PROJECT MANUAL

FOR

McILVAINE PLAZA

PREPARED FOR:

LARAMIE COUNTY COMMUNITY COLLEGE
1400 E. COLLEGE DRIVE
CHEYENNE, WYOMING

PREPARED BY:

DAVID OHDE & ASSOCIATES

Date: APRIL 15, 2017
Project: Laramie County Community College
McILVAINE PLAZA - Bid Set
Laramie County Community College
Cheyenne, Wyoming

Owner:
Physical Plant:
Bill Zink
Asst. Director, Physical Plant
Laramie County Community College
1400 E. College Dr.
Cheyenne, WY 82007
PH: (307) 778-1256
Email: bzink@lccc.wy.edu

Landscape Architect:
David Ohde & Associates
810 Randall Avenue
Cheyenne, WY 82001
PH: (307) 634-8804
Email: wyohde@gmail.com

Bid Date:  May 6, 2015

Bid Time:  3:00 PM MDT

Bid Location:
Laramie County Community College
Contracts Office
Administration Building
1400 E. College Drive
Cheyenne, Wyoming
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CONTRACT REQUIREMENTS

Refer to Laramie County Community College
INVITATION FOR BID – CONSTRUCTION SERVICES
PROJECT: McILVAINE PLAZA
BID No.: IFB-17193
DIVISION 01
GENERAL REQUIREMENTS
PART 1 GENERAL

1.01 PROJECT
A. Project Name: McILVAINE PLAZA
B. Owner's Name: Laramie County Community College.

1.02 CONTRACT DESCRIPTION
A. Contract Type: A single prime Lump Sum contract with an Add Alternate for the fire pit.

1.03 DESCRIPTION OF WORK
A. Work includes and consists of furnishing all labor, operations, materials, accessories, incidentals, services and equipment indicated, specified, mentioned, scheduled or implied per the Bid Documents for work on the specific aforementioned project. The specific Work includes: furnishing all labor, materials, services and equipment required for the following: a. Site grading and demolition; b. Construction of concrete and masonry retaining walls; c. Concrete pavement; d. Steel and aluminum fabrication; e. Signage; f. Site electrical including pole and bollard lighting; g. Landscaping including irrigation, sod and trees; h. Construction of quarried stone amphitheater; i. Quarried stone seats; j. Storm sewer installation; k. Installation of gas line; l. Fabrication and installation of gas fire pit.

All materials, services and/or work not specifically mentioned which are necessary in order to provide a complete project shall be included in the bid and shall conform to all Local, State, and Federal requirements in accordance with the requirements, terms, specifications, conditions, and provisions hereinafter contained.

1.04 OWNER OCCUPANCY
A. Owner will continue to occupy adjacent existing buildings and properties during the entire construction/installation period.
B. Owner and the LCCC students will continue to occupy areas around the site during the entire construction period including pedestrian traffic in the area of construction.
C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
D. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE
A. Construction Operations: Limited to areas noted on Drawings. Contractor’s storage area will be as shown on the drawings and as approved by the Owner.
B. Contractor shall access the construction site from the east or west using the existing 12 foot wide, 6” concrete sidewalk. Access will be limited to routes acceptable to the Owner.
B. Arrange use of site to allow:
   1. Owner occupancy and pedestrian traffic.
C. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permission from the Owner.
   3. At no time shall the Contractor reduce the traffic lanes on the adjacent campus roadway to less than one lane.
   4. Any activity that would cause the Contractor to close one lane shall be completed by dusk and the Contractor shall open the drive lane back for traffic. There shall not be any lane closure that extends over night.
   5. Owner reserves the right to request the Contractor to modify time of construction activity to not interfere with campus activities.
D. Utility Outages and Shutdown:
   1. Do not disrupt or shut down systems, without 7 days notice to Owner.
   2. Limit shutdown of utility services to 4 hours at a time during off-hours of campus, arranged at least 24 hours in advance with Owner.
   3. Prevent accidental disruption of utility services to other facilities.

E. Contractor will not be allowed to perform any construction related activities on site on July 24-July 26 due to CFD air show activities on campus. At the end of work on July 23 the Contractor shall insure that the construction site is cleaned up and free of obstacles and hazard to the public. Contractor shall fence the active site as necessary to avoid pedestrian traffic in the construction zone. At the end of work on July 23 confirm with the Owner that the site is acceptable for the non-work days.

1.06 MATERIAL TESTING
A. When the specifications or work call for material testing, the Contractor shall be responsible for the coordination, scheduling and costs of such tests. Copies of all tests shall be promptly delivered to the Landscape Architect.
B. Any work in which un-tested and unacceptable materials are used without approval or written permission shall be performed at the Contractor's risk and may be considered as unacceptable and unauthorized and will not be paid for; and if directed by the Landscape Architect, shall be removed at the Contractor's expense.
C. Unless otherwise modified, and where applicable, test in accordance with the most recent cited standard methods of AASHTO or ASTM, approved AASHTO Interim Specifications, or ASTM Tentative Specifications, which are current on the date of advertisement for bids.

1.07 CONSTRUCTION STAKING
A. Construction staking and layout for vertical and horizontal control of the improvements are the responsibility of the Contractor. The Contractor shall make all surveys necessary for the proper construction.

1.08 WARRANTY PERIOD
A. All work shall be warranted against defects for a period of one year from the date of Final Completion or for a longer period if so required by specific drawings or specifications.
B. After Final Completion and approval of final payment and prior to the expiration of one year after the date of Final Completion or such longer period as may be prescribed by law or by the terms of any applicable special guarantee, the Contractor shall promptly, without cost to the Owner and in accordance with the Owner's written instructions, either correct such defective work or, if it has been rejected by the Owner, remove it from the site and replace it with non-defective work. If the Contractor does not within a reasonable time comply with the terms of such instruction, the Owner may have the defective work corrected or the rejected work removed and replaced, and all costs incurred therefore, including compensation for additional professional services, shall be paid by the Contractor and its sureties. The remedies provided in this section are in addition to all other remedies available to the Owner under applicable law and shall not be construed as exclusive of any other legal right or remedy available to the Owner.

1.09 DISPOSAL OF WASTE MATERIALS
A. All materials indicated or necessary to be removed from the project site shall be lawfully disposed of at sites obtained by the Contractor. Lost and spilled materials onto the route taken by the Contractor shall be promptly removed or cleaned as may be required.
B. It will be the Contractor's responsibility to remove from the project, all excess material or to import adequate fill material where needed.

1.10 UTILITY LOCATES
A. The Contractor shall be responsible for requesting locates with the utility companies as to the location of such utilities, i.e., water service lines, valve boxes, sanitary sewer services, gas lines, underground telephone lines, etc. within the areas of work. The Contractor shall be solely responsible for any damage
done to such utilities due to failure of preserving original utility locate marks or to properly protect them when their location is known.

END OF SECTION
SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Pre-construction meeting.
B. Pre-installation (Site mobilization) meeting.
C. Progress meetings.
D. Construction progress schedule.
E. Submittals for review, information, and project closeout.
F. Number of copies of submittals.
G. Submittal procedures.

1.02 RELATED REQUIREMENTS
A. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.
B. Section 01 78 00 - Closeout Submittals: Project record documents.

1.03 PROJECT COORDINATION
A. Make the following types of submittals to Landscape Architect:
   1. Requests for interpretation.
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Inspection reports.
   5. Manufacturer's instructions and field reports.
   6. Applications for payment and change order requests.
   7. Progress schedules.
   8. Coordination drawings.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRE-CONSTRUCTION MEETING
A. Landscape Architect will assist the Owner in scheduling a conference call meeting after Notice of Award.
B. Attendance Required:
   1. Owner.
   2. Landscape Architect.
   3. Contractor.
C. Agenda:
   1. Designation of personnel representing the parties to Contract, Owner and Landscape Architect.
   2. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   3. Scheduling.
   4. Review of Contractor's plans for site mobilization, staging and traffic control measures.
D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Landscape Architect, Owner, participants, and those affected by decisions made.

3.02 PRE-INSTALLATION (SITE MOBILIZATION) MEETING
A. Landscape Architect will schedule a Pre-installation meeting at the Project site prior to Contractor occupancy.
B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Landscape Architect.
   4. Contractor’s Superintendent.
   5. Major Subcontractors.

C. Agenda:
   1. Use of premises by Owner and Contractor.
   2. Owner’s requirements.
   3. Construction facilities and controls provided by Owner.
   4. Temporary utilities provided by Contractor.
   5. Security and housekeeping procedures.
   7. Application for payment procedures.
   8. Procedures for testing.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Landscape Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS
A. Schedule and administer meetings throughout progress of the Work at weekly intervals.
B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Landscape Architect, as appropriate to agenda topics for each meeting.
D. Agenda:
   1. Review minutes of previous meetings.
   2. Review of Work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of off-site fabrication and delivery schedules.
   6. Maintenance of progress schedule.
   7. Corrective measures to regain projected schedules.
   8. Planned progress during succeeding work period.
  10. Effect of proposed changes on progress schedule and coordination.
  11. Other business relating to Work.
E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Landscape Architect, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE
A. Within 10 days after date of the Agreement, submit preliminary schedule.
B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
C. Within 14 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major contractors have reviewed and accepted proposed schedule.
D. Within 10 days after joint review, submit complete schedule.
E. Submit updated schedule with each Application for Payment.

3.05 SUBMITTALS FOR REVIEW
A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.
B. Submit to Landscape Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 – CLOSEOUT SUBMITTALS.

3.06 SUBMITTALS FOR INFORMATION
A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.
B. Submit for Landscape Architect's knowledge as contract administrator or for Owner. No action will be taken.

3.07 SUBMITTALS FOR PROJECT CLOSEOUT
A. When the following are specified in individual sections, submit them at project closeout:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   5. Other types as indicated.
B. Submit for Owner's benefit during and after project completion.

3.08 NUMBER OF COPIES OF SUBMITTALS
A. Documents for Review: One electronic copy.
B. Documents for Information: One electronic copy.
C. Documents for Project Closeout: One electronic copy and one paper copy.
D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Landscape Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.09 SUBMITTAL PROCEDURES
A. Transmit each submittal electronically with a copy of approved submittal form.
B. Transmit each submittal with approved form.
C. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
D. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
E. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
F. Deliver submittals to Landscape Architect at business address or electronically if acceptable to Landscape Architect.
G. Schedule submittals to expedite the Project, and coordinate submission of related items.
H. For each submittal for review, allow 14 days excluding delivery time to and from the Contractor.
I. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
J. Provide space for Contractor and Landscape Architect review stamps.
K. When revised for resubmission, identify all changes made since previous submission.
L. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
M. Submittals not requested will not be recognized or processed.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. References and standards.
B. Quality assurance submittals.
C. Control of installation.
D. Tolerances.

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

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. Design Data: Submit to the Owner (LCCC) and Landscape Architect for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
B. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Landscape Architect, in quantities specified for Product Data.
   1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   2. Certificates may be recent or previous test results on material or product, but must be acceptable to Landscape Architect.

