards.

C. Samples for Verification: For each type and finish of extruded nosing and tread.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with requirements.

C. Welding certificates.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

E. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Abrasive-Surface Floor Plate: Steel plate with abrasive material metallically bonded to steel (Checkered Plate).

D. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

E. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

2.2 FASTENERS

A. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3 (ASTM A 325M, Type 3); with hex nuts, ASTM A 563, Grade C3 (ASTM A 563M, Class 8S3); and, where indicated, flat washers.

B. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, First option in "Material for Exterior Locations and Where Stainless Steel Is Indicated" Subparagraph below refers to Type 304 and similar alloys; second option refers to Type 316 and similar alloys.

2.3 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099123 “Interior Painting." Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

C. Galvanize miscellaneous framing and supports where indicated.

2.6 METAL FLOOR PLATE

A. Fabricate from abrasive-surface floor (checkered) plate of thickness indicated on contract drawings.

B. Provide grating sections where indicated fabricated from welded steel bar grating.

C. Provide steel angle supports as indicated.

D. Include steel angle stiffeners, and fixed and removable sections as indicated.

2.7 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe, as indicated.

1. Cap bollards with 1/4-inch- (6.4-mm-) thick steel plate.
2. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
3. Where bollards are indicated to receive light fixtures, provide cutouts for fixtures and holes for wire.

B. Fabricate bollards with 3/8-inch- (9.5-mm-) thick steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch (19-mm) anchor bolts.

1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.

C. Prime bollards with zinc-rich primer..

2.8 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping

size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

B. Anchor bollards to existing construction with expansion anchors. Provide four 3/4-inch (19-mm) bolts at each bollard unless otherwise indicated.

1. Embed anchor bolts at least 4 inches (100 mm) in concrete.

C. Fill bollards solidly with concrete, mounding top surface to shed water.

1. Do not fill removable bollards with concrete.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 "Interior Painting."

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 05 50 00

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SECTION 05 52 13

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for other steel items not defined as structural steel.
2. Section 055116 “Metal Floor Plate Stairs”
3. Section 055119 “Metal Grating Stairs.”
4. Section 099113 "Exterior Painting" for surface-preparation and priming requirements.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.
3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.

a. Show method of connecting and finishing members at intersections.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

E. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

F. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch (38-mm) clearance from inside face of handrail to finished wall surface.

2.2 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed}.

B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

D. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.3 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 for zinc coating.
2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.
3. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.

3. Provide Phillips tamper-resistant square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Shop Primers: Provide primers that comply with Section 099123 "Interior Painting."

E. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

F. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

G. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

H. Intermediate Coats and Topcoats: Provide products that comply with Section 099123 "Interior Painting." Section 099600 "High-Performance Coatings."

I. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.

J. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.

K. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.5 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for member sizes and spacing, details, finish, and anchorage.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

F. Connections: Fabricate railings with welded connections unless otherwise indicated.

G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

H. Form Changes in Direction as Follows:

1. By bending.

I. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

J. Close exposed ends of railing members with prefabricated end fittings.

K. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

L. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

M. For removable railing posts, fabricate slip-fit sockets from pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.

1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.

N. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.6 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, galvanize anchors to be embedded in exterior concrete or masonry.

E. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with [**SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."**] [**SSPC-SP 3, "Power Tool Cleaning."**] [**requirements indicated below:**]

1. Exterior Railings: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Railings Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Railings Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Railings: SSPC-SP 3, "Power Tool Cleaning."

F. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with **universal shop primer primers specified in Section 099113 "Exterior Painting" and Section 099123** unless [**zinc-rich primer is**] Delete subparagraph below if galvanized railings are shop primed.
2. Do not apply primer to galvanized surfaces.

G. Painted Finish: Comply with Section 099113 "Exterior Painting**.**

1. Color: Sherwin Williams SW 7069 Iron Ore.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

A. Anchor posts to metal surfaces with welding:

1. For removable steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.5 ATTACHING RAILINGS

A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends.

3.6 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

3.7 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 05 52 13

SECTION 05 53 13

BAR GRATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes metal bar gratings.

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for structural-steel framing system components.
2. Section 055000 “Metal Fabrications” for misc. edge supports.
3. Section 055100 "Metal Stairs" for grating treads and landings of steel-framed stairs.
4. Section 055213 "Pipe and Tube Railings" for metal pipe and tube handrails and railings.

1.3 COORDINATION

A. Coordinate installation of anchorages for gratings. Furnish setting drawings, templates, and directions for installing anchorages, including weld size and spacing. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Clips and anchorage devices for gratings.
2. Paint products.

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

1.5 INFORMATIONAL SUBMITTALS

A. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.

B. Welding certificates.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Borden Grating Company or approved equal.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Gratings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Floors: Uniform load of 125 lbf/sq. ft. (6.00 kN/sq. m) or concentrated load of 1000 lbf (4.45 kN) on 2.5 ft. x 2.5 ft. area, whichever produces the greater stress.
2. Limit deflection to 1/4 inch (6.4 mm).

2.3 METAL BAR GRATINGS

A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual."

B. Welded Steel Grating MBG 531:

1. Bearing Bar Spacing: 1-3/16 inches (30 mm) o.c.
2. Bearing Bar Depth: 1-1/4 inches (32 mm).
3. Bearing Bar Thickness: 3/16 inch (4.8 mm).
4. Crossbar Spacing: 4 inches (102 mm) o.c.
5. Traffic Surface: Plain**.**
6. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. (550 g/sq. m) of coated surface.

2.4 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Wire Rod for Bar Grating Crossbars: ASTM A 510 (ASTM A 510M).

2.5 FASTENERS

A. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M,) and, where indicated, flat washers.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.7 FABRICATION

A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.

D. Fit exposed connections accurately together to form hairline joints.

E. Welding: Comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads

1. Toeplate Height: 4 inches (100 mm) unless otherwise indicated.

G. Edge-band grating sections as fabricated for delivery.

H. Do not notch bearing bars at supports to maintain elevation.

2.8 STEEL FINISHES

A. Finish gratings, after assembly.

B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded connectors and clips.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

C. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

D. Field Welding: Comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

3.2 INSTALLING METAL BAR GRATINGS

A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.

C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.3 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 05 53 13

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SECTION 07 8413

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Installer certificates signed by Installer certifying that products have been installed in compliance with requirements.

PART 2 - PRODUCTS

2.1 PENETRATION FIRESTOPPING

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. 3M Fire Protection Products.
   2. A/D Fire Protection Systems Inc.
   3. Hilti, Inc.
   4. Specified Technologies, Inc.
   5. Tremco, Inc.

B. Provide penetration firestopping materials that are compatible with one another, substrates, and penetrating items if any.

C. Penetrations in Fire-Resistance-Rated Walls and Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
   1. F-Rating at Horizontal Assemblies: At least 1 hour, but not less than that of construction penetrated.
   2. T-Rating at Horizontal Assemblies: At least 1 hour, but not less than the fire-resistance rating of construction penetrated except for penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
   1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency.

G. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

H. Coordinate sized of sleeves, openings or cut openings to accommodate penetration firestopping

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Include the following information on labels:
   1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
   2. Designation of applicable testing and inspecting agency.
   3. Manufacturer's name.
   4. Installer's name.

C. Install fill materials for firestopping by proven techniques to produce the following results:

D. 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire resistance ratings.

E. 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

F. 3. For fill materials that will remain exposed after completing the work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

G. 4. Provide final protection and maintain conditions during and after installation that insure that penetration firestopping is without damage or deterioration at time of substantial completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION

SECTION 07 9200

JOINT SEALANTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and color Samples.

B. Environmental Limitations: Do not proceed with installation of joint sealants when ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS

A. Low-Emitting Materials: Sealants shall comply with the following limits for VOC content:
   1. Architectural Sealants: 250 g/L..
   2. Other Sealants: 420 g/L.
   3. Sealant Primers for Nonporous Substrates: 250 g/L.
   4. Sealant Primers for Porous Substrates: 775 g/L.
   5. Other Sealant Primers: 750 g/L.

B. Low-Emitting Materials:
   1. Exterior reactive sealants shall have a VOC content of not more than 50 g/L or 4 percent by weight, whichever is greater.
   2. Other exterior caulks and sealants shall have a VOC content of not more than 30 g/L or 2 percent by weight, whichever is greater.
   3. Interior sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions.

D. Sealant for General Use Where Another Type Is Not Specified
   1. Single-component, neutral-curing silicone sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT.
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         1) Dow Corning Corporation.
         2) GE Construction Sealants; Momentive Performance Materials Inc.
         3) Polymeric Systems, Inc.
         4) Substitutions: Under provision of Division 1

   Sealant for Interior Use at Perimeters of Door and Window Frames:

   1. Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         1) BASF Construction Chemicals - Building Systems.
         2) Pecora Corporation.
         3) Sherwin-Williams Company (The).
         4) Tremco Incorporated.
         5) Substitutions: Under provision of Division 1

2.2 MISCELLANEOUS MATERIALS

A. Provide sealant backings of materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

D. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with ASTM C 1193.

B. Install sealant backings to support sealants during application and to produce cross-sectional shapes and depths of installed sealants that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

END OF SECTION

SECTION 08 1113

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Shop Drawings.

PART 2 - PRODUCTS

2.1 HOLLOW METAL DOORS AND FRAMES

A. Doors: Complying with SDI A250.8 for level and model and SDI A250.4 for physical-endurance level indicated, 1-3/4 inches thick unless otherwise indicated.
   1. Exterior Doors**:** Level 2 and Physical Performance Level B Heavy Duty, metallic-coated steel sheet faces with vertical steel stiffeners at 6” apart welded to both face sheets

      a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
   2. Hardware Reinforcement: Fabricate according to SDI A250.6 with reinforcement plates from same material as door face sheets.

B. Frames: ANSI A250.8; conceal fastenings unless otherwise indicated.
   1. Steel Sheet for Exterior Frames: 0.053-inch minimum thickness, metallic coated.
   2. Exterior Frame Construction: Face welded.
   3. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
   4. Frame Anchors: Not less than 0.042 inch thick.

C. Door Silencers: Three on strike jambs of single-door frames and two on heads of double-door frames.

D. Grout Guards: Provide where mortar might obstruct hardware operation.

E. Prepare doors and frames to receive mortised and concealed hardware according to SDI A250.6 and BHMA A156.115.

F. Reinforce doors and frames to receive surface-applied hardware.

G. Prime Finish: Manufacturer's standard, factory-applied coat of lead- and chromate-free primer complying with SDI A250.10 acceptance criteria.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, free of scale, pitting, or surface defects.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, G60 or A60.

D. Frame Anchors: ASTM A 879/A 879M, 4Z coating designation; mill phosphatized.
   1. For anchors built into exterior walls, sheet steel complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot dip galvanized according to ASTM A 153/A 153M.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install hollow metal frames to comply with SDI A250.11.

B. Install doors to provide clearances between doors and frames as indicated in SDI A250.11.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying rust-inhibitive primer. Use galvanizing repair paint for metallic coated surfaces.

END OF SECTION

SECTION 09 9113

EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:
   1. Product Data: Include printout of MPI's "MPI Approved Products List" with product highlighted.
   2. Samples.

B. Extra Materials: Deliver to Owner 1 gal. of each color and type of finish-coat paint used on Project, in containers, properly labeled and sealed.

PART 2 - PRODUCTS

2.1 PAINT

A. MPI Standards: Provide materials that comply with MPI standards indicated and listed in its "MPI Approved Products List.".
   1. Primer, Alkyd, Anticorrosive: MPI #79.
   2. Primer, Galvanized, Water Based: MPI #134.
   3. Primer, Latex: MPI #6.
   4. Primer, Alkyd: MPI #5.
   5. Latex, Exterior Flat (Gloss Level 1): MPI #10.
   6. Light Industrial Coating, Exterior, Water Based, Semigloss (Gloss Level 5): MPI #163.