1.05 REFERENCES AND STANDARDS
A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
C. Obtain copies of standards where required by product specification sections.
D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
E. Should specified reference standards conflict with Contract Documents, request clarification from Landscape Architect before proceeding?
F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Landscape Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION
A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
B. Comply with manufacturers' instructions, including each step in sequence.
C. Should manufacturers’ instructions conflict with Contract Documents, request clarification from Landscape Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TOLERANCES

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

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

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

3.03 DEFECT ASSESSMENT

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

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

END OF SECTION
SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01  SECTION INCLUDES
A.  Temporary sanitary facilities.
B.  Temporary office and storage.
C.  Temporary Utilities
D.  Temporary Controls
E.  Vehicular access and parking.
F.  Protection of existing facilities
G.  Removal of Temporary Facilities

1.02  TEMPORARY SANITARY FACILITIES
A.  Contractor shall supply and maintain temporary toilet facilities for contractor and sub-contractor use during at a location approved by the Owner. Temporary facilities shall be maintained on a regular time schedule such that they do not create health or nuisance concerns.
B.  Provide waste removal facilities and services as required to maintain the site in clean and orderly condition. Provide containers with lids. Remove trash from site periodically.
C.  If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

1.03  TEMPORARY OFFICE AND STORAGE
A.  The Contractor may maintain such office and storage facilities on the site as are necessary for the proper conduct of the work and where approved by the Owner. These shall be located so as to cause no interference to any work to be performed on the site.
B.  Upon completion of the improvements, or as directed by the Owner, the Contractor shall remove all such temporary structures and facilities from the site. The Contractor shall leave the site of the work in the condition acceptable to the Owner.
C.  Storage of materials shall be limited to areas designated by the Owner. The Contractor shall keep such storage areas in a neat and clean condition so as not to create a hazardous condition to motorists or pedestrians.

1.04  TEMPORARY UTILITIES
A.  The Owner shall allow access to water and electrical utilities for the Contractor’s use during construction. Contractor shall furnish all equipment required to get water and electrical from supply source provided to the location of the work. Only source points designated and approved by the Owner shall be used by the Contractor.

1.05  TEMPORARY CONTROLS
A.  Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for Owner’s use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
B.  Provide barricades required by governing authorities for public rights-of-way and for public access to existing buildings.
C.  As necessary all traffic control or other protective devices shall be installed and maintained in accordance with the Uniform Manual of Traffic Control Devices or in conformance with the applicable requirements of the authority having jurisdiction in such matters. Contractor shall schedule and supply all temporary traffic control, including flaggers, as may be required for vehicular and pedestrian safety.
D.  Protect existing stone monument base and walls along with precast caps and existing signage to remain.
E.  Provide protection for plants designated to remain. Replace damaged plants.
F. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.
G. Provide 6 foot high fence around required areas for the construction as deemed necessary by the contractor. Locations of fencing shall be approved by the Owner.

1.06 VEHICULAR ACCESS AND PARKING
A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
B. Coordinate access and haul routes with governing authorities and Owner.
C. Provide and maintain access to fire hydrants, free of obstructions.
D. Designated existing on-site roads may be used for construction traffic.
E. Provide temporary parking areas to accommodate construction personnel. Parking by Contractors and subcontractors shall be limited to areas designated by the Owner.

1.07 PROTECTION OF EXISTING FACILITIES
A. Contractor shall take all necessary precautions to protect existing roadways, properties, landscape improvements, underground utilities, and other facilities affected by the Contractor's operations.
B. Any existing improvements or facilities damaged by the Contractor's operations in the performance of the work under this Agreement shall be repaired or replaced by and at the expense of the Contractor to the satisfaction of the Owner.

1.08 REMOVAL OF TEMPORARY FACILITIES
A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
B. Clean and repair damage caused by installation or use of temporary work. The Contractor shall clean all sidewalk, street and other areas affected by construction, removing all loose surface materials, tires marks and other damage as identified by the Owner.
C. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. General product requirements.
B. Transportation, handling, storage and protection.
C. Product option requirements.
D. Substitution limitations and procedures.

1.02 RELATED REQUIREMENTS
A. Section 01 10 00 – Summary and General Conditions
B. Section 01 40 00 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS
A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers’ standard data to provide information specific to this Project.
B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS
A. Provide new products unless specifically required or permitted by the Contract Documents.
B. Where all other criteria are met, Contractor shall give preference to products that:
   1. Are extracted, harvested, and/or manufactured closer to the location of the project.
   2. Have longer documented life span under normal use.
   3. Result in less construction waste.

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

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES
A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
B. Landscape Architect will consider Requests for Substitutions only within 7 days prior to date of Bid Opening. No Substitution Requests will be reviewed after that deadline. Provide substitution request on the attached Project Substitution Request Form.
C. Substitutions will not be considered when a product becomes unavailable through no fault of the Contractor.

D. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

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

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

G. Substitution Submittal Procedure:
   1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
   2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
   3. The Landscape Architect will notify Contractor in writing of decision to accept or reject request.

3.02 TRANSPORTATION AND HANDLING
A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

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

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

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

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

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

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

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

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

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

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

END OF SECTION
SUBSTITUTION REQUEST FORM

TO: David Ohde & Associates  PROJECT NAME: Laramie County Community College McIlvaine Plaza

810 Randall Avenue
Cheyenne, WY 82001

SUPPLIER/SUBCONTRACTOR: ___________________________________________________

We hereby submit for consideration, the following product instead of specified item for above project:

SECTION PARAGRAPH SPECIFIED MATERIAL ____________ ________________

Proposed Substitution:

Substitution Requests will only be accepted within 10 days prior to the Bid Opening Date.
No Substitution Requests will be reviewed after that deadline.

Attach complete dimensional information and technical data, including laboratory rests, if applicable.

Include complete information on changes to Drawings and/or Specifications which proposed substitution will require for its proper installation.

Submit with request all necessary samples and substantiating data to prove equal quality and performance to that which is specified. Clearly mark manufacturer’s literature to indicate equality in performance. Differences in quality of materials and construction shall be indicated.

Fill in blanks below:

A. Does the substitution affect dimensions shown on Drawings?
Yes _______ No _________ If yes, clearly indicate changes. _______________
__________________________________________________________________

B. Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution?

C. What effect does the substitution have on other trades:

____________________________________________________________________________________

D. What effect does substitution have on applicable code requirements?

E. Differences between proposed substitution and specified item:

F. Manufacturer’s guarantee of the proposed and specified items are:

_________ Same _____________ Different (explain)

CERTIFICATION OF EQUAL PERFORMANCE AND ASSUMPTION OF LIABILITY FOR EQUAL PERFORMANCE

Submitted by:

Signature Title

Firm

Address

Telephone Date

Signature must be by person having authority to legally bind his firm to the above terms.
Failure to provide legally binding signature will result in retraction of approval.

END OF SECTION

SUBSTITUTION REQUEST FORM  SRF - 1
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Examination, preparation, and general installation procedures.
B. Pre-installation meetings.
C. Cutting and patching.
D. Cleaning and protection.
E. Closeout procedures, except payment procedures.

1.02 RELATED REQUIREMENTS
A. Section 01 10 00 - Summary: Limitations on working on the site; work sequence.
B. Section 01 30 00 - Administrative Requirements: Submittals procedures.
C. Section 01 40 00 - Quality Requirements: Inspection procedures.
D. Section 01 50 00 - Temporary Facilities and Controls: Temporary exterior enclosures.
E. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties.

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   5. Work of Owner or separate Contractor.
   6. Include in request:
      a. Identification of Project.
      b. Location and description of affected work.
      c. Necessity for cutting or alteration.
      d. Description of proposed work and products to be used.
      e. Alternatives to cutting and patching.
      f. Effect on work of Owner or separate Contractor.
      g. Written permission of affected separate Contractor.
      h. Date and time work will be executed.
C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 COORDINATION
A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
B. Coordinate completion and clean-up of work of separate sections.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
B. Examine and verify specific conditions described in individual specification sections.
C. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or mis-fabrication.
D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREINSTALLATION MEETINGS
A. When required in individual specification sections, convene a pre-installation meeting at the site prior to commencing work of the section.
B. Require attendance of parties directly affecting, or affected by, work of the specific section.
C. Notify Landscape Architect ten days in advance of meeting date.
D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.
E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Landscape Architect, Owner, participants, and those affected by decisions made.

3.03 GENERAL INSTALLATION REQUIREMENTS
A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.04 CUTTING AND PATCHING
A. Whenever possible, execute the work by methods that avoid cutting or patching.
B. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of electrical and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.
   7. Remove and replace defective and non-conforming work.
C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
D. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
F. Restore work with new products in accordance with requirements of Contract Documents.
G. Fit work tight to pipes, conduit, and other penetrations through surfaces.
H. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.05 PROGRESS CLEANING
A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
B. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.06 PROTECTION OF INSTALLED WORK
A. Protect installed work from damage by construction operations.
B. Provide special protection where specified in individual specification sections.
C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
D. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.07 FINAL CLEANING
A. Use cleaning materials that are nonhazardous.
B. Remove all labels that are not permanent.
C. Clean site; sweep paved areas, rake clean landscaped surfaces.
D. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.08 CLOSEOUT PROCEDURES
A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Landscape Architect.
B. Notify Landscape Architect when work is considered ready for Substantial Completion.
C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Landscape Architect’s review.
D. Correct items of work listed in executed Certificates of Substantial Completion.
E. Notify Landscape Architect when work is considered finally complete.
F. Complete items of work determined by Landscape Architect’s final inspection.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Project Record Documents.
B. Operation and Maintenance Data.
C. Warranties and bonds.

1.02 RELATED REQUIREMENTS
A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.
C. Individual Product Sections: Specific requirements for operation and maintenance data.
D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS
A. Project Record Documents: Submit documents to Landscape Architect with claim for final Application for Payment.
B. Operation and Maintenance Data:
   1. Submit electronic copy of preliminary draft or proposed formats and outlines of contents before start of Work. Landscape Architect will review draft and return with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Landscape Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit one paper copy and one electronic copy of revised final documents in final form within 10 days after final inspection.
C. Warranties and Bonds:
   1. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   2. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS
A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.
B. Ensure entries are complete and accurate, enabling future reference by Owner.
C. Store record documents separate from documents used for construction.
D. Record information concurrent with construction progress.
E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   2. Field changes of dimension and detail.
   3. Details not on original Contract drawings.

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

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES
A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
      Information for re-ordering custom manufactured products.
   2. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
   D. Additional information as specified in individual product specification sections.
   E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS
A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Landscape Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

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

3.05 WARRANTIES AND BONDS
A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
B. Verify that documents are in proper form, contain full information, and are notarized.
C. Co-execute submittals when required.
D. Retain warranties and bonds until time specified for submittal.
E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION
DIVISION 5
METALS
SECTION 05 75 00
DECORATIVE FORMED METAL

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Exterior fabrications made of formed metal sheet, secondary supports, and anchors to structure, including:
   1. Entry Towers

1.02 RELATED REQUIREMENTS
A. Sheet S-5: Additional Specifications on Entry Tower drawings.
B. Section 10 14 00 - Signage.