B. Material Compatibility: Provide materials that are compatible with one another and with substrates.
   1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. Colors: Sherwin Williams 7069 Iron Ore or approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Toughly clean and prepare metal surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

3.2 APPLICATION

A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Paint exposed surfaces**,** unless otherwise indicated.
   1. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise indicated.

C. Apply paints according to manufacturer's written instructions.
   1. Use brushes only where the use of other applicators is not practical.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
   1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

3.3 EXTERIOR PAINT APPLICATION SCHEDULE

A. Steel:
   1. Semigloss Water-Based, Light-Industrial Coating: Two coats over alkyd anticorrosive primer.

END OF SECTION

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SECTION 26 0010

BASIC ELECTRICAL MATERIALS, METHODS AND REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Division 1 General Conditions applying to the General Contractor also apply to this Subcontractor as modified by Division 26 requirements.

1.2 ELECTRICAL CONTRACTOR QUALIFICATIONS

A. The Electrical Contractor shall be a company or firm engaged in the business of electrical contracting on a full-time basis and has had a minimum of five (5) years experience in the business of electrical contracting. The firm shall have completed a minimum of three (3) projects similar in size and scope to this project.

B. The Electrical Contracting firm shall be capable of providing a performance bond equal to the amount of 100% of the electrical contract sum.

C. The Electrical Contractor shall have a current Oklahoma State License.

D. Proof of the Contractor qualifications shall be submitted to the Owner upon request.

1.3 ELECTRICAL CONTRACTOR RESPONSIBILITY

A. The Electrical Contractor shall be the entity responsible for the proper execution of this project in accordance with the drawings and following specifications. If a materials supplier and/or manufacturer's representative assists in preparation of bids and/or submittals for the project, it is the Electrical Contractor's responsibility to determine that the materials being submitted meet the quality and performance criteria of the materials specified in these specifications.

1.4 DESCRIPTION OF THE WORK

A. The Contractor shall furnish all labor, materials, appliances, equipment, tools, transportation, superintendence and service required to construct and install complete and operative in accordance with the true intent of the drawings and specifications, the electrical system as specified herein and as shown on the drawings.

B. The Contractor shall bid all labor and materials to make equipment that is specified and/or shown complete and functioning, whether all details are specifically mentioned or not. In the case of conflicts, these Specifications shall have precedence over the plans.

1.5 ELECTRICAL STANDARDS, REGULATIONS, AND CODES

A. All ordinances, laws, and codes of the City, County, State, and National governments, and the local utility company standards shall be observed, and no work shall be acceptable that does not comply. The Contractor shall be held responsible and shall make any of the work installed by him conform to these regulations and codes with no additional expense to the Owner.

B. Applicable provisions of the following statutes, laws, codes, and standards are hereby imposed on a general basis for the electrical work in addition to specific application specified by individual work sections of these specifications:
   1. National Electrical Code (NFPA 70)
   2. Life Safety Code (NFPA 101)

3. National Electrical Safety Code, (ANSI C2.)
4. International Code Council
5. Accessible and Usable Buildings and Facilities (ICC/ANSI A117.1)
6. Statutes and regulations of the State of Oklahoma
7. University of Oklahoma standards

1.6 DRAWINGS AND SPECIFICATIONS

A. General:
1. The Division 26 specifications and “E-sheet” drawings have been made to form the basis for the installation of the electrical work. The drawings and specifications shall be considered as mutually explanatory, and any work required by one, but not by the other, will be performed as though required by both.
2. The work shall be accomplished as called for in the specifications and as shown on the drawings.

B. Basic documents describing the electrical work:
1. Drawings: Refer to the ("E") series drawings for the graphic representations, schedules and notations showing electrical work.
2. Specifications: Refer to Division 26 for the primary technical specifications of electrical work.
3. Base Bid Proposal: For the complete description refer to Division 1 and to the Bid Form.
4. Alternate Bid Proposals: Refer to Division 1 and to the Bid Form for the complete description.

C. Other documents affecting the electrical work:
1. The Architectural, Structural, Mechanical, Plumbing, Fire Sprinkler System, Civil, and other special system drawings and specifications for this project may also contain important information that must be taken into consideration while preparing bids for and installing the electrical work. It is the responsibility of this Contractor to examine all available drawings and to determine their effect on the electrical work.
2. Do not scale the electrical drawings for locations of equipment and devices. Refer to the Architectural, Structural, and shop drawings for actual dimensions.

D. Accuracy of drawings and specifications:
1. The specifications and drawings have been made to form the basis for the installation of this contractor's work. The plans and specifications shall be considered as mutually explanatory, and any work required by one, but not by the other shall be performed as though required by both.
2. These drawings and specifications are presumed to be accurate, but extreme accuracy is not guaranteed. **Any errors or ambiguities in the drawings and/or specifications that are discovered by the Contractor during the bidding phase shall be reported to the Architect/Engineer.** The Architect/Engineer will review and issue an addendum.
3. Any errors or ambiguities in the drawings and specifications that are discovered by the Contractor after the bidding phase shall be reported to the Architect/Engineer before the work is started. Omission of particular reference to any item necessary for complete installation and proper operation thereof shall not relieve the Contractor of responsibility of furnishing the same at no extra cost.

1.7 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

A. If the Contractor has any questions concerning the true intent and/or meaning of these drawings and specifications, he shall request a clarification in writing from the Architect/Engineer before submitting his bid (See Division 1).

B. In case of a dispute concerning the true intent and/or meaning of these drawings and specifications, the Architect/Engineer shall interpret the same, and his interpretation shall be accepted by the Contractor as final.

1.8 EXAMINATION OF THE SITE AND EXISTING FACILITIES

A. All Contractors submitting proposals for this work shall, before submittal of proposals, examine the site and thoroughly familiarize themselves with the existing conditions. All bid proposals shall take into consideration all such conditions that may affect the work under this contract and the bidders shall satisfy themselves as to the existing building conditions, the actual configurations, existing equipment, etc. *No information given on the drawings or in the specifications shall relieve the Contractor of this responsibility.*

B. Failure of the Contractor to examine the site and/or existing facilities *will not be cause for extras by reason of unforeseen conditions.*

1.9 PERMITS, FEES, LICENSES, AND TAXES

A. All necessary licenses or permits for the carrying out of this work shall be secured and paid for by this Contractor. The Contractor shall be responsible for any damages sustained due to his failure to secure such licenses or permits. This Contractor shall pay all taxes applicable to his work.

1.10 ELECTRICAL DEFINITIONS

A. The following definitions supplement definitions of the Contract, General Conditions, Supplementary Conditions and other General Contract Documents, and apply generally to the work.
   1. General Requirements: Provisions of Division 1 sections of these specifications.
   2. Indicated: Shown on drawings by notes, graphics or schedules, or written into other portions of contract documents. Terms such as "shown", "noted", "scheduled" and "specified" have same meaning as "indicated", and are used to assist the reader in locating particular information.
   3. Directed, Requested, Approved, Accepted, etc.: These terms imply "by the Architect/Engineer", unless otherwise indicated.
   4. Approved by Architect/Engineer: In no case releases Contractor from responsibility to fulfill requirements of contract documents.
   5. Project Site: Space available to Contractor at location of project, either exclusively or to be shared with separate Contractors, for performance of the work.
   6. Furnish: Supply and deliver to project site, ready for unloading, unpacking, assembly, installation, and similar subsequent requirements.
   7. Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.
   8. Provide: Furnish and install, complete and ready for intended use.
   9. Installer: Entity (firm or person) engaged to install work, by Contractor, Subcontractor or Sub subcontractor. Installers are required to be skilled experts in work they are engaged to install.

1.11 COOPERATION

A. This Contractor shall employ a full time experienced and competent electrical superintendent to supervise the installation of the electrical system, represent him on the project and to coordinate the electrical work with the other trades.

B. This Contractor shall cooperate fully with all other Contractors on this project. If any part of this Contractor's work depends for proper execution or results upon the work of any other Contractor, this Contractor shall inspect and promptly report to the Architect/Engineer any defects in such work that render it unsuitable for such execution and results. His failure to so inspect and report shall constitute an acceptance of the other Contractor's work as fit and proper for the reception of this work.

C. This Contractor shall coordinate work with all other Contractors or Subcontractors whose work will be in contact with the work under this heading, so that proper cooperation between the different trades shall result there from.

D. To insure against delaying any other Contractor, this Contractor shall install immediately any of his work necessary at the time for continuous construction operations, and shall be held responsible for any delays caused due to his negligence. This Contractor shall at all times keep in close contact with the project, so that all work will proceed without delay.

1.12 WORKMANSHIP

A. The work to be performed as a part of this contract shall be performed by experienced craftsmen in a neat, careful, and workman-like manner, and in full compliance with all requirements of the latest revision of the National Electrical Code (NEC) and The National Electrical Installation Standards (NEIS), latest issue. The entire installation shall conform to the best standard practices of the electrical industry.

B. Any work found to be defective, not approved in writing, or in any way contrary to the provisions of this specification, no matter in what state of completion, may be rejected by the Architect/Engineer and must be brought into compliance immediately upon notification.

1.13 COORDINATION OF ELECTRICAL INSTALLATION

A. Sequence, coordinate and integrate the various elements of electrical work so that the electrical system will perform as indicated and be in harmony with the other work of the building. The Architect/Engineer will not supervise the coordination, which is the exclusive responsibility of the Contractor.

B. Raceways and cables shall not be installed closer than 6 inches from flues and steam or hot water lines. Give the right-of-way in confined-service spaces to piping which must slope for drainage and to larger HVAC ductwork and similar services which are less conformable than electrical services. The various phases of work shall have precedence over each other in the following sequence:
1. Soil and Waste Piping
2. Condensate Piping
3. Primary Electrical Conduit
4. Domestic Water Piping
5. Duct Work
6. Refrigerant Piping
7. Chilled and Heating Hot Water Piping
8. Gas Piping
9. Electrical Conduit and Wireways
10. Fire Sprinkler Piping

C. Locations, horsepower, and electrical ratings of motors and other electrical equipment indicated on the drawings are for guidance only and do not limit the equipment sizes or exact locations. When electrically operated equipment furnished under other divisions of these specifications materially differs from the design shown, this Contractor shall make the necessary adjustments to the wiring, disconnect devices, control devices, and branch circuit protection to accommodate the equipment actually installed. Coordinate exact locations of connections, sizes, etc. with the contractor providing the equipment.

1.14 ELECTRICAL WORK INDICATED ON THE DRAWINGS

A. The branch circuit wiring is indicated on the drawings, and is intended to be generally installed as shown. Any changes in the circuiting or conduit routing shall be submitted to the Architect/Engineer for approval before any deviations are made.

B. Any changes to the work under this contract from that shown on the drawings to make the work conform to the structure, to fit the work of other trades, or alternate methods of installation preferred by the Contractor shall be submitted to the Architect/Engineer for his approval before any deviations are made.

1.15 PRODUCT HANDLING AND STORAGE

A. Scheduling: This contractor shall be responsible for the proper scheduling, for delivery of his materials, equipment, and etc., to minimize the possibilities of damage or theft.

B. Storage:
1. This Contractor shall be responsible for the proper care of all his materials, equipment, etc., delivered at the site.
2. Building materials, Contractor's equipment, etc., may be stored on the premises, but the placing of same shall be subject to the approval of the Project Manager.
3. When any room in the building is used as a shop, storeroom, etc., the one making use of such room will be held responsible for any repairs, patching or cleaning arising from such use.