1.03 REFERENCE STANDARDS
D. SSPC-SP6 - Commercial Blast Cleaning.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Fabricator Qualifications.
C. Product Data - Sheet Metal Material: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Specimen warranty.
D. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, number of anchors, supports, reinforcement, trim, flashings, and accessories.
   1. Differentiate between shop and field fabrication.
   2. Indicate substrates and adjacent work with which the fabrications must be coordinated.
   3. Include large-scale details of anchorages and connecting elements.
E. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
F. Verification Samples: For each finish product specified, minimum size 12 inches square, representing actual product in color and texture.
G. Installer’s Qualifications.
H. Certificate: Certify that the work results of this section meet or exceed specified requirements.
I. Maintenance Data: Care of finishes and warranty requirements.

1.05 QUALITY ASSURANCE
A. Fabricator Qualifications: Sign fabricator company specializing in fabricating products specified in this section.
   1. With not less than ten years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified in this section.
   1. With minimum ten of documented experience. C. Coordinate the installation and attachment of the metal signage logo as specified in Section 10 14 00 Signage with the signage manufacturer.
1.06 DELIVERY, STORAGE, AND HANDLING
A. Deliver products in manufacturer’s original, unopened, undamaged containers with identification labels intact.
   1. Protect finishes by applying heavy duty removable plastic film during production.
   2. Package for protection against transportation damage.
   3. Provide markings to identify components consistently with drawings.
   4. Exercise care in unloading, storing and installing panels to prevent bending, warping, twisting and surface damage.
B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
   1. Protect from moisture and condensation with tarpaulins or other suitable weather tight covering installed to provide ventilation.
   2. Store at a slope to ensure positive drainage of any accumulated water.
   3. Avoid contact with any other materials that might cause staining, denting, or other surface damage.

PART 2 PRODUCTS

2.01 FORMED METAL FABRICATIONS - GENERAL
A. Shop Assembly: Preassemble items to greatest extent possible. Minimize field splices and field assembly. Disassemble only as necessary for transportation and handling. Mark items clearly for assembly and installation.
B. Coordination: Match dimensions and attachment of formed metal items to adjacent construction. Produce integrated assemblies. Closely fit joints; align edges and flat surfaces unless indicated otherwise.
C. Forming: Profiles indicated. Maximize lengths. Fold exposed edges to form hem indicated or ease edges to radius indicated with concealed stiffener. Provide flat, flush surfaces without cracking or grain separation at bends.
D. Reinforcement: Increase metal thickness; use concealed stiffeners, backing materials or both. Provide stretcher leveled standard of flatness and stiffness required to maintain flatness and hold adjacent items in flush alignment.
E. Anchors: Straps, plates and anchors as required to support and anchor items to adjacent construction.
F. Supports: Miscellaneous framing, mounting, clips, sleeves, fasteners and accessories required for installation.
G. Welding and Brazing: Weld or braise joints continuously. Grind, fill or dress to produce smooth, flush, exposed surfaces. Do not discolor metal.
H. Performance Requirements:
   1. Thermal Movements:
      a. Allow for thermal movements in exterior metal fabrications due to temperature changes. Prevent buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
      b. Temperature Change Range: 120 degrees F, ambient; 180 degrees F, on material surfaces.
   2. Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

2.02 FORMED METAL FABRICATIONS
A. Metal Base: Form metal base from type and thickness of metal indicated. Provide integral cove, reveals and other features shown on drawings.

2.03 MATERIALS
A. General: Provide sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections exposed to view on finished units.
B. Aluminum Sheet: ASTM B209209M, 5005-H32 minimum; alloy and temper recommended by aluminum producer and finisher for use and finish indicated.
C. Anchors, Clips and Accessories: Use one of the following:
   1. Structural Anchors: Provide anchors where work is indicated to comply with design loads.
      a. Type: Provide chemical or torque-controlled expansion anchors.
      b. Capacity: When tested according to ASTM E488; six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete.
   2. Nonstructural Anchors: Provide powder-actuated fasteners of where work is not indicated to comply with design loads. Provide size and number required for load, installation and as recommended by manufacturer, unless indicated otherwise.

D. Fasteners, General: Same basic metal and alloy as formed metal sheet unless indicated otherwise. Do not use metals incompatible with the materials joined.

2.04 FINISHES
A. Aluminum Finishes: Powder coated: custom color as shown on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify dimensions, tolerances, and interfaces with other work.
B. Verify substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturer's written instructions.
C. If substrate preparation is the responsibility of another installer, notify Landscape Architect of unsatisfactory preparation before proceeding.
D. Notify Landscape Architect in writing of conditions detrimental to proper and timely completion of work. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.02 PREPARATION
A. Protect adjacent work areas and finish surfaces from damage during installation.
B. Deliver anchorage items to be cast into concrete or built into masonry to appropriate installer(s) together with setting templates.

3.03 INSTALLATION - METAL FABRICATIONS
A. Locate and place decorative formed sheet metal items level and plumb; align with adjacent construction. Cut, drill and fit as required to install.
B. Do not cut or abrade sheet metal finishes that cannot be completely restored in the field. Return such items to manufacturer or fabricator for required alterations and refinishing or provide new items.
C. Use concealed anchorages where possible.
   1. Provide metal caps to conceal bolts and nuts.
   2. Provide washers where needed on bolts or screws to protect metal surfaces and make weather tight connection.
D. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers indicated.
E. Coordinate the installation of the signage panels as specified in 10 14 00 Signage.
F. Corrosion Protection: Apply permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with incompatible substrate materials. Prevent corrosion damage to material and finish.

3.04 CLEANING
A. Remove temporary coverings and protection of adjacent work areas.
B. Clean installed products in accordance with manufacturer's instructions.

3.05 PROTECTION
A. Protect installed products from damage during construction.

END OF SECTION
SECTION 10 14 00
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Exterior signage – Entry Tower sign

1.02 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
C. Engineered structural drawing for Aluminum structure with structural base plate designed to work with the existing anchor bolts with the structural capacity as noted in the drawings. Engineer shall be licensed Professional Engineer in the State of Wyoming.
D. Samples: Submit sample of letter “C”, of size similar to that required for project, illustrating sign style, font, color and method of attachment.
E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
F. Verification Samples: Submit samples showing colors specified.
G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.03 QUALITY ASSURANCE
A. Manufacturer Qualifications: Sign fabricator company specializing in manufacturing the products specified in this section with minimum ten years of documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING
A. Package signs as required to prevent damage before installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Dimensional Letter Signs:
   1. Cosco Industries: www.coscoLandscapeArchitecturalsigns.com
   2. Gemini Signs: www.geminisignletters.com
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SIGNAGE APPLICATIONS
A. Site Entrance Identification Signs:
   1. Use individual Formed Channel letters.
   2. Mount on aluminum panel in location shown on Drawings.

2.03 SIGN TYPES
A. Color and Font: Unless otherwise indicated:
   1. Character Font: “Forza Bold”.
   2. Character Case: Upper case only.
   3. Character Height: as shown on drawing.
   4. Character Color: as shown on the drawings.
2.04 DIMENSIONAL LETTERS
A. Aluminum Letters:
   1. Material: 1/4” Formed Channel Can and Formed Face Letters.
   2. Color: As selected.

2.05 ACCESSORIES
A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal compatible with the sign letter metal.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Install neatly, with horizontal edges level.
C. Locate signs where indicated on drawings.
D. Coordinate installation of aluminum sign panel with fabricator of the decorative formed metal sculptural elements.
E. Protect from damage until Substantial Completion; repair or replace damage items.

END OF SECTION
1.1 RELATED DOCUMENTS:

A. All drawings associated with the entire project, including general provisions of the Contract, including The General Conditions of the Contract for Construction, General and Supplementary Conditions and Division-1 Conditions specification sections shall apply to the Division 21, 22, and 23 specifications and drawings. The Contractor shall be responsible for reviewing and becoming familiar with the aforementioned and all other Contract Documents associated with the project.

B. Related Sections: Refer to all sections in Division 21, 22, and 23. Refer to Division 26 specification sections and Division 26 drawings.

C. Where contradictions occur between this section and Division 1, the more stringent requirement shall apply.

D. Contractor shall be defined as any and all entities involved with the construction of the project.

1.2 SUMMARY:

A. This Section specifies the basic requirements for mechanical installations and includes requirements common to more than one section of Divisions 21, 22, and 23. It expands and supplements the requirements specified in Division 1.

1.3 MECHANICAL INSTALLATIONS:

A. The Contract Documents are diagrammatic, showing certain physical relationships which must be established within the mechanical work and its interface with all other work. Such establishment is the exclusive responsibility of the Contractor. Drawings shall not be scaled for the purpose of establishing material quantities.

B. Drawings and specifications are complementary. Whatever is called for in either is binding as though called for in both. Report any discrepancies to the Engineer and obtain written instructions before proceeding. Where any contradictions occur between the specifications and the drawings the more stringent requirement shall apply. The contractor shall include pricing for the more stringent and expensive requirements.

C. Drawings shall not be scaled for rough-in measurements or used as shop drawings. Where drawings are required for these purposes or have to be made from field measurement, Contractor shall take the necessary measurements and prepare the drawings.

D. The exact location for some items in this specification may not be shown on the drawings. The location of such items may be established by the Engineer during the progress of the work.

E. The contract documents indicate required size and points of terminations of pipes, and suggest proper routes to conform to structure, avoid obstructions and preserve clearances. It is not intended that drawings indicate necessary offsets. The contractor shall make the installation in such a manner as to conform to the structure, avoid obstructions, preserve headroom and keep openings and passageways clear, without further instructions or costs to the Owner. All equipment shall be installed so access is maintained for serviceability.
F. Before any work is installed, determine that equipment will properly fit the space; that required piping grades can be maintained and that ductwork can be run as intended without interferences between systems, structural elements or work of other trades.

G. Verify all dimensions by field measurements.

H. Coordinate installation in chases, slots and openings with all other building components to allow for proper mechanical installations.

I. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

J. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.

K. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

L. Make allowance for expansion and contraction for all building components and piping systems that are subject to such.

M. The ceiling space shall not be “layered”. It is the contractor’s responsibility to offset and system as required to allow installation within the identified ceiling cavity. The contractor shall include labor and material in the base bid to accommodate such offsets.

N. In general, all “static” piping systems shall be routed as high as possible, i.e. fire protection systems. Keep all equipment in accessible areas such as corridors and coordinate with systems and equipment from other sections.

O. The Contractor shall provide all labor and material necessary but not limited to the starting/stopping of all mechanical equipment, opening/closing of all valves, draining/refilling all mechanical systems and operating/verifying the operation of all mechanical systems controls as required to accomplish all work necessary to meet construction document requirements. Contractor shall submit records of such activities to engineer and include in the O & M manuals.

1.4 COORDINATION:

A. Work out all installation conditions in advance of installation. The Contractor shall be responsible for providing all labor and material, including but not limited to all fittings, isolation valves, offsets, hangers, control devices, etc., necessary to overcome congested conditions at no increase in contract sum.

B. Provide proper documentation of equipment, product data and shop drawings to all entities involved in the project.

C. Existing Conditions:
   1. Carefully survey existing conditions prior to bidding work.
   2. Provide proper coordination of mechanical work with existing conditions.
   3. Report any issues or conflicts immediately to Engineer before commencing with work and prior to purchasing equipment and materials.
D. Complete the entire installation as soon as the condition of the building will permit. No extras will be allowed for corrections of ill-timed work, when such corrections are required for proper installation of other work.

E. Support Dimensions: Provide dimensions and drawings so that concrete basis and other equipment supports to be provided under other sections of the specifications can be built at the proper time.

F. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.

G. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.

H. Modifications required as result of failure to resolve interferences, provide correct coordination drawings or call attentions to changes required in other work as result of modifications shall be paid for by responsible Contractor/Subcontractor.

1.5 PROJECT CONDITIONS:

A. The Contractor shall be required to attend a mandatory pre-bid walk-thru and shall make themselves familiar with the existing conditions. No additional costs to the Owner shall be accepted for additional work for existing conditions.

B. Field verify all conditions prior to submitting bids.

C. Report any damaged equipment or systems to the Owner prior to any work.

D. Protect all mechanical work against theft, injury or damage from all causes until it has been tested and accepted.

E. Be responsible for all damage to the property of the Owner or to the work of other contractors during the construction and guarantee period. Repair or replace any part of the work which may show defect during one year from the final acceptance of all work, provided such defect is, in the opinion of the Architect, due to imperfect material or workmanship and not due to the Owner's carelessness or improper use.

F. The Contractor shall coordinate and co-operate with Owner at all times for all new to existing connections, system shutdowns and start-ups, flushing and filling both new and existing systems.

G. Provide temporary piping services, where required, to maintain existing areas operable.

H. Coordinate all services shut-down with the Owner; provide temporary services. Coordinate any required disruptions with Owner, one week in advance.

I. Minimize disruptions to operation of mechanical systems in occupied areas.

1.6 SAFETY:

A. Refer to LCCC Bidding Documents and Division 1.

1.7 EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS:

A. Refer to LCCC Bidding Documents and conform with the Owners requirements.
1.8 REQUIREMENTS OF REGULATORY AGENCIES:

A. Refer to Division 1 and LCCC Bidding Documents.

B. Execute and inspect all work in accordance with all Underwriters, local and state codes, rules and regulations applicable to the trade affected as a minimum, but if the plans and/or specifications call for requirements that exceed these rules and regulations, the greater requirement shall be followed. Follow recommendations of NFPA, SMACNA, EPA, OSHA and ASHRAE.

C. Comply with the local and state codes adopted by the Authorities Having Jurisdictions at the time of permit application, including referenced standards, amendments and policies. The following are the codes in effect:

1. 2015 International Building Code
2. 2015 International Fire Code
3. 2015 International Plumbing Code
4. 2015 International Mechanical Code
5. 2015 International Fuel Gas Code

D. Comply with standards in effect at the date of these Contract Documents, except where a standard or specific date or edition is indicated.

E. The handling, removal and disposal of regulated refrigerants and other materials shall be in accordance with U.S. EPA, state and local regulations.

F. The handling, removal and disposal of lead based paint and other lead containing materials shall comply with EPA, OSHA, and any other Federal, State, or local regulations.

G. After entering into contract, Contractor will be held to complete all work necessary to meet these requirements without additional expense to the Owner.

1.9 REQUIREMENTS OF LOCAL UTILITY COMPANIES:

A. Comply with rules and regulations of local utility companies. Include in bid the cost of all valves, valve boxes, meter boxes, meters and such accessory equipment which will be required but not provided by Local Utility Company for the project.

B. Utility Connections:

1. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies and controlling agencies. Provide required connection for each service.

2. The contract documents indicate the available information on existing utilities and services and on new services (if any) to be provided to the project by utility companies and agencies. Notify Engineer immediately if discrepancies are found.

3. Coordinate mechanical utility interruptions one week in advance with the Owner and the Utility Company. Plan work so that duration of the interruption is kept to a minimum.

1.10 PERMITS AND FEES:

A. Refer to LCCC Bidding Documents and Division 1.
B. The Contractor shall pay all tap, development, meter, etc., fees required for connection to municipal and public utility facilities, unless directed otherwise by the General Contractor/Owner – IN WRITING.

C. Contractor shall arrange for and pay for all inspections, licenses and certificates required in connection with the work.

1.11 PROJECT SEISMIC REQUIREMENTS:

A. Installation shall comply with the local seismic requirements for the area of installation. Provide restraints, bracing, anchors, vibration isolation, seismic snubbers, and all other components required for the installation.

B. All systems shall be installed to meet IBC Seismic requirements.

   1. Where any conflicts arise the more stringent requirements shall be applicable.
   2. The design of the seismic requirements shall be the full responsibility of the Contractor.

1.12 TEMPORARY FACILITIES:

A. Light, Heat, Power, Etc.: Responsibility for providing temporary electricity, heat and other facilities shall be as specified in LCCC Bidding Documents and Division 1.

1.13 PRODUCT OPTIONS AND SUBSTITUTIONS:

A. Refer to the Instructions to Bidders, LCCC Bidding Documents and Division 1.

B. The burden of proof that proposed equipment is equal in size, capacity, performance, and other pertinent criteria for this specific installation, or superior to that specified is up to the Contractor. Substituted equipment will only be allowed where specifically listed in a written addendum. If substitutions are not granted, the specified materials and equipment must be installed. Where substituted equipment is allowed, it shall be the Contractor's responsibility to notify all related trades of the accepted substitution and to assume full responsibility for all costs caused as a result of the substitution.

C. Materials and equipment of equivalent quality may be submitted for substituted prior to bidding. This may be done by submitting to the Architect/Engineer at least ten (10) working days prior to the bid date requesting prior review. This submittal shall include all data necessary for complete evaluation of the product.

   1. Substitutions shall be allowed only upon the written approval of the Architect/Engineer NO EXCEPTIONS.
   2. The Contractor shall be responsible for removal, replacement and remedy of any system or equipment which has been installed which does not meet the specifications or which does not have prior approval.

1.14 MECHANICAL SUBMITTALS:

A. General

   1. Refer to the Conditions of the Contract (General and Supplementary), LCCC Bidding Documents and Division 1.
   2. Contractor shall provide a submittal schedule appropriate for the size and schedule of the project. Limit the number of large submittals being reviewed at one time and coordinate timing of sections that are dependent on each other.
3. The Contractor shall identify any "long lead time" items which may impact the overall project schedule. If these submittal requirements affect the schedule, the Contractor shall identify the impacts and confer with the Engineer within two weeks of entering into the contract.

4. The front of each submittal package shall be identified with the specification section number, job name, Owner's project number, date, Prime Contractor and Sub-Contractor's names, addresses, and contact information, etc. Each Specification Section shall be submitted individually and submittal shall be tabbed for the equipment/materials/etc. within the section. Submittals that are not complete with the required information will not be reviewed and will be sent back to be corrected.

5. Submittals shall be provided electronically. All electronic submittals need to be complete with all design information and stamped for conformity by the contractor. Submittals will be reviewed, marked appropriately and returned by the same means received.

6. An index shall be provided which includes:
   a. Product
   b. Plan Code (if applicable)
   c. Specification Section
   d. Manufacturer and Model Number

7. Submittal schedule shall be provided for review within four (4) working weeks from award of contract to successful bidder.

B. Basis of Design: The manufacturer's material or equipment listed in the schedule or identified by name on the drawings are the basis of design and provide for the establishment of size, capacity, grade and quality. If alternates are used in lieu of the scheduled names, the cost of any changes in construction required by their use shall be borne by Contractor.

C. All equipment shall conform to the local Energy Conservation Standards.

D. Contractor Review: Submittal of shop drawings, product data and samples will be accepted only when submitted by and stamped by the General Contractor. Each submittal shall be reviewed by the contractor for general conformance with contract requirements and stamped by the respective contractor prior to submittal to the Engineer. Any submittal not stamped or complete will be sent back. Data submitted from Subcontractors and material suppliers directly to the Engineer will not be processed unless prior written approval is obtained by the Contractor.

E. Submittal Review Process: Before starting work, prepare and submit to the Engineer shop drawings and descriptive equipment data required for the project. Continue to submit in the stated format after each Engineer's action until a "No Exception Taken" or "Make Correction Noted" action is received. When a "Make Corrections Noted" is received, make the required corrections for inclusion in the Operating and Maintenance Manual (O&M). Submittals marked "Make Corrections Noted" shall not be resubmitted during the submittal process. Unless each item is identified with specification section and sufficient data to identify its compliance with the specifications and drawings, the item will be returned "Revise and Resubmit". Where an entire submittal package is returned for action by the Contractor, the Engineer may summarize comments in letter format and return the entire set. Submittals shall be prepared per the MECHANICAL SUBMITTAL CHECKLIST, of this section; supplemental requirements are listed in each Division 21, 22, and 23 Sections.

F. The Design Professional’s review and appropriate action on all submittals and shop drawings is only for the limited purpose of checking for conformance with the design concept and the information expressed in the contract documents. This review shall not include:

1. Accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes
2. Construction means or methods
3. Coordination of the work with other trades
4. Construction safety precautions

G. The Design Professional’s review shall be conducted with reasonable promptness while allowing sufficient time in the Design Professional’s judgment to permit adequate review. Review of a specific item shall not indicate that the Design Professional has reviewed the entire assembly of which the item is a component.

H. The Design Professional shall not be responsible for any deviations from the contract documents not brought specifically to the attention of the Design Professional in writing by the Contractor. This shall clearly identify the design and the specific element which vary from the Design. The Contractor shall be responsible for all remedy for lack of strict conformance associated with this criteria.

I. The Design Professional shall not be required to review partial submissions or those for which submissions of correlated items have not been received.

1.15 SPECIFIC CATEGORY SUBMITTAL REQUIREMENTS:

A. Product Data:

1. Where pre-printed data covers more than one distinct product, size, type, material, trim, accessory group or other variation, mark submitted copy with black pen to indicate which of the variations is to be provided.
2. Delete or mark-out portions of pre-printed data which are not applicable.
3. Where operating ranges are shown, mark data to show portion of range required for project application.
4. For each product, include the following:
   a. Sizes.
   b. Weights.
   c. Speeds.
   d. Capacities.
   e. Piping and electrical connection sizes and locations.
   f. Statements of compliance with the required standards and regulations.
   g. Performance data.
   h. Manufacturer's specifications.

B. Shop Drawings:

1. Shop Drawings are defined as mechanical system layout drawings prepared specifically for this project, or fabrication and assembly type drawings of system components to show more detail than typical pre-printed materials.
2. Prepare Mechanical Shop Drawings, except diagrams, to accurate scale, min 1/8”-1'-0", unless otherwise noted.
   a. Show clearance dimensions at critical locations.
   b. Show dimensions of spaces required for operation and maintenance.
   c. Show interfaces with other work, including structural support.