C. Damage:
1. This Contractor shall protect and be responsible for any damage to his work or material, from the date of the agreement until the final acceptance is made, and shall make good without cost to the Owner any damage or loss that may occur during this period.
2. Contractor shall handle all material as directed, so that they may be inspected by the Architect/Engineer upon request.
3. Should any material be found defective, not approved in writing, or in any way contrary to the contract, this material, no matter in what state of completion may be rejected by the Architect/Engineer and must be removed from the premises at once.

D. No waste material or rubbish resulting from this work shall be allowed to accumulate on or about the premises, but shall be promptly removed at the Contractor's expense.

1.16 TELEPHONE AND DATA SERVICES

A. Telephone and data cables will be furnished and installed by The University of Oklahoma.

B. Furnish and install raceways for the telephone and data cables per Section 26 0533 and as indicated on the drawings.

1.17 ELECTRICAL SERVICE

A. Refer to Electrical drawings for secondary electrical service to the building.

1.18 TEMPORARY ELECTRIC SERVICE

A. This Contractor shall furnish and install a temporary electrical lighting and power system in the building for use during construction. The existing electrical power system may be utilized, if allowed by Division 1, and as necessary for this system. Refer to Section 01 5000 for additional information regarding temporary facilities.

1.19 SERVICE INTERRUPTIONS

A. Any revisions to the electrical system which require interruption to the electrical services in use in the existing building(s) shall be of the shortest duration as practical. Times of interruption shall be coordinated with the Owner's Representative and accomplished after hours, on weekends, and/or at times as directed.

1.20 PENETRATIONS OF FIRE WALLS AND SMOKE PARTITIONS

A. All openings for electrical raceways, sleeves, devices, etc. which penetrate fire walls and/or smoke partitions shall be sealed with an approved sealing material, which will maintain the fire and/or smoke rating of the separation.

1.21 ELECTRICAL SYSTEM PERFORMANCE

A. This Contractor shall provide the necessary personnel and equipment to demonstrate that the electrical systems, equipment, and/or other system components are functioning to the performance as specified. The necessary personnel shall include electricians, technicians, engineers, or vendors' representatives as necessary for the system involved. The equipment shall include electrical metering and test equipment as necessary to demonstrate performance for the particular system or equipment in question.

B. All electrical systems and installations shall be tested to show that the equipment is installed and operates as planned and specified.

C. Take load readings at all panelboards and change branch circuits as required if unbalance of the load exists. The ampere readings should not differ more than 20% on ungrounded conductors. Submit load readings to the Architect/Engineer.

D. At the completion of the project, and before final payment is made, this Contractor shall submit to the Architect/Engineer for transmittal to the Owner, two (2) copies of a written record of performance tests on the electrical systems. Such tests shall show compliance with governing codes. These test reports shall be signed and certified by this Contractor.

E. This Contractor shall take all actions necessary to eliminate the source of any objectionable noise or vibration. Such changes shall be made without cost or inconvenience to the Owner. All air devices, transformers, relays, starters, lighting units, and other equipment shall not exceed the noise criterion curve of 35 db SPL when measured on the flat response C scale in any occupied spaces.

1.22 ELECTRICAL CONNECTIONS TO EQUIPMENT

A. Mechanical equipment supplied under Divisions 11, 22, 23, Owner furnished equipment, and other equipment supplied under other Divisions of this specification will require electrical feeders, control wiring, and connections as indicated on the drawings. Sizes of the feeders and circuit protective devices have been indicated. Exact locations, details and sizes of connections shall be coordinated with the supplier of the equipment item and connected as directed by the equipment manufacturer's instructions or Owner's Representative.

B. Outlets for electric water coolers (drinking fountains) shall be coordinated with the contractor responsible for furnishing and installing the coolers. Install the receptacles in accordance with the water cooler manufacturer recommended locations.

C. If disconnect switches for equipment are indicated to be mounted directly on the equipment, bring the conduits and wiring to and mount switch at the location as directed by the equipment manufacturer.

D. Maintain required working space per NEC 110.26.

1.23 CONTROL WIRING, DEVICES AND CONNECTIONS

A. Wiring required for control of mechanical equipment has been indicated in schematic diagrams on the E series drawings. The Contractor shall coordinate the installation and connection of the wiring with the Contractor providing the controls.

B. Line voltage control wiring shall be per Sections 26 0519, installed in conduits per Section 26 0533 of this specification. Low voltage thermostat wire shall be provided by the supplier of the equipment, installed and connected by this Contractor.

C. Control Relays where required: Coil voltage, number of poles and ratings shall be as indicated

1. Manufacturers: Subject to compliance with requirements, provide Square D, Class 8501 installed in NEMA-1 enclosures or approved equivalent from one of the following manufacturers:
    a. Allen Bradley
    b. Siemens
    c. GE
    d. Square D
2. Substitutions: Under provisions of Division 01.

1.24 REMODEL WORK

A. Certain areas of the existing building(s) may be required to be remodeled as shown on the drawings. In these areas electrical equipment and devices may be required to be disconnected and/or relocated from their points of service or function. Where these conditions are encountered, this Contractor shall remove and/or relocate the devices as shown or required and reconnect the devices to their original source as required.

B. Work in the remodeled areas shall be phased the same as the general contractor's work.

C. New devices and circuits are indicated to be connected to existing panelboards. Spare breakers may be used where available. If spare breakers are not available, install new circuit breakers in existing spaces.

1.25 DAMAGE

A. Damage to the Owner's property or other Contractor's work caused by this Contractor, or damage due to failure of his equipment or materials, shall be repaired or replaced at this Contractor's expense.

1.26 SALVAGE MATERIALS

A. Electrical materials which are removed from the existing building(s) (lighting fixtures, transformers, generators, etc.) shall be offered to the Owner. If the Owner does not want the materials, they shall become the property of the Contractor and removed from the job site. Owner retained materials shall be transported to and stored at the locations as directed by the Owner.

1.27 CLEANING AND TOUCH-UP

A. Prior to final inspection the Contractor shall clean the construction dust from all lighting fixtures and lamps, clean any paint or other foreign material from all panelboards and devices, and touch-up paint on all electrical equipment.

1.28 GUARANTEE

A. Warranties: The contractor shall deliver to the owner, via architect, all warranties on all equipment, which are for a longer period than one year.

B. Guarantee: The Contractor shall guarantee the apparatus as installed by him to develop the performance as specified, and shall guarantee to keep the entire system as installed by him or his Subcontractors in repair and perfect working order for one (1) year after day of acceptance of same, and shall furnish free of cost to the Owner all material, labor and other expenses necessary to comply with the above guarantee, said guarantee being based upon defective material, workmanship, and equipment performance.

1.29 SUBSTITUTIONS OF SPECIFIED MATERIALS AND EQUIPMENT

A. Where an item of equipment is specified on the plans or in the specifications with no specific manufacturer named, it shall be assumed that products of any manufacturer meeting the requirements of the specification will be acceptable.

B. Refer to Section 01 2500 for additional information regarding substitutions.

1.30 ELECTRICAL SUBMITTALS

A. General:
1. Submittals shall be in accordance with Division 1 requirements except as modified herein. Refer to Section 01 3000 for additional information regarding submittals.
2. Each item of electrical equipment shall be submitted for approval.
3. The Electrical Contractor is responsible for the content, preparation and timely delivery of the electrical submittal. If a second party prepares the submittal for the Contractor, it is the Electrical Contractor's responsibility to assure that the submittal is complete and in the proper format and content as set forth in this specification.
4. Contractor shall submit dimensioned shop drawings where required. Shop drawings shall show relationship of electrical equipment with the building structure and equipment of other trades.
   a. Shop drawings will be submitted for any items or equipment which is fabricated specifically for this project. All such shop drawings shall be included with the submittal data. Fabrication or shipment of such equipment shall not be started until all shop drawings have been approved and released by the Owner's representative.
   b. Shop drawings shall be provided for modifications to the fire alarm system.

B. Certification Statement:
1. The electrical submittal shall be accompanied by a statement signed by the Electrical Contractor or his authorized representative stating that:
   a. He has thoroughly reviewed the project drawings and specifications and has made himself aware of all of the requirements contained therein.
   b. He has thoroughly reviewed the electrical submittal, certifies that it is complete, that he is familiar with the equipment being submitted, and certifies that all substituted products are equal in every way to those specified.
   c. He is submitting to the Architect/Engineer a list of any deviations in quality or performance of materials being submitted from the quality or performance of materials specified on drawings or in the specifications.
2. Any submittal without this statement is considered to be incomplete and will not be reviewed until the letter is received.

C. Submittal Schedule:
1. Refer to Section 01 3000 for information on submittal schedule.

D. Submittal Format:
1. The Contractor shall provide the submittal in electronic/PDF format to the Owner's representative for approval.
2. Submittals shall be provided with an index and divided by specification section – no more than one specification section per electronic file. Materials, devices, and equipment shall be submitted under their associated specification section. Each submittal shall include an entire specification section (for example, submit all items included in the raceways and boxes section, not just the EMT). Submittal data shall be arranged in the same order as the specifications.
3. When utilizing catalog pages, highlight or indicate the items, accessories, and options, to be provided as part of the project.
4. Provide a separate sheet similar to the index, recording deviations from Contract Document requirements, including minor variations and limitations. Highlight these deviations so it is apparent to the reviewer.
5. Include Contractor's certification that information and equipment complies with Contract Document requirements.
6. Submittal shall be provided with specification section title sheets corresponding to the specification.
7. Partial specification section submittals will not be accepted.
8. The submittal shall consist of a list of the materials, devices, and equipment to be furnished together with descriptive literature, equipment name, capacities, manufacturer's model and size,

performance data as the conditions specify, approximate delivery date, and any other pertinent facts concerning the various items. The submittal shall consist of all the items in the specifications, and shall include the following for each item or group of similar items:

a. Item name and designation number shown on plans; manufacturer's name, model and size number; capacity and performance data corresponding to that set forth in the specifications and shown in the schedule on the plans.

b. Printed descriptive literature and cuts showing general arrangement and design of the equipment submitted. Complete catalogs are neither desired nor acceptable as submittals. Include only portions of catalogs that pertain to the equipment submitted with specific items/models to be provided for the project clearly indicated.

NOTE: PARTIAL OR INCOMPLETE SUBMITTAL SPECIFICATION SECTIONS AND SUBMITTAL SPECIFICATION SECTIONS NOT CONFORMING TO THE REQUIREMENTS OF THIS SPECIFICATION MAY NOT BE ACCEPTED, AND MAY BE RETURNED TO THE CONTRACTOR FOR COMPLETION AND/OR CORRECTION.

E. Submittal Review:

1. The Architect/Engineer will review the submittal for conformance with the requirements of the specification and issue a report thereon. Items rejected, incomplete, or request for additional information will be contained in the report and may require resubmittal.
2. The Architect/Engineer will review and prepare a report with recommendations on the submittal and one (1) resubmittal. If the resubmittal is incomplete or in any other way unsatisfactory or unacceptable, the review of any further required resubmittals will be at the Contractors expense, otherwise the material must be furnished as specified.

1.31 APPROVAL OF MATERIALS

A. The Architect/Engineer will not, under any circumstances, give verbal approval for any item. The Contractor must obtain the Architect/Engineer's written approval of each item submitted.

B. The Architect/Engineer will not be required to prove that an item proposed for substitution is or is not of equal quality to the specified item. It is mandatory that the Contractor submit to the Architect/Engineer, in writing, all evidence required to support his contention that the item proposed for substitution is equal to the item indicated by the plans and/or specifications. Any deviations from the specified products shall be called to the attention of the Architect/Engineer.

C. The Architect/Engineer's approval of such submittals shall not relieve the Contractor of the responsibility for proper performance of all equipment.