C. Test Reports:

1. Submit test reports which have been signed and dated by the accredited firm or testing agency performing the test.
2. Prepare test reports in the manner specified in the standard or regulation governing the test procedure (if any) as indicated.

3. Submit test reports as required for O & M manuals.

D. Product Listing:

1. Prepare listing of major mechanical equipment and materials for the project, within (2) two weeks of signing the Contract Documents and transmit to the Architect. A sample schedule is included at the end of this section to complete this requirement.
   a. Provide all information requested.
   b. Submit this listing as a part of the submittal requirement specified in Division 1, "PRODUCTS AND SUBSTITUTION."

2. Unless otherwise specified, all materials and equipment shall be of domestic (USA) manufacture and shall be of the best quality used for the purpose in commercial practice.

3. When two or more items of same material or equipment are required (plumbing fixtures, pumps, valves, air conditioning units, etc.) they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units and similar items used in work, except as otherwise indicated.
   a. Provide products which are compatible within systems and other connected items.

E. Schedule of Values

1. Provide preliminary schedule of values with product data submittal, within three (3) weeks from award of contract to successful bidder. Provide according to the following descriptions:
   a. Site Utilities
   b. Plumbing
   c. Demolition
   d. Miscellaneous

2. Provide a final Schedule of Values at close-out of project including updated values based on actual installation.

F. Coordination Drawings: See section 1.4 of this specification section.

G. Required Submittals: Provide submittals for each item of equipment specified or scheduled in the contract documents. See table at the end of this section.

H. If more than two submittals (either for product data, shop drawings, record drawings, or test and balance reports) are made by the Contractor, the Owner reserves the right to charge the Contractor for subsequent reviews by their consultants. Such extra fees shall be deducted from payments by the Owner to the Contractor.

I. The contractor shall cloud all changes made on submittals that are marked “Revise and Resubmit.”

1.16 DELIVERY, STORAGE, AND HANDLING:

A. Refer to LCCC Bidding Documents and Division 1 Sections on Transportation and Handling and Storage and Protection.
B. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels and similar information needed for distinct identifications; adequately packaged and protected to prevent damage or contamination during shipment, storage, and handling.

C. Check delivered equipment against contract documents and submittals.

D. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage, dirt, dust, freezing, heat and moisture.

E. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

F. Provide factory-applied plastic end-caps on each length of pipe and tube, except for concrete, corrugated metal, hub-and-spigot, clay pipe. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris and moisture.

G. Protect stored ductwork, pipes and tubes. Elevate above grade and enclose with durable, waterproof wrapping. When stored inside, do not exceed structural capacity of the floor.

H. Protect flanges, fittings and specialties from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

I. Protect sheet metal ductwork and fittings. Elevate and store above grade and cover ends with waterproof wrapping.

1.17 CUTTING AND PATCHING:

A. This Article specifies the cutting and patching of mechanical equipment, components and materials to include removal and legal disposal of selected materials, components and equipment. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.

B. Refer to LCCC Bidding Documents and Division 1.

C. Do not endanger or damage installed work through procedures and processes of cutting and patching.

D. Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations.

E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective or non-conforming installations.

F. Perform cutting, fitting and patching of mechanical equipment and materials required to:
   1. Uncover work to provide for installation of ill-timed work;
   2. Remove and replace defective work;
   3. Remove and replace work not conforming to requirements of the Contract Documents;
   4. Remove samples of installed work as specified for testing;
   5. Install equipment and materials in existing structures;
   6. Upon written instructions from the Architect/Engineer, uncover and restore work to provide for Architect /Engineer observation of concealed work.
G. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including, but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim and other mechanical items made obsolete by the new work.

H. Protect the structure, furnishings, finishes and adjacent materials not indicated or scheduled to be removed.

I. Locate identify, and protect mechanical and electrical services passing through remodeling or demolition area and serving other areas required to be maintained operational. When services must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover. Cover openings in ductwork to remain. Protect equipment and systems to remain.

1.18 ACCESSIBILITY:

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

B. Final installed conditions shall accommodate accessibility and replacement of system components that regularly require service and replacement. This includes control devices, sensors, motors, etc. Such devices shall not be permanently obstructed by building systems such as piping, ductwork, insulation, drywall, etc.

1.19 EXCAVATING AND BACKFILLING:

A. General:

1. In general, follow all regulations of OSHA as specified in Part 1926, Subpart P, "Excavations, Trenching and Shoring." Follow specifications of Division 23 as they refer specifically to the mechanical work.

B. Contact Owners of all underground utilities to have them located and marked, at least 2 business days before excavation is to begin. Also, prior to starting excavation brief employees on marking and color codes and train employees on excavation and safety procedures for natural gas lines. When excavation approaches gas lines, expose lines by carefully probing and hand digging.

C. Pipe Trenching:

1. Provide all necessary pumping, cribbing and shoring.
2. Walls of all trenches shall be a minimum of 6 inches clearance from the side of the nearest mechanical work. Install pipes with a minimum of 6 inches clearance between them when located in same trench.
3. Dig trenches to depth, width, configuration, and grade appropriate to the piping being installed. Dig trenches to 6 inches below the level of the bottom of the pipe to be installed. Install 6 inches bed of pea gravel or squeegee, mechanically tamp to provide a firm bed for piping, true to line and grade without irregularity. Provide depressions only at hubs, couplings, flanges, or other normal pipe protrusions.

D. Backfilling shall not be started until all work has been inspected, tested and accepted. All backfill material shall be reviewed by the soils engineer. In no case shall lumber, metal or other debris be buried in with backfill.

1. Provide warning tape for marking and locating underground utilities. Tape shall be specifically manufactured for this purpose and shall be polyethylene film, 6 inches wide, 0.004 inches thick
and have a minimum strength of 1750 psi. Tape shall carry continuous inscription naming the specific utility.

a. Tape shall have magnetic strip and be used for exterior underground system only.

E. Trench Backfill:

1. Backfill to 12 inches above top of piping with pea gravel or squeegee, the same as used for piping bed, compact properly.
2. Continue backfill to finish grade, using friable material free of rock and other debris. Install in 6 inch layers, each properly moistened and mechanically compacted prior to installation of ensuing layer. Compaction by hydraulic jetting is not permissible.

F. After backfilling and compacting, any settling shall be refilled, tamped, and refinshed at this contractor's expense.

G. This contractor shall repair and pay for any damage to finished surfaces.

H. Complete the backfilling near manholes using pea gravel or squeegee, installing it in 6 inch lifts and mechanically tamping to achieve 95 percent compaction.

I. Use suitable excavated material to complete the backfill, installed in 6 inch lifts and mechanically compacted to seal against water infiltration. Compact to 95 percent for the upper, 30 inches below paving and slabs and 90 percent elsewhere.

1.20 NAMEPLATE DATA:

A. Provide permanent operational data nameplate, on each item of mechanical equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location. Coordinate with Owner for specific requirements.

1.21 CLEANING:

A. Refer to LCCC Bidding Documents and Division 1.

1.22 RECORD DOCUMENTS:

A. Refer to LCCC Bidding Documents and Division 1. The following paragraphs supplement the requirements of LCCC Bidding Documents and Division 1.

B. Keep a complete set of record document prints in custody during entire period of construction at the construction site. Documents shall be updated on a weekly basis.

C. Mark Drawing Prints to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices. Changes to be noted on the drawings shall include final location of any piping or ductwork relocated more than 1 foot-0 inches from where shown on the drawings.
D. Mark shop drawings to indicate approved substitutions; Change Orders; actual equipment and materials used.

E. Mark equipment and fixture schedules on drawings to indicate manufacturer and model numbers of installed equipment and fixtures.

F. Revisions to the Contract Documents shall be legible and shall be prepared using the following color scheme:
   1. Red shall indicate new items, deviations and routing.
   2. Green shall indicate items removed or deleted.
   3. Blue shall be used for relevant notes and descriptions.

G. At the completion of the project, obtain from the Engineer a complete set of the Mechanical Contract Documents in a read-only electronic format (.pdf unless otherwise noted). This set will include all revisions officially documented through the Engineer. Using the above color scheme, transfer any undocumented revisions from the construction site record drawings to this complete set. Submit completed documents to the Engineer. This contract will not be considered completed until these record documents have been received and reviewed by the Engineer.

H. Contractor may propose methods of maintaining record documents on electronic media. Obtain approval of Engineer and Owner prior to proceeding. Marked-up .pdf format readable by Bluebeam is preferred.

1.23 OPERATION AND MAINTENANCE DATA:

A. Refer to LCCC Bidding Documents and Division 1.

B. No later than four (4) weeks prior to the completion of the project provide one complete set of Operating and Maintenance Manuals, or as specified in Sections of LCCC Bidding Documents and Division 1 (whichever is more stringent).

C. In addition to the information required LCCC Bidding Documents and Division 1 for Maintenance Data, include the following information:
   1. The job name and address and contractor's name and address shall be identified at the front of the electronic submittal.
   2. Description of mechanical equipment, function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
   3. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions; and summer and winter operating instructions. Provide any test reports and start-up documents.
   4. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   5. Servicing instructions, lubrication charts and schedules, including Contractor lubrication reports.
   6. Manufacturer's service manuals for all mechanical equipment provided under this contract.
   7. Include the valve tag list.
   8. Name, Address and Telephone numbers of the Sub-contractors and local company and party to be contacted for 24-hour service and maintenance for each item of equipment.
   9. Starting, stopping, lubrication, equipment identification numbers and adjustment clearly indicated for each piece of equipment.
   10. Complete recommended spare parts list.
   11. Mechanical System and Equipment Warranties.
   12. Copies of all test reports shall be included in the manuals.
13. Provide manuals with dividers for major sections and special equipment. Mark the individual equipment when more than one model or make is listed on a page. Provide detailed table of contents.
14. Final schedule of values with all mechanical change order costs included and identified.
15. Contractor may propose methods of maintaining record documents on electronic media. Obtain approval of Engineer and Owner prior to proceeding. Marked-up PDF format readable by Bluebeam is preferred.

D. This contract will not be considered completed nor will final payment be made until all specified material, including test reports, and final Schedule of Values with all change order costs included and identified is provided and the manual is reviewed by the Engineer.

1.24 PROJECT CLOSEOUT LIST:

A. In addition to the requirements specified in LCCC Bidding Documents and Division 1, complete the requirements listed below.

B. The Contractor shall be responsible for the following Mechanical Submittal Checklist either by performing and/or coordinating such items prior to applying for certification of substantial completion. Refer to individual specification sections for additional requirements. (Checklist is located at the end of this section.)

1.25 WARRANTIES:

A. Refer to the LCCC Bidding Documents and Division 1 for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements. In any case the entire mechanical system shall be warranted no less than one year from the time of acceptance by the Owner.

B. Compile and assemble the warranties specified in Division 23, into the Operating and Maintenance Manuals.

C. Provide complete warranty information for each item to include product or equipment to include date or beginning of warranty or bond; duration of warranty or bond; and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

1.26 CONSTRUCTION REQUIREMENTS:

A. The contractor shall maintain and have available at the jobsite current information on the following at all times:

1. Up to date record drawings.
2. Submittals
3. Site observation reports with current status of all action items.
4. Test results; including recorded values, procedures, and other findings.
5. Outage information.
1.27 MECHANICAL SUBMITTAL CHECKLIST:

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3 See Specific Specification Section for Test & Certification Requirements

END OF SECTION 23 0500
PART 1 - GENERAL

1.1 SUBMITTALS:

A. Refer to LCCC Bidding Documents and Section 23 05 00 “Common Work Results for Mechanical” for administrative and procedural requirements for submittals.

B. Product Data: Submit industry standards and manufacturer’s technical product data, installation instructions, and dimensioned drawings for each type of pipe and pipe fitting. Submit piping schedule showing pipe or tube weight, fitting type, and joint type for each piping system.

C. Welding Certifications: Submit reports as required for piping work.

1.2 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of pipes and pipe fittings of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Welder's Qualifications: All welders shall be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications.

C. Welding procedures and testing shall comply with the latest revisions of the applicable sections for B31, of the ANSI/ASME standard codes for pressure piping, noted as follows: B31.1 - Pressure Piping Code / B31.2 - Fuel Gas Piping Code / B31.5 - Refrigeration Piping / B31.9 - Building Service Piping Code.

D. Before any welding is performed, the contractor shall submit to the Architect/Engineer, or his authorized, a copy of the Manufacturer's Record of Welder or Welding Operator Qualification Tests and his Welding Procedure Specification together with the Procedure Qualification Record as required by ASME Boiler and Pressure Vessel Code.

E. Each manufacturer or contractor shall be responsible for the quality of welding done by his organization and shall repair or replace any work not in accordance with these specifications.

PART 2 - PRODUCTS

2.1 GENERAL:

A. Piping Materials: Provide pipe and tube of type, pressure and temperature ratings, capacities, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.

B. Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.

2.2 STEEL PIPES AND PIPE FITTINGS:

A. Black Steel Pipe: ASTM A 53, Grade B, type E, electric resistance welded.
B. PE Pipe: ASTM D 2513, SDR 11.

C. Malleable-Iron Threaded Fittings: ANSI/ASME B16.3; plain or galvanized as indicated (Class 125 and 300).


E. Steel Flanges/Fittings: ANSI/ASME B16.5, including bolting and gasketing of the following material group, end connection and facing, except as otherwise indicated.
   
   Material Group: Group 1.1.
   End Connections: Buttwelding.
   Facings: Raised-face.

F. Wrought-Steel Buttwelding Fittings: ANSI B16.9, except ANSI B16.28 for short-radius elbows and returns; rated to match connected pipe.

G. Forged Branch-Connection Fittings: Except as otherwise indicated, provide type as determined by Installer to comply with installation requirements.

H. Pipe Nipples: Fabricated from same pipe as used for connected pipe; except do not use less than Schedule 80 pipe where length remaining unthreaded is less than 1-1/2 inches, and where pipe size is less than 1-1/2 inches, and do not thread nipples full length (no close-nipples).

I. PE Fittings: ASTM D 2683, socket-fusion type or ASTM D 3261, butt-fusion type with dimensions matching PE pipe.

J. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D 2513, SDR 11; and steel pipe complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

   2. Casing: Steel pipe complying with ASTM A 53/A 53M, Schedule 40, black steel, Type E or S, Grade B, with corrosion-protective coating covering.[ Vent casing aboveground.]
   4. Outlet shall be threaded or flanged or suitable for welded connection.
   5. Tracer wire connection.
   6. Ultraviolet shield.
   7. Stake supports with factory finish to match steel pipe casing or carrier pipe.

   1. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet connected to steel pipe complying with ASTM A 53/A 53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
   2. Outlet shall be threaded or flanged or suitable for welded connection.
   3. Bridging sleeve over mechanical coupling.
   4. Factory-connected anode.
   5. Tracer wire connection.
   6. Ultraviolet shield.
   7. Stake supports with factory finish to match steel pipe casing or carrier pipe.

M. Plastic Mechanical Couplings, NPS 1-1/2 (DN 40) and Smaller: Capable of joining PE pipe to PE pipe.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   c. Perfection Corporation; a subsidiary of American Meter Company.

2. PE body with molded-in, stainless-steel support ring.
4. Acetal collets.
5. Electro-zinc-plated steel stiffener.

N. Plastic Mechanical Couplings, NPS 2 (DN 50) and Larger: Capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   c. Perfection Corporation; a subsidiary of American Meter Company.

2. Fiber-reinforced plastic body.
3. PE body tube.
5. Acetal collets.

O. Steel Mechanical Couplings: Capable of joining plain-end PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Dresser Piping Specialties; Division of Dresser, Inc.
   b. Smith-Blair, Inc.

2. Steel flanges and tube with epoxy finish.
4. Steel bolts, washers, and nuts.
5. Factory-installed anode for steel-body couplings installed underground.

2.3 MISCELLANEOUS PIPING MATERIALS/PRODUCTS:

A. Welding Materials: Except as otherwise indicated, provide welding materials as determined by Installer to comply with installation requirements.


B. Gaskets for Flanged Joints: ANSI B16.21; full-faced for cast-iron flanges; raised-face for steel flanges, unless otherwise indicated.

C. Pipe Thread Sealant Material: Except as otherwise indicated, provide all pipe threads with the sealant material as recommended by the manufacturer for the service.
PART 3 - EXECUTION

3.1 EXAMINATION:

A. Verify all dimensions by field measurements. Verify that all water distribution piping may be installed in accordance with pertinent codes and regulations, and original design, and the referenced standards.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PIPING INSTALLATION:

A. General: Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently-leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connections, within 1/16 inch misalignment tolerance.

1. Comply with ANSI B31 Code for Pressure Piping.
2. Install underground, PE, natural-gas piping according to ASTM D 2774.
3. Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical or electronic equipment spaces and enclosures. Only piping serving this type of equipment space shall be allowed.
4. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. Locations and arrangements of piping take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.
5. Use fittings for all changes in direction and all branch connections.
6. Install piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.
7. Install piping free of sags or bends.
8. Coordinate foundation and all other structural penetrations.

3.3 PIPING SYSTEM JOINTS:

A. General: Provide joints of type indicated in each piping system.

B. Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed.

C. Weld pipe joints in accordance with ASME Code for Pressure Piping, B31. Provide weld-o-let fittings for two pipe sizes less than main pipe size.

D. Weld pipe joints in accordance with recognized industry practice and as follows:

1. Weld pipe joints only when ambient temperature is above 0 degrees F (-18 degrees C) where possible.
2. Bevel pipe ends at a 37.5 degrees angle where possible, smooth rough cuts, and clean to remove slag, metal particles and dirt.
3. Use pipe clamps or tack-weld joints with 1 inch long welds; 4 welds for pipe sizes to 10 inches, 8 welds for pipe sizes 12 inch to 20 inch.
4. Build up welds with stringer-bead pass, followed by hot pass, followed by cover or filler pass. Eliminate valleys at center and edges of each weld. Weld by procedures which will ensure elimination of unsound or unfused metal, cracks, oxidation, blow-holes and non-metallic inclusions.
5. Do not weld-out piping system imperfections by tack-welding procedures; refabricate to comply with requirements.

E. Flanged Joints: Match flanges within piping system, and at connections with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets.

F. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.4 PIPING APPLICATION:

A. Accessible Gas Piping:

1. Above Grade:
   a. Exposed Location:
      1) 2 Inches and Smaller: Schedule 40, black steel pipe, beveled ends, with 150 lb. malleable iron fittings and threaded joints.
      2) Over 2 Inches: Schedule 40 black steel with butt weld fittings and welded joints.
      3) Above Ground Outside: Schedule 40 black steel pipe sizes matching above. Piping shall be painted to protect against rust.
   b. Inaccessible Location:
      1) All sizes: Schedule 40 black steel pipe, beveled ends, with socket weld fittings same thickness as pipe; welded joints.

2. Below Grade: PE pipe and fittings joined by heat fusion, or mechanical couplings; service-line risers with tracer wire terminated in an accessible location.

3.5 PIPING TESTS:

A. General: Provide temporary equipment for testing, including pump and gauges. Test piping system before insulation is installed wherever feasible, and remove control devices before testing. Test each section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for indicated pressure and time.

B. Test all piping systems as specified. Correct leaks by remaking joints. Remove equipment not able to withstand test procedure during test.

C. Work to be installed shall remain uncovered until the required tests have been completed.
D. Piping which is to be concealed shall be tested before being permanently enclosed.

E. As soon as work has been completed, conduct preliminary tests to ascertain compliance with specified requirements. Make repairs or replacements as required.

F. Give a minimum of twenty-four hours notice to Engineer of dates when acceptance test will be conducted. Conduct tests as specified for each system in presence of representative of owner, agency having jurisdiction or his representative. Submit three (3) copies of successful tests to the Engineer for his review. Report shall state system tested and date of successful test.

G. Contractor shall obtain certificates of approval, acceptance and compliance with regulations of agencies having jurisdiction. Work shall not be considered complete until such certificates have been delivered by the Engineer to the Owner.

H. All costs involved in these tests shall be borne by Contractor.

I. System Tests

1. Compressed Air or Nitrogen Test: Compressed air tests may be substituted for hydrostatic tests only when ambient conditions or existing building conditions prohibit safe use of hydrostatic testing and must be reviewed by the Engineer prior to any testing. For tests of this type, the piping system shall be subjected to the gas pressure indicated for that specific system. The piping capped or plugged and water-pumped with oil free air, or a nitrogen bottle shall be introduced into the entire system to the pressure specified. The system shall maintain that pressure for the duration of a soapy water test of each joint.

2. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

3.6 UNDERGROUND PIPE INSTALLATION:

A. Clean fittings, nipples and other field joints thoroughly before coating.

3.7 ADJUSTING AND CLEANING:

A. General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.

1. Inspect pressure piping in accordance with procedures of ASME B31.

3.8 COMMISSIONING:

A. Fill system.

B. Before operating the system open valves to full open position.

END OF SECTION 23 0510
1.1 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of supports and anchors, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:
   1. Regulatory Requirements: Comply with applicable plumbing codes pertaining to product materials and installation of supports and anchors.
   2. MSS Standard Compliance:
      a. Provide pipe hangers and supports of which materials, design, and manufacture comply with MSS SP-69.

1.2 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data, including installation instructions for each type of support and anchor. Submit pipe hanger and support schedule showing Manufacturer's figure number, size, location, and features for each required pipe hanger and support.

B. Shop Drawings: Submit manufacturer's assembly-type shop drawings for each type of support and anchor, indicating dimensions, weights, required clearances, and methods of assembly of components.