D. The Architect/Engineer's approval of submitted equipment shall not relieve the Contractor of the responsibility for providing materials and equipment that have the features, function, and performance of the specified items, unless he has in writing, directed the attention of the Architect/Engineer to such deviations at the time the materials are submitted for approval.

E. The Architect/Engineer's decision on the approval or rejection of any item shall be accepted by the Contractor as final.

F. Approved submittals and shop drawings will become a part of the construction documents for this project.

1.32 MATERIALS INSTALLED ON PROJECT

A. The Contractor shall verify that materials installed on the project have been approved by the Architect/Engineer.

B. All materials furnished shall be new and a standard catalog product of the manufacturer. Experimental or unproven designs will not be considered.

1.33 AS CONSTRUCTED DRAWINGS AND OPERATING AND MAINTENANCE (O&M) MANUAL

A. At the completion of the project, and before final payment is made, this Contractor shall submit as-built Record Drawings and Operating and Maintenance Manuals to the Architect/Engineer. Refer to Section 01 7000 for information regarding Record Drawings and O&M Manuals.
   1. As-Constructed Drawings: The Contractor shall maintain a set of electrical drawings during construction on which any and all changes made in the installation of the electric system are recorded. These recorded changes shall include any changes in routing of conduits, relocated electrical equipment, etc. and any other changes made during the progress of the work. Locate all underground conduits with dimensions. Show the actual panel board circuit numbers and load description of each circuit. At the completion of the project, neatly transfer all of the changes in colored pencil or pen, in the same nomenclature as the original drawings, to one (1) clean, complete set of electrical working drawings.
   2. Operating and Maintenance Manual (O & M Manual): One (1) loose-leaf 3 ring binder with tabs or in electronic pdf form, containing a compilation of catalog data of each manufactured item of equipment used in the electrical work. This catalog may be similar to the electrical submittal, but shall include all descriptive data and printed installation, operating, instructions, guarantees, warranties, maintenance agreements, maintenance proposals and maintenance instructions for each item of equipment. A complete type written index shall be provided listing each product alphabetically by name together with the manufacturer, catalog number, and name, address, and telephone number of the area sales representative.

1.34 SPARE MATERIALS AND KEYS

A. At the completion of the project, and before final payment is made, this Contractor shall submit the following to the Architect/Engineer for transmittal to the Owner:
   1. Keys: Two keys of each type of key on the job.
   2. Spare Materials: Deliver spare fuses, lamps, and other spare equipment specified in various sections of this specification and store as directed.

1.35 PROJECT CLOSEOUT OR SUBSTANTIAL COMPLETION SITE VISIT

A. Refer to Section 01 7000 for additional information regarding project closeout.

B. The Architect/Engineer will conduct a review of the electrical installation when the Contractor gives notification that all the materials have been furnished and all work has been performed, and all the construction provided for by the contract has been completed in accordance with the contract terms.

C. In order to expedite the review of the electrical system installation, the Contractor shall have the following available at the job site on the agreed upon day(s) and time of the Architect/Engineer site visit.
   1. The Electrical Superintendent to represent the Contractor and to be available to answer any questions that may arise regarding the installation of the electrical system.
   2. Three (3) copies of a list of any items that are not complete with supporting documentation for the reasons the items are incomplete.
   3. As constructed drawings per Section 26 0010.
   4. Equipment catalog with operation and maintenance manuals, per Section 26 0010.
   5. Spare parts and equipment, per 26 0010.
   6. Warranties, guarantees, and certification letters.
   7. Electrical system performance test reports and certifications.

D. If it is necessary for the Architect/Engineer to make a return trip to the jobsite for another review due to the Contractor's failure to adequately complete his portion of the work, the cost of the Architect/Engineer's time and expenses of the return to the jobsite for the review will be at the Contractor's expense and will be withheld from the Contractor's final payment.

PART 2 - PRODUCTS

2.1 Refer to specific sections of Division 26 for products required for described work.

PART 3 - EXECUTION (Not applicable)

END OF SECTION

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SECTION 26 0040

ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Division 1 General Conditions applying to the General Contractor also apply to this Subcontractor as modified by Division 26 requirements.

1.2 DESCRIPTION OF WORK

A. The extent of demolition work is indicated on the drawings and by the requirements of this section. A visit to the site will be required to properly bid the demolition work.

B. Provide all demolition work required for the removal and/or relocation of electrical equipment and associated conductors, conduit, boxes, etc. to provide a complete and operable system upon completion of the project.

C. Work shall at all times be in compliance with local and national safety codes. Great care shall be taken to avoid leaving hazardous conditions unattended.

D. Schedule any required power outages in writing a minimum of 10 days in advance with the Owner.

E. Division 26 work includes removal or relocation of electrical devices which may include panels, transformers, lighting, fire alarm devices, exit signs, conduit, wiring, etc., in the areas to be remodeled as required and as indicated on the drawings. Demolition plans were prepared from as-built drawings and site surveys. Field modifications and/or additions have been made since the preparation of the as-built drawings, and all demolition items may not be shown or exist as exactly indicated, and absolute accuracy cannot be guaranteed. Contractor shall field verify actual conditions for himself during bidding and shall anticipate and include in his bid contingencies for any necessary work that may appear after demolition work has begun.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 DEMOLITION

A. Where devices or equipment are indicated or required to be removed, the associated boxes, conduit, and conductors shall be removed back to their source.

B. Where devices or equipment are indicated or required to be relocated, the associated boxes, conduit, and conductors shall be removed back to a junction box and new products shall be used to extend the service to the new location.

C. Where devices or equipment are served from under a concrete floor, the conduit shall be cut off below finish floor level and capped. Non-shrink cementitious grout shall be provided to level the finished floor.

D. Where underfloor duct openings are deactivated the pedestal and associated fittings shall be removed and returned to the owner. Install a mud cap in the underfloor duct insert and grout flush with finished floor.

E. Where conduits are run above inaccessible ceilings or in walls which are to remain undisturbed, conductors shall be removed and the conduits capped and abandoned in place.

F. Where the demolition work renders equipment downstream inoperable, service shall be extended to the downstream devices or equipment so that they are left in operating condition.

G. Where devices or equipment are served with conduits penetrating a basement wall, the conduits shall be cut off outside the basement wall and capped. The basement wall penetration shall be sealed and made watertight.

END OF SECTION

SECTION 26 0049

ELECTRICAL TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Division 1 General Conditions applying to the General Contractor also apply to this Subcontractor as modified by Division 26 requirements.

1.2 DESCRIPTION OF WORK

A. The types of temporary facilities and uses requiring electrical work may include (but are not necessarily limited to) the following:
   1. Temporary power service/source.
   2. Temporary power distribution.
   3. Temporary lighting.
   4. Temporary use of permanent electrical facilities.

B. Refer to Division 1 and Section 01 5000 for basic requirements and administrative requirements relating to electrical work of temporary facilities.

1.3 QUALITY ASSURANCE

A. Governing Regulations, Permits: Comply with governing regulations for the electrical work of temporary facilities; including but not necessarily limited to code compliance's, permits, inspections, and health and safety compliance's.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide either new or used materials and equipment for electrical temporary facilities which are suitable for intended uses and will ensure safe, adequate performance of the facilities in accordance with governing regulations and codes.

PART 3 - EXECUTION

3.1 INSTALLATION AND OPERATION

A. General: Connect and terminate electrical temporary facilities at locations as determined by the General Contractor to fulfill project requirements. Unless specifically indicated in Division 1, the General Contractor will pay for electric utility usage during the period of construction. Install meters as required for the proper allocation of charges for temporary power use.

B. Electrical Work:
   1. Temporary power service to the project construction area, including stand-alone power generating units, or connected power service from an existing utility source, is not feasible.
   2. Temporary power distribution (temporary wiring) for the purpose of supplying convenience outlets, heating, temporary lighting, and similar facilities for construction, general services, security and protection. Work includes outlets with ground fault circuit interrupter protection and similar devices and facilities but does not include extension cords and actual temporary mechanical equipment connections.
   3. Temporary lighting for construction areas; for temporary offices, shops, storage sheds and similar temporary space enclosures; for exterior construction areas, parking roadways and walkways;

and for special lighting for security, protection and project identification; but excluding plug-in type task lighting (defined as "tools"), needed to supplement general temporary lighting for specific construction activities.

4. A ground fault protective system per the N.E.C. shall be installed and maintained and shall be subject to the approval of the authority having jurisdiction.

3.2 REMOVAL AND RESTORATION

A. When no longer needed for construction work, remove electrical temporary facilities. Repair and restore or replace work damaged by installation and operation of electrical temporary facilities. Electrical equipment and devices installed as temporary facilities shall, upon removal, remain the property of the Installer. All debris and unused materials shall be removed from the site at the Contractors expense.

B. Restore any permanent equipment used for temporary facilities to original condition including lamps that have been in operation for one half or more of their rated life. All equipment shall be cleaned and touched up with manufacturer's matching paint. Light fixtures shall be carefully cleaned so as to not scratch or dull specular surfaces.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. The Division 1 General Conditions applying to the General Contractor also apply to this Subcontractor as modified by Division 26 requirements.

1.2 GENERAL CONDITIONS

A. Provide wires, cables, and connector products which are UL-listed and labeled for the temperature, conditions, and location where installed.

B. All wiring shall be installed in raceways per Section 26 0533 unless specifically noted or specified otherwise.

C. Type MC cable is only approved for use as lighting fixture whips of 6-foot length or less on this project, unless other uses are preapproved by Architect/Engineer.

1.3 CODES AND STANDARDS

A. NEC Compliance: Comply with applicable requirements of NEC (current edition) for construction and installation of wires/cables and connectors.

B. UL Compliance: Comply with UL Standards 83 and 486A.

C. NEMA/ICEA Compliance: Comply with NEMA/ICEA Std Pub/no. WC-5.

D. ASTM Compliance: Comply with ASTM B1, 2, 3, and 8.

1.4 DESCRIPTION OF WORK

A. The requirements of this section apply to cable, wire and conductor splices for work indicated in drawings, schedules and elsewhere in these specifications.

B. Copper conductors for systems less than 50V including remote control, signaling, and communications circuits.

C. The types of connectors suitable for copper conductors, as applicable, required for the project include the following:
   1. Solderless pressure type
   2. Compression type
   3. Split-bolt type

1.5 CONTROL WIRING

A. Control wiring shall be in accordance with this section, No. 16AWG minimum size or as recommended by manufacturer of systems equipment (motor control, alarm systems, communications, etc.)

1.6 SPECIAL SYSTEM WIRE AND CABLE

A. Clock system wire:
   1. This project does not require clock system wiring.

B. Refer to the following sections for wiring for other special systems:
   1. Section 283111 or Section 283112 for fire alarm system wire.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. American Insulated Wire Corp.
   2. Brintec Corp.
   3. Carol Cable Co. Inc.
   4. Senator Wire and Cable Co.
   5. Southwire Company

B. Copper conductors shall be furnished for all wires and cables. No aluminum or copper clad aluminum conductors will be allowed.

C. For voltages greater than 50V, provide wire and cable listed for 600V.

D. Conductor Color Coding: Provide color coding for secondary service, feeder, and branch circuit conductors throughout the project secondary electrical system as follows:

208 or 240/120 Volts	Conductor	480/277 Volts
Black	A Phase	Brown
Red	B Phase	Orange
Blue	C Phase	Yellow
White	Neutral	Gray
Green	Equipment Ground	Green
Green/yellow stripe	Isolated Ground	Green/yellow stripe

   1. Conductors No. 10 and smaller shall have color factory-applied the entire length of the conductors. Conductors No. 8 and larger may instead have colors applied according to Section 26 0533.
   2. Control and Special Systems: In accordance with ICEA or equipment manufacturer's recommendations.