C. Product certificates signed by the manufacturer of hangers and supports certifying that their products meet the specified requirements.

D. Maintenance Data: Submit maintenance data and parts list for each type of support and anchor. Include this data, product data, and shop drawings in maintenance manual; in accordance with requirements of Division 23.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

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

1. Pipe Hangers and Supports:
   a. B-Line Systems Inc.
   b. ANVIL International
   c. PHD Manufacturing, Inc.
   d. Unistrut Metal Framing Systems
   e. Hubbard Enterprises (Supports for domestic water piping)
   f. Specialty Products Co. (Supports for domestic water piping)
   g. Erico
   h. Grinnell

2. Concrete Inserts and Anchors:
2.2 PIPE HANGERS & SUPPORTS:

A. Hangers and support components shall be factory fabricated of materials, design, and manufacturer complying with MSS SP-69.

1. Components shall have galvanized coatings where installed for piping and equipment that will not have field-applied finish.
2. Pipe attachments shall have nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.

B. Pipe Clamps: MSS Type .

2. Copper Pipe, size 1/2" thru 4", Type 8 (PVC Coated).

C. U Bolts: MSS Type .

1. Steel Pipe, size 1/2" thru 30" Type 24
2. Copper Pipe, size 1/2" thru 8", Type 24 (PVC Coated).

D. Straps: MSS Type 26.

E. Pipe Stanchion Saddle: MSS Type 37.

F. Hangers:

1. Cold Pipes:
   a. 1/2" through 1-1/2": Adjustable wrought steel ring.
   b. 2" and Over: Adjustable wrought steel clevis.

2. Multiple or Trapeze: Structural steel channel (with web vertical and engineered for the specific applications), with welded spacers and hanger rods. Provide cast iron roll and base plate for hot pipe sizes six inches and over. Provide hanger rods one size larger than for largest pipe in trapeze. If the deflection at center of trapeze exceeds 1/360 of the distance between the end hangers, install an additional hanger at mid-span or use a larger channel.

G. Wall Supports for Horizontal Steel Pipe:

1. 1/2 inch through 4 inches: Offset or straight j-hook.
2. 4 inches and Over: Welded steel bracket Type 31, 32 or 33 and wrought steel clamp. Provide adjustable steel yoke and cast iron roll Type 44 for hot pipe 200 degrees F and over and for sizes six inches and over.

H. Supports for Vertical Pipe: Steel riser clamp. Type 8.
2.3 CONCRETE INSERTS AND ANCHORS:

A. Inserts: Case shall be of galvanized carbon steel with square threaded concrete insert nut for hanger rod connection; top lugs for reinforcing rods, nail holes for attaching to forms. This type of upper attachment is to be used for all areas having poured in place concrete construction.

1. Size inserts to suit threaded hanger rods.

B. Provide fasteners attached to concrete ceilings that are vibration and shock resistant. Provide hangers for piping attached to concrete construction with one of the following types.

1. Concrete insert per MSS SP 69, Type 18.
2. Powder driven fasteners subject to approval of Architect and Structural Engineer. Each fastener shall be capable of holding a test load of 1000 pounds whereas the actual load shall not exceed 50 pounds.
3. Self-drilling expansion shields. The load applied shall not exceed one-fourth the proof test load required.
4. Machine bolt expansion anchor. The load applied shall not exceed one-fourth the proof test load required.

C. Anchors: Carbon steel, zinc plated and coated with a clear chromate finish. Installation shall be in holes drilled with carbide-tipped drill bits or by use of self-drilling anchors.

1. Provide anchors suitable for the location of installation and designed to withstand all forces and movements acting in the anchor. Manufacture pipe anchors in accordance with MSS SP 69. Provide a safety factor of four for the anchor installation.

2.4 MISCELLANEOUS MATERIALS:

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

B. Heavy-Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS standards.

C. Pipe Alignment Guides: Provide factory-fabricated guides, of cast semi-steel or heavy fabricated steel, consisting of bolted two-section outer cylinder and base with two-section guiding spider bolted tight to pipe. Size guide and spiders to clear pipe and insulation (if any), and cylinder. Provide guides of length recommended by manufacturer to allow indicated travel.

2.5 ROOF PIPE SUPPORTS:

A. See details on drawings

PART 3 - EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which supports and anchors are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 PREPARATION:

A. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not
limited to) proper placement of inserts, anchors and other building structural attachments. Review Structural Drawings to obtain structural support limitations.

B. Prior to installation of hangers, supports, anchors and associated work, Installer shall meet at project site with Contractor, installer of each component of associated work, inspection and testing agency representatives (if any), installers of other work requiring coordination with work of this section and Engineer for purpose of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified. Provide Shop Drawing showing method and support locations from structure.

3.3 INSTALLATION OF BUILDING ATTACHMENTS:

A. Install building attachments within concrete or on structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

B. Existing Construction:

1. In existing concrete construction, drill into concrete slab and insert and tighten expansion anchor bolt. Connect anchor bolt to hanger rod. Care must be taken in existing concrete construction not to sever reinforcement rods or tension wires.

3.4 INSTALLATION OF HANGERS AND SUPPORTS:

A. Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on field fabricated, heavy-duty trapeze hangers where possible. Install supports with maximum spacings complying with MSS SP-69. Where piping of various sizes is supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories.

C. Prevent electrolysis and abrasion in support of copper tubing by use of hangers and supports which are plastic coated, or with EPDM isolation strips. Duct tape or copper coated hangers are not acceptable.

D. Install hangers and supports to allow controlled movement of piping systems, to permit freedom of movement between pipe anchors, to facilitate action of expansion joints, expansion loops, expansion bends and similar units and within 1'-0" of each horizontal elbow.

E. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

F. Install steel natural gas piping with the following minimum rod size and maximum spacing:

<table>
<thead>
<tr>
<th>SIZE (NPS)</th>
<th>MAX. SPAN IN FEET</th>
<th>MIN. ROD SIZE - INCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>6</td>
<td>3/8</td>
</tr>
<tr>
<td>3/4 TO 1</td>
<td>8</td>
<td>3/8</td>
</tr>
<tr>
<td>SIZE (NPS)</td>
<td>MAX. SPAN IN FEET</td>
<td>MIN. ROD SIZE - INCHES</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>1-1/4</td>
<td>10</td>
<td>3/8</td>
</tr>
<tr>
<td>1-1/2</td>
<td>10</td>
<td>3/8</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>3/8</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>½</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>5/8</td>
</tr>
<tr>
<td>6</td>
<td>21</td>
<td>3/4</td>
</tr>
<tr>
<td>8</td>
<td>24</td>
<td>7/8</td>
</tr>
<tr>
<td>10</td>
<td>26</td>
<td>7/8</td>
</tr>
<tr>
<td>12</td>
<td>30</td>
<td>7/8</td>
</tr>
</tbody>
</table>

Vertical, all sizes every floor level

G. Place a support within one foot of each horizontal elbow.

H. Support vertical steel piping at every story height but at not more than 15 foot intervals for steel and 10 feet for copper.

I. Where practical, support riser piping independently of connected horizontal piping.

J. Install anchors and fasteners in accordance with manufacturer's recommendations and the following:
   1. In the event a self-drilling expansion shield or machine bolt expansion shield is considered to have been installed improperly, the Contractor shall make an acceptable replacement or demonstrate the stability of the anchor by performing an on-site test under which the anchor will be subjected to a load equal to twice the actual load.
   2. Powder-driven fasteners may be used only where they will be concealed after the construction is complete. Where an occasional fastener appears to be improperly installed, additional fastener(s) shall be driven nearby (not closer than 6 inches) in undisturbed concrete. Where it is considered that many fasteners are improperly installed, the Contractor shall test load any 50 successively driven fasteners. If 10 percent or more of these fasteners fail, the Contractor shall utilize other fastening means as approved and at no additional cost to the Owner.

3.5 INSTALLATION OF ANCHORS:
   A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31.9, and to prevent transfer of loading and stresses to connected equipment.
   B. Fabricate and install anchor by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B31.9 and with AWS Standards D1.1.
   C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions, to control movement to compensators.
   D. Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of
anchors as required to accommodate both expansion and contraction of piping. Provide shop drawing for review by Engineer.

3.6 PREFABRICATED ROOFTOP PIPE SUPPORTS:

A. All supports shall be installed in accordance with manufacturer's recommendations.

3.7 METAL FABRICATION:

A. Cut, drill, and fit miscellaneous metal fabrications for pipe anchors and equipment supports. Install and align fabricated anchors.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, 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.
4. Finish welds at exposed connections so no roughness shows after finishing and contours at welded surfaces match adjacent contours.

3.8 ADJUSTING:

A. Support Adjustment: Adjust supports to distribute loads equally on attachments and to achieve indicated slope of pipe. Cut off the bottom of threaded rods so they are no more than one rod diameter below the bottom nut.

B. Touch-Up Painting: Immediately after erection of anchors and supports, clean field welds and abraded areas of shop paint and paint exposed areas with same material as used for shop painting to comply with SSPC-PA-1 requirements for touch-up of field-painted surfaces.

1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

END OF SECTION 23 0229
PART 1 - GENERAL

1.1 DEFINITIONS:

A. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).

B. Gas Distribution Piping: A pipe within the building which conveys gas from the point of delivery to the points of usage.

C. Gas Service Piping: The pipe from the gas main or other source of supply including the meter, regulating valve, or service valve to the gas distribution system of the building served.

D. Point of Delivery is the outlet of the service meter assembly, or the outlet of the service regulator (service shutoff valve when no meter is provided).

1.2 SUBMITTALS:

A. Product data for each gas piping specialty and special duty valve. Include rated capacities of selected models, furnished specialties and accessories, and installation instructions.

B. Shop drawings detailing dimensions, required clearances, for connection to gas meter.

C. Record Drawings: At project closeout, submit record drawings of installed systems products; in accordance with requirements of Division 23.

D. Maintenance data for gas specialties and special duty valves, for inclusion in operating and maintenance manual specified in Division 23.

E. Welders' qualification certificates, certifying that welders comply with the quality requirements specified under "Quality Assurance" below.

F. Test reports specified in Part 3 below.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of natural gas systems products, of types, materials, sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer Qualifications: Installation and replacement of gas piping, gas utilization equipment or accessories, and repair and servicing of equipment shall be performed only by a qualified installer. The term qualified is defined as experienced in such work (experienced shall mean having a minimum of 5 previous projects similar in size and scope to this project), familiar with precautions required, and has complied with the requirements of the authority having jurisdiction. Upon request, submit evidence of such qualifications to the Architect.

C. Qualifications for Welding Processes and Operators: Comply with the requirements of ASME Boiler and Pressure Vessel Code, "Welding and Brazing Qualification."
D. Regulatory Requirements: Comply with the requirements of the following codes:

1. NFPA 54 - National Fuel Gas Code, for gas piping materials and components, gas piping installations, and inspection, testing, and purging of gas piping systems.
2. Local Building Code.
3. Utility Compliance: Fabricate and install natural gas systems in accordance with local gas utility company.