E. Provide THHN/THWN insulation for all conductors size 500MCM and larger. For all other sizes, unless otherwise noted, provide THW, THHN/THWN or XHHW insulation as appropriate for the locations where installed. Provide types THW, THHW, THWN installation for conductors installed underground, under floor, or in wet locations. Provide USE insulation for underground service cable when specified in drawings.

F. Conductors and Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THW, Type THHN/THWN, Type THWN-2, Type XHHW and Type USE.

G. Multi-conductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for Type AC, Type MC, Type MI, Type NM, Type SO, and Type USE with ground wire.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. AMP
   2. 3M Company
   3. O-Z/Gedney Co.
   4. Square D Company

B. For voltages greater than 50V, provide connectors listed for 600V.

C. Description: Factory-fabricated, solderless, metal connectors and splices of sizes, amp ratings, materials, types, and classes for applications and services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

PART 3 - EXECUTION

3.1 WIRING METHODS

A. Wire sizes shall be as noted on the drawings. Wire shall be a minimum of No. 12 AWG unless noted otherwise.

B. No more than three circuits shall be allowed in a raceway. Where more than three (3) current carrying conductors are installed in a raceway, comply with NEC adjustment factors for reduced ampacity and for higher ambient temperatures.

C. Each circuit shall have a green grounding conductor installed with the phase and neutral conductors. The grounding conductor shall be sized as indicated and/or per the NEC. Refer to Section 26 0526.

D. Neutrals shall not be combined on branch circuits. A separate neutral shall be installed for each circuit. Multiconductor circuits are not allowed, except within UL listed equipment.

E. Feeders and Branch Circuits: Copper; solid or stranded for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

F. Service Entrance: Type THHN/THWN single conductors in raceway, Type XHHW single conductors in raceway, or, when specified, Type USE single conductors in raceway or direct burial.

G. Exposed Feeders, Branch Circuits, and Class 1 Control Circuits, Including in Crawlspaces: Type THHN/THWN single conductors in raceway.

H. Feeders and Branch Circuits Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN single conductors in raceway.

I. Feeders and Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN single conductors in raceway.

J. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, and strain-relief device at terminations to suit application.

K. Class 2 Control Circuits: Type THHN/THWN single conductors, or approved control system's pre-made cables in raceway. Where pre-made cables are connector type for connecting to open control modules, raceway shall terminate with protective bushing near control module allowing cable to be disconnected and reconnected easily.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. The wiring layout indicated on the drawings is intended to be diagrammatic and minor variances to accommodate the building structure are acceptable. If the Contractor desires to make major modifications to the general layout, (i.e. install conduits overhead where indicated to be underfloor, etc.), he shall obtain the approval of the Architect/Engineer before beginning the changes.

B. Complete raceway installation between conductor and cable termination points according to Section 26 0533 prior to pulling conductors and cables.

C. Complete cable tray installation as applicable according to Section 26 0536 prior to pulling cables.

D. Install sleeves and sleeve seals at penetrations of exterior concrete floor and exterior concrete wall assemblies. Comply with requirements in Section 26 0544.

E. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

F. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

G. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway. Do not use rope hitches for pulling attachment to wire or cable.

H. Pull conductors simultaneously where more than one is being installed in same raceway. Use manufacturer-approved pulling compound or lubricant, where necessary.

I. 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-486B.

J. Make splices, terminations, and taps that are compatible with conductor material. Install conductor at each outlet, with at least 6 inches of slack.

K. Splices: No splices or joints will be permitted in feeders or branches except at outlets or accessible junction boxes. Secure joints in branch circuit wiring mechanically and electrically with solderless connectors as listed by Underwriters Laboratories, Inc., pressure cable type, 600-volt rating, compression type. Install approved insulated connectors integral or separate cover to provide insulating value equal to that of the conductors being joined

L. Identify conductors and cables according to Section 26 0533.

3.3 FIELD QUALITY CONTROL

A. When the wiring has been pulled in and before tying into circuit breakers, motors, etc., test each conductor to ground and between conductors on each conduit run with a 600V DC "megger".
   1. Insulation should show a resistance reading of 150 megohms or higher. Any conductor in a conduit that doesn't, or shows a significantly lower resistance than the other conductors in the same conduit must be thoroughly checked and replaced

B. Prior to energizing, test wires and cables for electrical continuity.

C. Subsequent to wire and cable hook-ups, energize circuits and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Division 1 General Conditions applying to the General Contractor also apply to this Subcontractor as modified by Division 26 requirements.

1.2 SECTION REQUIREMENTS

A. Steel slotted support systems shall be submitted for approval.

B. REFER TO SECTIONS 01 3000 AND 26 0010 FOR SUBMITTAL FORM AND REQUIREMENTS:

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: U-Channel, 16-gauge steel channels with 9/16" diameter holes a minimum of 8" on center in top surface, "Unistrut" or approved equal. Provide fittings and accessories that mate and match U-channel and are of the same manufacture. Comply with MFMA-4, factory-fabricated components for field assembly.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. Unistrut
      b. Thomas and Betts
      c. Gregory Industries, Inc.
      d. Flex-Strut
      e. Haydon Corporation, Inc.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit, Cable, and Box Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings. Shall be "Caddy" or approved equivalent.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. Caddy.
      b. Cooper B-Line.
      c. Steel City.

D. Mounting, Anchoring, and Attachment Components:
   1. Powder-Actuated Fasteners: Threaded heat-treated steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   2. Mechanical-Expansion Anchors: Insert-wedge type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.

4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 SUPPORT INSTALLATION

A. Comply with NFPA 70, NECA 1, and NECA 101 for installation requirements except as specified in this Article.

B. Separate dissimilar metals and metal products from contact with wood or cementitious materials by painting each metal surface in area of contact with a bituminous coating or by other permanent separation.

C. Raceway Support Methods: In addition to methods described in NECA 1, EMT and RMC may be supported by existing openings through structure members, as permitted in NFPA 70.

D. Parallel Runs of Horizontal Raceways: Install on trapeze-type supports fabricated with approved U-channel.

E. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4-inch-diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.

F. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb at each support.

G. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69 or Spring-tension clamps.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount on slotted-channel racks attached to substrate.

H. Support exposed and concealed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at the box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.

I. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.

J. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

K. Conduit, Cable, and Boxes shall be mounted to the structural members with approved mounting clips.

L. Vertical Conductor Supports: Install simultaneously with installation of conductors

M. Boxes mounted in metal stud walls:
   1. All single gang boxes shall be mounted with approved mounting clips.
   2. All multiple gang boxes shall be mounted with Caddy #TSGB or equal box supports.
   3. Conduits shall be secured to studs with approved clips.

N. Support outlet boxes above suspended ceilings from the structure above. Provide outlets occurring at locations other than at the main ceiling channels with auxiliary metal cross members of adequate strength and stiffness. Conduits above suspended ceilings and flexible metallic raceway runs from junction boxes above removable suspended ceilings shall be adequately fastened to ceiling supporting members by means of clamps, spring clips, or other positive devices.

O. Device Box Supports: All device boxes mounted in metal stud walls shall be mounted with approved mounting clips and conduits secured with approved clips. 4" square and multi-gang boxes shall have far-side box supports.

P. Miscellaneous Supports: Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.

Q. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including but not limited to conduits, raceways, cables, cable trays, busways, cabinets, panelboards, transformers, boxes, disconnect switches, and control components in accordance with the following:
   1. Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, and machine screws, welded threaded studs, or spring-tension clamps on steel. Threaded studs driven by a powder charge and provided with lock washers and nuts may be used instead of expansion bolts and machine or wood screws. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures. In partitions of light steel construction, use sheet metal screws.
   2. Holes cut to depth of more than 1-1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete shall not cut the main reinforcing bars. Fill holes that are not used.
   3. Ensure that the load applied to any fastener does not exceed 25 percent of the proof test load. Use vibration-resistant and shock-resistant fasteners for attachments to concrete slabs.

R. Do not use wooden plugs inserted in masonry or concrete as a base to secure conduit supports. Provide toggle bolts for use with hollow concrete masonry units (CMU), and wedge anchors in concrete or brick. Hangers and devices for mounting of electrical equipment and devices shall be galvanized or otherwise protected from rusting by an approved method.

END OF SECTION

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SECTION 26 0533

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. The Division 1 General Conditions applying to the General Contractor also apply to this Subcontractor as modified by Division 26 requirements.

B. Submittals:
1. Product Data and Shop Drawings for custom enclosures and cabinets.
2. Manufacturer's data on raceways, boxes, and fittings.
3. REFER TO SECTIONS 01 3000 AND 26 0533 FOR SUBMITTAL FORM AND REQUIREMENTS.

PART 2 - PRODUCTS

2.1 GENERAL

A. Products shall be new and undamaged. Raceways shall be a standard cataloged product of the manufacturer. Minimum conduit size shall be ¾", except for fire alarm FMC whips which shall be ½".

B. Conduit will be color coded as follows:
1. Normal power – Galvanized or no color
2. Emergency power – Yellow
3. Fire alarm - Red

2.2 GENERAL COMPLIANCE

A. NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of raceways, boxes, and fittings.

B. Listing and Labeling: raceways, boxes, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. NEMA Compliance: Comply with National Electrical Manufacturers Association standards as applicable to nonmetallic fittings for underground installation.

D. NECA Standard: Comply with applicable portions of the National Electrical Contractors Association's "Standard of Installation".

2.3 CONDUITS, TUBING, FITTINGS, AND WIREWAY MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, conduits, tubing, fittings, and wireways shall be manufactured by firms regularly engaged in the manufacture of conduits, tubing, fittings, and wireways of the types and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Conduit Bodies:
   a. Appleton Electric Co.
   b. Crouse-Hinds Co.
   c. Killark Electric Mfg. Co.
   d. Pyle-National Co.
2. Bushings, Knockout Closures, and Locknuts:
   a. Allen-Stevens Conduit Fittings Corp.

b. Allied Metal Stamping, Inc.
c. Appleton Electric Co.
d. Carr Co.
e. Raco, Inc.
f. Steel City
g. Midland-Ross Corp.
h. Thomas and Betts Co., Inc.

2.4 METAL CONDUITS, TUBING, AND FITTINGS

A. Conduit Bodies: Provide galvanized cast metal conduit bodies (condulets), of the type, shape, and size, to suit each respective location and installation, constructed with threaded conduit hubs, removable cover with gasket, and corrosion resistant screws.

B. Conduit fittings shall conform to UL 467 and UL 514 as applicable for rigid metal conduit, flexible metal conduit, EMT, and MI cable. Fittings for each type of conduits shall be of the same material as the conduit and when installed underground or in wet locations, they shall provide a watertight joint.

C. Bushings, Knockout Closures and Locknuts: Provide corrosion resistant punched steel box knockout closures, conduit locknuts and malleable iron conduit bushings of the type and size to suit each respective use and installation.

D. Galvanized Rigid Conduit (GRC)
1. Comply with ANSI C80.1 and UL 6.
2. Rigid galvanized steel conduit shall be hot-dip galvanized steel with threads hot-dip galvanized after cutting.
3. Provide threaded GRC fittings.

E. Electrical Metallic Tubing (EMT)
1. Comply with ANSI C80.3 and UL 797.
2. Electrical metallic tubing shall be hot galvanized steel tubing with an additional outside and inside urethane or similar coating for further rust protection.
3. Provide steel compression fittings. Cast fittings, setscrew fittings, and indent fittings will not be accepted.

F. Flexible Metal Conduit (FMC)
1. Comply with UL 1.
2. Flexible metal conduit shall be zinc-coated steel.

G. Liquidtight Flexible Metal Conduit (LFMC)
1. Comply with UL 360.
2. Liquid-tight flexible metal conduit shall be comprised of single strip, continuous, flexible, interlocked, double wrapped steel, galvanized inside and outside; forming smooth internal wiring channel; liquid tight jacket of flexible polyvinyl chloride (PVC). Provide separate green insulated equipment grounding conductor.
3. Liquid-tight flexible metal conduit shall be produced in accordance with U.L. Standard #360.

H. PVC Externally Coated Rigid Galvanized Steel Conduit and Fittings
1. The galvanized conduit, prior to plastic coating, shall be new, unused material and conform to specifications given above for galvanized rigid conduit.
2. The exterior galvanized surfaces shall be coated with primer before PVC coating to insure a bond between the zinc substrate and the PVC coating.
3. Nominal thickness of the exterior coating shall be 40 mils
4. A PVC sleeve extending one pipe diameter or two inches, whichever is less, shall be formed at every female conduit opening on fittings except unions. The inside diameter of the sleeve shall be the same as the outside diameter of the conduit to be used.
5. The PVC coating on the exterior of conduit couplings shall have a series of longitudinal ribs 40 mils thick to protect the coating from tool damage during installation.

6. A urethane coating shall be uniformly and consistently applied to the interior of all conduit and fittings. This internal coating shall be a nominal two mil thickness. Conduit having areas with thin or no coating will not be accepted.
7. All male and female threads on conduit, elbows and nipples shall be protected by application of a urethane coating.
8. Conduit bodies shall be supplied with stainless steel cover screws. Screw heads shall be encapsulated with plastic to assure corrosion protection.

I. Raceway Fittings: Specifically designed for raceway type used in Project.

2.5 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Electrical Nonmetallic Tubing: Comply with NEMA TC 13 and UL 1653.

B. Rigid Nonmetallic Conduit (RNC)
1. Comply with NEMA TC 2 and UL 651 unless otherwise indicated.
2. Provide nonmetallic conduit and fittings of the type, grade, size and weight (wall thickness) indicated for each service. Where type and grade are not indicated, provide proper selection as determined by the Installer to fulfill the wiring requirements (Schedule 40 minimum, unless noted otherwise). Type selected shall comply with the National Electrical Code and all applicable standards.

C. Raceway Fittings: Specifically designed for raceway type used in Project.

2.6 METAL WIREWAYS

A. Description: Rigid steel sheets formed into rectangular or square shapes and totally enclosed. It shall comply with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and be sized as indicated on drawings or according to NFPA 70.
1. Fittings: Specifically designed for raceway type used in Project.
2. Covers: Hinged-cover type unless otherwise indicated.
3. Finish: Manufacturer's standard enamel finish.

2.7 SURFACE RACEWAY SYSTEMS

A. Manufacturers
1. Manufacturers: Subject to compliance with requirements, surface raceway systems shall be manufactured by firms regularly engaged in the manufacture of surface raceway systems of the types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years. Provide Legrand “Wiremold” system or approved equivalent system Available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Legrand
   b. Hoffman
   c. Hellermann Tyton
   d. National Electric Products Co.
2. Substitutions: Under provisions of Division 01.

B. Surface raceways shall be metal, paintable, and sized in accordance with the wiring installed. Furnish raceway system complete with all necessary accessories, hardware, and fittings for a complete system as recommended by the manufacturer.

C. Surface raceway color shall match the mounting surface, unless otherwise noted.

2.8 CONDUIT AND TUBING ACCESSORIES

A. Provide conduit and tubing accessories including straps, hangers, supports and expansion joints, bonding jumpers and conduit seals for hazardous areas as required and as recommended by the conduit and tubing manufacturer.

2.9 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, boxes, enclosures, and cabinets shall be manufactured by firms regularly engaged in the manufacture of boxes, enclosures, and cabinets of the types and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Interior Outlet Boxes:
    a. Appleton Electric Co.
    b. Arrow Conduit and Fittings Corp.
    c. National Electric Products Co.
    d. Steel City
    e. Midland-Ross Corp.
    f. Raco
2. Weatherproof Outlet Boxes
    a. Appleton Electric Co.
    b. Crouse-Hinds Co.
    c. Harvey Hubbell, Inc.
    d. Pyle-National Co.
3. Junction and Pull Boxes:
    a. Arrow-Hart, Inc.
    b. General Electric Co.
    c. Keystone Columbia, Inc.
    d. Square “D” Co.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Malleable Iron Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Boxes shall be provided in wiring or raceway systems wherever required for pulling of wires, making connections, and mounting devices or fixtures. Construction and design of boxes to be the best adapted for the location, fixture and/or device. Boxes shall be of the cast metal hub type when located in normally wet locations, when surface mounted on outside of exterior surfaces, in hazardous areas, and when installed exposed up to seven (7) feet above interior floors and walkways. Boxes in other locations shall be sheet steel.

F. Interior Boxes:

1. Concealed Work: Provide galvanized steel interior outlet wiring boxes of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices.
2. Exposed Work: Provide die-cast alloy outlet wiring boxes of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with integral conduit hubs and tapped holes for securing box covers or wiring devices.
3. Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps and metal straps for

supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations. Choice of accessories is Installer's option.

G. Pull boxes shall be constructed of code gage galvanized sheet steel except where cast metal boxes are required in location specified herein.

H. Covers shall be provided on outlet boxes, pull boxes and junction boxes if no device or fixture is attached. Covers shall be blank, suitable for painting and exactly fit the box.

I. Weatherproof Outlet Boxes: Provide corrosion-resistant cast metal weatherproof outlet wiring boxes, of the type, shape and size, including depth of box, with threaded conduit ends, cast metal face plate with spring-hinged waterproof cap suitably configured for each application, including face plate gasket and corrosion proof fasteners.

J. Junction and Pull Boxes: Provide galvanized sheet steel junction and pull boxes, with screw-on covers; of the type, shape and size, to suit each respective location and installation; with welded seams and equipped with steel nuts, bolts, screws and washers.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

A. Provide color-coded thread protectors on the exposed threads of threaded rigid metal conduit. Handle conduit and tubing carefully to prevent end-damage and to avoid scoring the finish. Store conduit and tubing inside and protect from weather. When necessary to store outdoors, elevate well above grade and enclose with durable, waterproof wrapping.

3.2 INSTALLATION

A. General Installation

1. Install raceways, boxes, and fittings as indicated, in compliance with NEC requirements, in accordance with the manufacturer's written instructions, and with recognized industry practices to ensure that the boxes and fittings service the intended purposes.
2. Provide knockout closures to cap unused knockout holes where blanks have been removed. Locate boxes and conduit bodies to ensure accessibility of electrical wiring. Avoid using round boxes where conduit must enter box through side of box, which would result in a difficult and insecure connection with a locknut or bushing on the rounded surface. Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.
3. Furnish and install outlet boxes for the various special systems such as intercommunication, burglar alarm, television, fire alarm, etc., as well as special outlets to accommodate devices, of such size, type, material and configuration as required to suit the equipment provided, type of occupancy, and space available. In the event the approved equipment for these special systems requires boxes, the contractor shall furnish and install the boxes, conduit and all required fittings at no increase in the contract amount.
4. Install outlet boxes for switches and receptacles in finished walls, except for special applications as specified herein or indicated of one-piece standard gang type, a minimum of 4" x 1 1/2" deep for one device and 6 7/8" x 4" x 1 1/2" deep for two devices, with plaster covers and rectangular openings of proper size and shape. Install other special boxes as shown on drawings or details as necessary to meet structural requirements.
5. Install outlet boxes at mounting heights indicated on the drawings. Install those not definitely located or where the heights interfere with mechanical, architectural, or structural elements as directed by the Architect. Outlet mounting heights are construed to mean the distance from centerline of cover plate to finished floor unless otherwise noted. Generally, receptacle heights shall be 18" and wall switches shall be mounted 48" high above the finished floor to the center of the device. These heights may be adjusted with permission, if necessary to more nearly fit architectural features and shall comply with the ADA. Other heights shall be as noted or as necessary to meet equipment or safety requirements.

6. In no instance will boxes be allowed to be installed back-to-back in rooms with tenants such as, nursing homes, dormitories, hospital rooms, etc., or in rooms which need to sound isolated such as conference rooms, exam rooms, classrooms, etc.
7. "Outdoor Raceways Applications" and "Indoor Raceways Applications" sections below provide examples of application requirements for various types of raceways. Coordinate with Drawings. Unless noted otherwise, provide conduit systems as described below for the conditions given.
    a. Outdoor Raceways Applications:
        1) Exposed or Concealed: GRC
        2) Underground or in concrete: RNC
        3) Connection to Vibrating Equipment (dry-type transformers, motors, recessed luminaires, etc.): LFMC (12” minimum and 72” maximum)
        4) Corrosive environments – PVC coated GRC
        5) Boxes and Enclosures: Metallic, NEMA 250, Type 3R, Type 4, or Type 4X
    b. Indoor Raceways Applications:
        1) Exposed or Concealed: EMT; for 3” and larger use GRC
        2) Underground or in concrete: RNC
        3) Connection to Vibrating Equipment (dry-type transformers, motors, recessed luminaires, etc.): FMC; in wet or damp locations use LFMC (12” minimum and 72” maximum)
        4) Damp or Wet Locations: GRC
        5) Corrosive environments – Stainless Steel RC
        6) Boxes and Enclosures: Metallic, NEMA 250, Type 1, unless otherwise indicated.
8. Install conduit and tubing products as indicated, in accordance with the manufacturer's written instructions, the applicable requirements of NEC, the National Electrical Contractors Association's "Standard of Installation", and in accordance with recognized industry practices to ensure that products serve the intended function.
9. All conduits installed below grade, under-floor, or in damp areas shall have connections coated with an approved sealant and tightened securely to make each joint waterproof.
10. Conduits shall be of sizes required to accommodate the number and size of conductors required in accordance with the tables given in the latest edition of the National Electrical Code. Where space will not permit the installation of one conduit of sufficient size to contain the conductors of a circuit required, two conduits shall be provided, each conduit shall contain duplicate phase, neutral and grounding conductors. The number and size of conduits indicated on the drawings are a minimum for the various systems required. If larger conduits or greater numbers are required, they shall be provided as necessary to accommodate the wiring as recommended by the manufacturer supplying the particular equipment. Where more than three (3) current carrying conductors are installed in a raceway, comply with NEC adjustment factors for reduced ampacity and for higher ambient temperatures.
11. Conduit and electrical metallic tubing shall be cut square, reamed smooth and drawn up tight.
12. Maintain electrical continuity throughout metallic raceway systems. Install removable cover pull boxes on long runs. Allow for natural drain of condensate. Install conduit bushings at all boxes, cabinets, etc. and at the termination ends of conduit stub-outs.
13. Do not use wooden plugs inserted in masonry or concrete as a base to secure conduit supports. Provide toggle bolts for use with hollow concrete masonry units (CMU), and wedge anchors in concrete or brick. Hangers and devices for mounting of electrical equipment and devices shall be galvanized or otherwise protected from rusting by an approved method.
14. Where wiring is required to be installed on the surface of walls in finished spaces, it shall be installed in surface raceway systems. Installation of surface raceways shall be in accordance with the manufacturer's instructions. In unfinished spaces such as mechanical rooms, surface mount conduit shall be acceptable.
15. Complete each electrical raceway system before installing cables or wire.
16. All raceway systems shall be equipped with a separate, green insulated equipment grounding conductor installed with the circuit conductors. In no case shall the grounding properties of the raceway itself be relied upon as the sole grounding means.
17. Wire pulling lubricants, when utilized, shall be in accordance with the requirements of Underwriters Laboratories, Inc., applicable to the specific conductor or cable insulation and raceway material.
18. Install nylon pull rope having 600 LB tensile strength in all empty conduits. Leave 12" of tail at each end.

19. RNC or PVC Externally Coated conduit shall not be installed above grade indoors except as specifically noted or detailed.

B. Conduit through or in concrete:
   1. Conduit shall be installed under concrete, unless specifically noted or detailed otherwise.
   2. Install raceways embedded in concrete in middle third of concrete thickness where practical, and leave at least 1-inch thick concrete cover. Conduits shall not be larger in outside diameter than 1/3 the thickness of the concrete in which they are embedded.
   3. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
   4. Space raceways laterally a minimum of three diameters to prevent voids in concrete.
   5. Install conduit larger than 1-inch trade size, parallel to, or at right angles to main reinforcement. Where conduit is at right angles to reinforcement, place conduit close to slab support.
   6. Transition from nonmetallic tubing or RNC to PVC Externally Coated Rigid Galvanized Steel sweeps and risers before rising from concrete outdoors, and to GRC before rising from concrete indoors. In no case shall PVC conduit be stubbed up from concrete, unless specifically noted or detailed.
   7. Arrange raceways to cross building expansion joints at right angles with expansion fittings. Install expansion fittings on runs over 150 feet long. Expansion fittings shall be telescopic and waterproof and permit a movement up to 4 inches. Fittings shall be equipped with approved bonding jumpers around or through each fitting.

C. Routing:
   1. Install raceways and cables concealed within finished walls, ceilings, and floors unless in mechanical rooms or otherwise indicated.
   2. Route concealed conduits in as direct a line with as long bends as possible. Exposed conduits shall be routed parallel to or at right angles to the lines of the building. Boxes, plates, and etc. shall be accurately set plumb and level. Where conduits are routed exposed, right angle bends shall be made with standard conduit ells or field bends to not less than the same radius. All bends shall be free from dents or flattening. Not more than the equivalent of four quarter bends shall be used in any run between terminals at cabinets, outlets, junction boxes or pull boxes.
   3. Route horizontal runs of concealed conduit close to ceiling beams, passing across and above water, steam, or other piping, etc., where possible.
   4. Install raceways and cables at least 6 inches away from parallel runs of flues and steam or hot-water pipes.
   5. Except as otherwise indicated, arrange electrical services and overhead equipment with a minimum of 7'-0" headroom in storage spaces, and 8'-6" headroom in other spaces. Arrange work to facilitate maintenance and repair or replacement of equipment. Locate services requiring maintenance on wiring devices and similar units in front of services requiring less maintenance.
   6. Connect equipment for ease of disconnecting, with minimum of interference with luminaries, with ceiling finish, suspension, ductwork, air diffusers and other work, so that required performances of each will be achieved.
   7. Do not install conduits through beams without special permission of the Architect unless specifically detailed or noted in drawings or specifications.
   8. Flush mounted panelboards shall have three (3) ¾ inch empty conduits extended from the panelboard into accessible ceiling space, terminating in a 6" x 6" x 4" pull box with screw cover for future use. Install other future conduits as noted or required for future systems as directed by Architect/Engineer.

D. Terminations:
   1. Terminate all rigid steel conduits with double lock nuts and bushings or hubs. For grounding purposes, secure EMT terminations at outlet boxes, junction boxes, panelboard cabinets, etc., with steel interlocking compression connectors. Set screws or indentations will not be accepted as a method of attachment of fittings to conduit or electrical metallic tubing.
   2. Equip rigid steel conduit with insulated end bushings. Provide electrical metallic tubing 3/4" and larger with insulated connectors or end bushings. Bushings shall be of the type to prevent abrasion of wires without impairing the continuity of the conduit system grounding. The insulating insert material shall be thermoplastic molded and locked into the steel casing forming the body of the connector or bushing.

3. Provide the ends of each conduit or tubing in outlet boxes, pull boxes, and cabinets with blank discs ("pennies") inserted in bushings or other approved bushing closures to prevent the entrance of foreign material during the construction period. Conduits left empty for future wiring shall also be so equipped.

E. Special raceway systems:
1. Install conduits for thermostats, control, interlock wiring, and as otherwise required to effect proper operation of all systems specified in this and other sections of the specifications. Also provide empty conduits for future systems as required in the specifications and as noted or shown on the drawings.
2. Communication raceways:
   a. Minimum size of telephone and data conduits shall be 1”.
   b. Provide telephone conduit system suitable for installation of fiber optic cable having a minimum bend radius of 8". All sweeps, pull boxes, and junction boxes shall accommodate this minimum radius. No conduit bodies shall be installed in the telephone raceway system, unless specifically indicated on the drawings.
   c. Install a pull rope with 12" of tail in all empty communication raceways.
3. Existing unmarked Fire Alarm raceways in project areas with fire alarm work:
   a. Junction box covers shall be painted red.
   b. Conduit runs over 10ft shall be painted red for 3 feet on the visible side a minimum of every 10 feet.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior concrete floor and exterior concrete wall assemblies. Comply with requirements in Section 26 0544.

3.4 FIRESTOPPING

A. Install fire-stopping at penetrations of fire-rated floor and wall assemblies sufficient to maintain original fire-rating.

END OF SECTION

SECTION 26 0553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Division 1 General Conditions applying to the General Contractor also apply to this Subcontractor as modified by Division 26 requirements.

1.2 SECTION REQUIRMENTS

A. Identification materials and accessories shall be submitted for approval.

B. REFER TO SECTIONS 01 3000 AND 26 0010 FOR SUBMITTAL FORM AND REQUIREMENTS.

1.3 CODES AND STANDARDS

A. Comply with NFPA 70 "National Electrical Code."

B. Comply with ANSI Standard A13.1, "Scheme for the Identification of Piping Systems," with regard to type and size of lettering for raceway and cable labels.

1.4 DESCRIPTION OF WORK

A. The extent of the electrical systems and equipment requiring identification is shown on the drawings and the extent of identification required is specified herein and in individual sections of work requiring identification.

B. The types of electrical identification specified in this section include the following:
1. Cable/conductor identification
2. Conduit identification
3. Danger signs
4. Equipment/system identification signs
5. Receptacles and switch circuit identification

PART 2 - PRODUCTS

2.1 ELECTRICAL IDENTIFICATION MATERIAL

A. General: Except as otherwise indicated, provide manufacturer's standard products of the categories and types required for each application.

B. Baked Enamel Danger Signs: Provide manufacturer's standard Danger Signs of baked enamel finish on 20 gauge steel of standard red, black and white graphics with recognized standard wording where applicable. Signs shall be 14" x 10" in size except where physically too large to apply, in which case 10" x 7" signs shall be used.

C. Engraved Plastic Laminate Signs: Provide engraving stock melamine plastic laminate, complying with FS-L-P-387 for all electrical equipment provided, installed or connected by the Contractor. Signs shall be black with white core, and shall be of suitable size to for the equipment to which they are attached.
1. Thickness: 1/16" for units up to 20 square inches or 8" length 1/8" for larger units.
2. Size: Unless noted otherwise, provide single line of text, 3/8" high lettering on 1" high sign (2" high where 2 lines are required).

3. Fasteners: Self-tapping stainless steel screws, except where screws cannot or should not penetrate the substrate use contact type permanent adhesive.

D. Fasteners for Plastic Laminated and Metal Signs: Epoxy adhesive or self tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers

E. Adhesive backed vinyl markers: Provide self-stick markers of standard color and wording for voltage and system identification of equipment, raceways and enclosures (Emergency, Lighting, Power, Light, Power DC, Air Conditioning, Communications, Control, Fire, etc)
   1. Label Size as follows:
      a. Raceways 1 Inch and Smaller: 1 1/8 inches high by 4 inches long.
      b. Raceways larger than 1 Inch: 1 1/8 inches high by 8 inches long.

F. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.

G. Pretensioned Flexible Wraparound Colored Plastic Sleeves for Raceway and Cable Identification: Flexible acrylic bands sized to suit the raceway diameter and arranged to stay in place by pre tensioned gripping action when coiled around the raceway or cable.

H. Wire/Cable Designation Tape Markers: Vinyl or vinyl cloth, self adhesive, wraparound, cable/conductor markers with pre-printed numbers and letter.

I. Aluminum, Wraparound, Cable Marker Bands: Bands cut from 0.014 inch thick, aluminum sheet, fitted with slots or ears for securing permanently around wire or cable jacket or around groups of conductors. Provide for legend application with stamped letters or numbers.

J. Underground Line Marking Tape: Permanent, bright colored, continuous printed, acid and alkali-resistant polyethylene film for direct burial service not less than 6 inches wide with minimum thickness of 0.004 inch. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise with an elongation factor of 350 percent. Tape color shall be as specified in Table 1 below, and shall bear a continuous printed inscription describing the specific utility.

Table 1 - Tape Color

Red	Electric
Yellow	Gas, Oil, Dangerous Materials
Orange	Telephone, Telegraph, Television, Police, and Fire Communication
Blue	Water System
Green	Sewer Systems

K. Switch and Receptacle Covers: Provide and install circuit identification label with black or white letters (to best contrast wall plates) on clear adhesive tape. Size shall be 3/8" wide and a maximum of 1-3/4" long. Each label shall show panelboard and circuit number, i.e., 1N2Y-12 with letter and numbers a minimum of 1/8" high. Where receptacle is dedicated to serving a piece of equipment, label shall also show equipment name. Brady BMP21 electronic labeling system or approved equal. Provide labels for all receptacles and switches including those not provided by division 26. Dymo type tape system is not acceptable.

2.2 CONDUIT AND JUNCTION BOX IDENTIFICATION

A. Provide junction box and pull-box exterior labeling indicating all panels and circuit numbers, or signal systems contained in the junction box. Label all junction boxes.

B. Provide heat shrink conduit identification to indicate origination point of all conduits stubbing up from underground into equipment. Also provide conduit identification at 20'-0" intervals along corridors, and 10'-0" intervals in electrical and mechanical rooms.

C. Band exposed or accessible raceways of the following systems for identification: Bands shall be pretensioned plastic sleeves, colored adhesive marking tape, or a combination of the two. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two color markings in contact, side by side. Install bands at changes in direction, at penetrations of walls and floors, and at 40-foot maximum intervals in straight runs. Apply the following colors:
1. Fire Alarm System: Red
2. Fire-Suppression Supervisory and Control System: Red and yellow
3. Emergency Power: Yellow
4. Security System: Blue and yellow
5. Mechanical and Electrical Supervisory System: Green and blue
6. Telecommunication System: Green and yellow
7. Control Wiring: Green and red

D. Identify Junction, Pull, and Connection Boxes: Code required caution sign for boxes shall be pressure sensitive, self-adhesive label indicating system voltage in black, pre-printed on orange background. Install on outside of box cover. Also label box covers with identity of contained circuits. Use pressure sensitive plastic labels at exposed locations and similar labels or plasticized card stock tags at concealed boxes.

PART 3 - EXECUTION

3.1 APPLICATION, INSTALLATION, AND GENERAL INSTALLATION REQUIREMENTS

A. Coordination: Install identification after completion of painting.

B. Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.

C. Install identification devices in accordance with manufacturer's written instructions and requirements of NEC.

D. Regulations: Comply with NEC Article 110, governing regulations, and the requests of governing authorities for the identification of electrical work.

E. Conductors #10 and smaller shall have color factory applied the entire length of the conductors according to Section 26 0519. Conductors #8 and larger shall have colors applied as follows:
1. The following field applied color coding methods may be used in lieu of factory coded wire (See Section 26 0519 for color code) for sizes larger than No. 10 AWG:
    a. Apply 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 the last two laps of tape with no tension to prevent possible unwinding. Use 1 inch wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration.
    b. In lieu of pressure sensitive tape, colored cable ties may be used for color identification. Apply three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten for snug fit, and cut off excess length.

F. Tag or label conductors as follows:

1. Future Connections: Conductors indicated to be for future connection or connection under another contract with identification indicating source and circuit numbers.
2. Multiple Circuits: Where multiple branch circuits or control wiring or communications/signal conductors are present in the same box or enclosure (except for three circuit, four wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by means of coded color of conductor insulation. For control and communications/signal wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.
3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

G. Apply warning, caution, and instruction signs and stencils as follows:
1. Install warning, caution, or instruction signs where required by NEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plastic laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items.
2. Emergency Operating Signs: Install engraved laminate signs with white legend on red background with minimum 3/8 inch high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.

H. Install equipment/system circuit/device identification as follows:
1. Apply equipment identification labels of engraved plastic laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with 1/2 inch high lettering on 1 inch high label (2 inch high where two lines are required), white lettering in black field. Text shall match terminology and numbering of the Contract Documents and shop drawings. Apply labels for each unit of the following categories of electrical equipment.
    a. Panelboards, electrical cabinets, and enclosures
    b. Access doors and panels for concealed electrical items
    c. Electrical switchboards and switchgear
    d. Transformers
    e. Motor starters and motor controllers
    f. Pushbutton stations
    g. Clock/program master equipment
    h. Call system master station
    i. Fire alarm master station or control panel and major equipment
    j. Intrusion alarm control panel and major equipment
    k. Any device serving a remote load

I. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, and similar items for power distribution and control components above, except panelboards and alarm/signal components, where labeling is specified elsewhere. For new panelboards or panelboards affected by this project, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

J. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

K. Underground Line Marking Tape: Warning tapes shall be installed directly above the conduit, at a depth of 6 to 8 inches below finished grade unless otherwise indicated. Where multiple lines installed in a common trench or concrete envelope, do not exceed an overall width of 16 inches; install a single line marker.

END OF SECTION

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SECTION 26 2726

WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Division 1 General Conditions applying to the General Contractor also apply to this Subcontractor as modified by Division 26 requirements.

1.2 SECTION REQUIREMENTS

A. Wiring devices shall be submitted for approval.

B. REFER TO SECTIONS 01 3000 AND 26 0010 FOR SUBMITTAL FORM AND REQUIREMENTS.

1.3 DESCRIPTION OF WORK

A. The extent of wiring device work is indicated by drawings and schedules, and by the requirements of this section. Wiring devices are defined as single discrete units of electrical distribution systems which are intended to carry but not utilize electric energy. The devices covered in this section may include, but not necessarily be limited by the following:
   1. Receptacles

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

B. Materials shall be new and a standard cataloged product of the manufacturer. Experimental or unproven designs will not be acceptable.

C. Comply with NFPA 70.

D. Comply with National Electrical Manufacturers Associations standards for wiring device products.

2.2 DEVICES

A. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
   1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
   2. Devices shall comply with the requirements in this Section.

B. Duplex receptacles and lighting switches shall be of the same manufacturer.

C. Device Color:
   1. Wiring Devices Connected to Normal Power System: Black unless otherwise indicated or required by drawings, NFPA 70, or device listing.

2.3 RECEPTACLES

A. Convenience Duplex Receptacles: 125V, 20A, straight blade, NEMA WD 1, NEMA WD 6, Configuration 5-20R, and UL 498.

1. Provide wide body industrial specification grade, constructed with one piece grounding backstrap/mounting yoke having integral ground contacts. Backstrap shall be equipped with a green ground screw and shall have not more than one rivet. Receptacles shall accept side or back wiring.
2. Manufacturers: Subject to compliance with requirements, provide Hubbell #5362, Leviton #5362, or approved equivalent. Available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Hubbell Wiring Device Div.
   b. Arrow-Hart, Inc.
   c. Pass and Seymour, Inc.
   d. General Electric
   e. Leviton
3. Substitutions: Under provisions of Division 01.

B. Special Receptacles: 250V, 20A, twist-lock, NEMA WD 6, Configuration L6-20R, and UL 498.
1. Provide wide body industrial specification grade, constructed with one piece grounding backstrap/mounting yoke having integral ground contacts. Backstrap shall be equipped with a green ground screw and shall have not more than one rivet. Receptacles shall accept side or back wiring.
2. Manufacturers: Subject to compliance with requirements, provide Hubbell #2320, Leviton #2320 or equivalent. Available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Hubbell Wiring Device Div.
   b. Arrow-Hart, Inc.
   c. Pass and Seymour, Inc.
   d. General Electric
   e. Leviton

C. Special Receptacles: 250V, 20A, twist-lock, NEMA WD 6, Configuration L14-20R, and UL 498.
1. Provide wide body industrial specification grade, constructed with one piece grounding backstrap/mounting yoke having integral ground contacts. Backstrap shall be equipped with a green ground screw and shall have not more than one rivet. Receptacles shall accept side or back wiring.
2. Manufacturers: Subject to compliance with requirements, provide Hubbell #2410, Leviton #2410 or equivalent. Available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Hubbell Wiring Device Div.
   b. Arrow-Hart, Inc.
   c. Pass and Seymour, Inc.
   d. General Electric
   e. Leviton

D. Telephone and Audio/Visual Outlets will be provided by others and are not included in this contract. Contractor shall provide required boxes and raceways with pull-strings only.

PART 3 - EXECUTION

3.1 INSPECTION

A. Installer must examine the areas and conditions under which wiring devices are to be installed and notify the General Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Architect.

3.2 INSTALLATION

A. Comply with NFPA 70.

B. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

C. Furnish and install devices in accordance with the manufacturer's recommendations, and in accordance with recognized industry practices to ensure that products serve the intended function.

D. Delay installation of devices until wiring is completed. Install receptacles and switches only in electrical boxes which are clean and free from excess building materials, debris, etc.

E. Mount devices flush, with long dimension vertical, unless above kitchen/break room countertops or otherwise directed. Install grounding terminal on top with type 302 stainless-steel wall plates, and grounding terminal on bottom with plastic wall plates. Group adjacent devices under single, multi-gang wall plates.

F. NEMA configuration and capacity of three and four wire receptacles serving equipment supplied by others shall be compatible with the plug on the equipment being supplied. Coordinate with the equipment supplier.

G. Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

H. If devices are installed prior to wall painting or finish, the Contractor shall carefully mask all devices to prevent paint splatters on devices.

I. Devices or plates with scratches or blemishes in finish shall be replaced as determined by the Architect/Engineer.

J. Prior to the project completion inspection, the Contractor shall:
   1. Clean the construction dust and other debris from all devices and plates.
   2. Clean all construction paint from devices and plates.
   3. Apply supply circuit labeling to the device cover plates according to Section 26 0553.

END OF SECTION

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SECTION 26 2813

FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Division 1 General Conditions applying to the General Contractor also apply to this Subcontractor as modified by Division 26 requirements.

1.2 SECTION REQUIREMENTS

A. Fuses and accessories shall be submitted for approval.

B. REFER TO SECTIONS 01 3000 AND 26 0010 FOR SUBMITTAL FORM AND REQUIREMENTS

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIRMENTS

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

B. Comply with NEMA FU 1 for cartridge fuses.

C. Materials shall be new and a standard cataloged product of the manufacturer. Experimental or unproven designs will not be acceptable.

2.2 CARTRIDGE FUSES

A. Fuses and accessories:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Bussmann
      b. Gould
      c. Littelfuse
      d. Mersen
   2. Substitutions: Under provisions of Division 01.

B. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

C. NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical fuses.

PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

A. Provide fuses as specified on drawings. If fuses are not specified, provide properly selected fuses as determined by submittal to fulfill the requirements, and based on the following:
   1. Motor Branch Circuits: Class RK5, time delay or Class CC - motor duty, time delay.
   2. Large Motor Branch (601-4000 A): Class L, time delay.
   3. Power Electronics Circuits: Class J, high speed.
   4. Power Transformer Circuits: Class RK5, time delay, or Class J, time delay.

5. Control Transformer Circuits: Class CC, time delay, control-transformer duty.

3.2 INSTALLATION

A. Install fuses so rating information is readable without removing fuse.

B. Install labels indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

C. Provide one set of spare fuses for each size and type fusible device installed, or as noted.

END OF SECTION

SECTION 26 2816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. The Division 1 General Conditions applying to the General Contractor also apply to this Subcontractor as modified by Division 26 requirements.

B. Enclosed switches and circuit breakers to be submitted for approval.

C. REFER TO SECTIONS 01300 AND 260533 FOR SUBMITTAL FORM AND REQUIREMENTS.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMNTS

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

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

A. Fusible Switches, 600 A and Smaller: UL 98 and NEMA KS 1, Type HD, single throw that accommodate specified fuses, and with lockable handle interlocked with cover in closed position.

B. Nonfusible Switches, 600 A and Smaller: UL 98 and NEMA KS 1, Type HD, single throw with lockable handle interlocked with cover in closed position.

C. Switch Interior: Switch blades to be fully visible in the OFF position when the door is open. Dead-front construction with permanently attached arc suppressors hinged or otherwise attached to permit easy access to line-side lugs without removal of the arc suppressor. Lugs to be UL listed for copper and/or aluminum cables and front removable. Current carrying parts to be plated by electrolytic processes. Fuse holders to be of a type to reject all class H fuses.

D. Switch Mechanism: Provide a quick-make and quick-break operating handle and mechanism as a integral part of the box, not the cover. Provide a dual cover interlock to prevent unauthorized opening of the switch door in the ON position or closing of the switch mechanism with the door open.

E. Enclosures: furnish switches in NEMA 1 enclosures or as shown on the plans. Attach covers on NEMA 1 enclosures with suitable hinges. All enclosures installed where exposed to the weather shall be in NEMA 3R (raintight) enclosures. Raintight covers shall be securable in the open position. Provide NEMA 3R switches thru 200 amperes with closing caps, interchangeable hubs. Enclosures of code gauge (UL 98) sheet steel (NEMA 1) or code gauge (UL 98) galvanized steel (NEMA 3R), treated with a rust-inhibiting phosphate, finished in gray baked enamel.

F. Ratings: Switches to be horsepower rated for 250 or 600 volts AC or DC as required.

G. Provide fuses located as indicated and in accordance with the following:
   1. Section 26 2813.
   2. Provide any other time delay fuses for safety switches, as recommended by the switch or equipment manufacturer, and/or as shown, of class, type and rating needed to meet electrical requirements.

H. Manufacturers

1. Manufacturers: Subject to compliance with requirements, provide from one of the following manufacturers:
    a. General Electric
    b. Square D
    c. Siemens
    d. Eaton
    e. Westinghouse
2. Substitutions: Under provisions of Division 01.

2.3 ENCLOSURES

A. NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
    1. Outdoor Locations: NEMA 250, Type 3R.
    2. Kitchen Areas: NEMA 250, Type 4X, 304 stainless steel.
    3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide a motor disconnect switch under this section of the specifications when required by NEC, even when not indicated.

B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

C. Install all switches to meet NEC clearance requirements for working space.

D. Install electrical equipment to allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.

E. Install electrical equipment to provide for ease of disconnecting the equipment with minimum interference to other installations.

F. Install electrical equipment to allow right of way for piping and conduit installed at required slope.

G. Install electrical equipment to ensure that connecting raceways, cables, wireways, cable trays, and busways are clear of obstructions and of the working and access space of other equipment.

H. Install required supporting devices in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

I. Install fuses in fusible devices, with a voltage rating not less than the circuit voltage. Provide one set of spare fuses for each size and type fusible device installed, or as noted.

J. Comply with NECA 1.

3.2 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections, and prepare test reports:
    1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

END OF SECTION