1.4 DELIVERY, STORAGE, AND HANDLING:

A. Handling Flammable Liquids: Remove and legally dispose of liquid from a drip in existing gas piping and handle cautiously to avoid spillage or ignition. Notify the gas supplier. Handle flammable liquids used by the installer with proper precautions, and do not leave on the premises from the end of one working day to the beginning of the next.

1.5 SEQUENCING AND SCHEDULING:

A. Notification of Interruption of Service: Except in the case of an emergency, notify all affected users when the gas supply is to be turned off.

B. Work Interruptions: When interruptions in work occur while repairs or alterations are being made to an existing piping system, leave the system in safe condition.

C. Coordinate the installation of pipe sleeves for foundation wall penetrations.

1.6 EXTRA MATERIALS:

A. Valve Wrenches: Furnish to Owner, with receipt, 2 valve wrenches for each type of gas valve installed, requiring same.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

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

1. Gas Cocks:
   a. Jenkins Bros.
   b. Lunkenheimer Co.
   c. Nibco, Inc.
   d. Powell Co.
   e. Stockham.

2.2 PIPE, TUBING AND JOINTING MATERIALS:

A. Provide pipes and pipe fitting complying with Division 23, Section 23 05 10 “Basic Piping Materials and Methods”.

2.3 NATURAL GAS PIPING SPECIALTIES:

A. Protective Coating: Provide factory applied polyethylene tape, having the following properties:

1. Overall thickness; 20 mils.
2. Synthetic adhesive.
3. Water vapor transmission rate.
4. Gallons per 100 square inch: 0.10 or less.
5. Water absorption, percent: 0.02 or less.
6. Prime pipe and fittings with a compatible primer prior to application of tape.
7. Pipe wrapping shall conform to the following schedule:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Tape Width</th>
<th>Scotchwrap No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Standard</td>
</tr>
<tr>
<td>1/4 - 3/4 inch</td>
<td>1 inch</td>
<td>50</td>
</tr>
<tr>
<td>1 - 1-1/2 inch</td>
<td>2 or 4 inch</td>
<td>50</td>
</tr>
<tr>
<td>2 inch and larger</td>
<td>4 inch</td>
<td>50</td>
</tr>
<tr>
<td>Color backing</td>
<td></td>
<td>Black</td>
</tr>
</tbody>
</table>

8. During application of wrap, if the ambient temperature is 40 degrees F or less, use only Scotchwrap No. 40 tape. If ambient temperature is 40 degrees F or more, use only Scotchwrap No. 50.

2.4 VALVES:

A. Special duty valves are specified in this section by their generic name. Refer to Part 3, "VALVE APPLICATION," for specific uses and applications for valve specified.

B. Gas Cocks 2 Inch and Smaller: 150 psi WOG, bronze body, straightaway pattern, square head, threaded ends.

C. Gas Cocks 2-1/2 Inch and Larger: MSS SP-78; 175 psi, lubricated plug type, semi-steel body, single gland, wrench operated, flanged ends.

D. Gas Line Pressure Regulators: Single stage, steel jacketed, corrosion-resistant gas pressure regulators; with atmospheric vent, elevation compensator; with threaded ends for 2 inch and smaller, flanged ends for 2-1/2 inch and larger; for inlet and outlet gas pressures, specific gravity, and volume flow indicated.

PART 3 - EXECUTION

3.1 INSPECTION:

A. General: Examine areas and conditions under which natural gas systems materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.2 PREPARATION:

A. Precautions: Before turning off the gas to the premises, or section of piping, turn off all equipment valves. Perform a leakage test as specified in "FIELD QUALITY CONTROL" below, to determine that all equipment is turned off in the piping section to be affected.

B. Conform to the requirements in NFPA 54, for the prevention of accidental ignition.
3.3 INSTALLATION OF PIPE:

A. Install natural gas piping in accordance with Division 23, Section 23 05 10.

B. Conform to the requirements of NFPA 54 - National Fuel Gas Code.

C. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. Design locations and arrangements of piping take into consideration pipe sizing, flow direction, slope of pipe, expansion, and other design considerations. So far as practical, install piping as indicated.

D. Install pipe sleeve and seals at foundation and basement wall penetrations, as specified in Division 23 Section 23 05 10 "Basic Piping Materials and Methods."

E. Drips and Sediment Traps: Install a drip leg at points where condensate may collect, at the outlet of the gas meter, and in a location readily accessible to permit cleaning and emptying. Do not install drips where condensate is likely to freeze.

1. Construct drips and sediment traps using a tee fitting with the bottom outlet plugged or capped. Use a minimum of 3 pipe diameters in length for the drip leg. Use same size pipe for drip leg as the connected pipe.

F. Use fittings for all changes in direction and all branch connections.

G. Install gas piping at a uniform grade upward to risers, and from the risers to the meter, or service regulator when meter is not provided, or the equipment.

H. Connect branch outlet pipes from the top of horizontal lines, not from the bottom or sides.

3.4 NATURAL GAS PIPING SPECIALTIES:

A. Protective Coating:

1. Provide protective coating on piping and fittings that will be in contact with material or atmosphere exerting a corrosive action, or piping buried in floors. Protective coating shall be applied at the factory.

3.5 VALVE APPLICATIONS:

A. General: The Drawings indicate valve types, locations, and arrangements.

B. Shut-off duty: Use gas cocks.

3.6 VALVE INSTALLATIONS:

A. Install valves in accessible locations, protected from physical damage. Tag valves with a metal tag attached with a metal chain indicating the piping systems supplied.

B. Install a gas cock upstream of each gas pressure regulator. Where two gas pressure regulators are installed in series in a single gas line, a manual valve is not required at the second regulator.

C. Install pressure relief or pressure limiting devices so they can be readily operated to determine if the valve is free; so they can be tested to determine the pressure at which they will operate; and examined for leakage when in the closed position. Pipe atmospheric vent to outdoors.
D. Valves shall be installed with unions or other means to facilitate removal or repair without disassembly of connecting piping.

3.7 ELECTRICAL BONDING AND GROUNDING:

A. Install above ground portions of gas piping systems, upstream from equipment shutoff valves electrically continuous and bonded to a grounding electrode in accordance with NFPA 70 - "National Electrical Code."

B. Do not use gas piping as a grounding electrode.

3.8 FIELD QUALITY CONTROL:

A. Piping Tests: Inspect, test, and purge natural gas systems in accordance with NFPA 54, and local utility requirements.

B. Test system before covering underground lines.

C. Submit written results of tests to Engineer.

3.9 SPARE PARTS:

A. Valve Wrenches: Furnish to Owner, with receipt, 2 valve wrenches for each type of gas valve installed, requiring same.

END OF SECTION 23 1123
DIVISION 26
ELECTRICAL
PART 1 GENERAL

1.1 SUMMARY

A. Section includes building wire, wiring connectors and connections.

B. Related Sections:

1.2 REFERENCES

A. International Electrical Testing Association:

B. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

A. Product Requirements: Provide products as follows:
   1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
   2. Stranded conductors for control circuits.
   3. Conductor not smaller than 12 AWG for power and lighting circuits.
   4. Conductor not smaller than 16 AWG for control circuits.
   5. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.

B. Wiring Methods: Provide the following wiring methods:
   1. Exterior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
   2. Underground Locations: Use only building wire, Type THHN/THWN insulation, in raceway.

1.4 DESIGN REQUIREMENTS

A. Conductor sizes are based on copper.

1.5 SUBMITTALS

A. Product Data: Submit for building wire.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and circuits.

1.7 QUALITY ASSURANCE

A. Maintain one copy of each document on site.
1.8 QUALIFICATIONS

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

1.9 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings.

1.10 COORDINATION

A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.

B. Wire and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 ft of length shown.

PART 2 PRODUCTS

2.1 BUILDING WIRE

A. Manufacturers:
   1. Aetna Insulated Wire, Inc.
   3. Cerro Wire LLC.
   5. General Cable.
   7. Substitutions: By Prior Approval.

B. Product Description: Single conductor insulated wire.

C. Conductor: Copper.

D. Insulation Voltage Rating: 600 volts.

E. Insulation Temperature Rating: 75 degrees C.

F. Insulation Material: Thermoplastic.

2.2 WIRING CONNECTORS

A. Manufacturers; Split Bolt Connectors:
   1. Brundy.
   2. ILSCO.
   3. Thomas & Betts Corporation.

B. Manufacturers; Solderless Pressure Connectors:
   1. 3M.
   2. Ideal Industries, Inc.
C. Manufacturers; Spring Wire Connectors:
   1. 3M.
   2. NELCO, Inc.

D. Manufacturers; Compression Connectors:
   1. Brundy.
   2. Ideal Industries, Inc.
   3. Leviton Manufacturing Co., Inc.
   4. Thomas & Betts Corporation.
   5. Substitutions: Permitted.

2.3 TERMINATIONS

   A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.

PART 3 EXECUTION

3.1 EXAMINATION

   A. Verify mechanical work likely to damage wire and cable has been completed.

   B. Verify raceway installation is complete and supported.

3.2 PREPARATION

   A. Completely and thoroughly swab raceway before installing wire.

3.3 EXISTING WORK

   A. Remove exposed abandoned wire and cable. Patch surfaces where removed cables pass through building finishes.

   B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed.

   C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.

   D. Extend existing circuits using materials and methods compatible with existing electrical installations, or as specified.

   E. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.4 INSTALLATION

   A. Route wire and cable to meet Project conditions.

   B. Neatly train and lace wiring inside boxes, equipment, and panelboards.
C. Identify and color code wire and cable under provisions of Section 26 0553. Identify each conductor with its circuit number or other designation indicated.

D. Special Techniques--Building Wire in Raceway:
   1. Pull conductors into raceway at same time.

E. Special Techniques - Wiring Connections:
   1. Clean conductor surfaces before installing lugs and connectors.
   2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
   3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
   4. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
   5. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

3.5 WIRE COLOR

A. General:
   1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
      a. Black, red, and blue for circuits at 120/208 volts three phase.
      b. Orange, brown, and yellow for circuits at 277/480 volts three phase.
   2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
      a. Black, red, and blue for circuits at 120/208 volts three phase.
      b. Orange, brown, and yellow for circuits at 277/480 volts three phase.

B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase.

3.6 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION 26 0519
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Rod electrodes.
   2. Wire.
   3. Mechanical connectors.
   4. Exothermic connectors

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

B. International Electrical Testing Association:

C. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

A. Grounding systems use the following elements as grounding electrodes:
   1. Rod electrode.

1.4 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms maximum.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and grounding electrodes.

1.6 QUALITY ASSURANCE

A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.

B. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

PART 2 PRODUCTS

2.1 ROD ELECTRODES

A. Manufacturers:
   1. ERICO Internation Corporation.
   2. Harger Lightning Ground.

B. Product Description:
   1. Material: Copper-clad steel.
   3. Length: 8 feet.

C. Connector: Connector for exothermic welded connection.

2.2 WIRE

A. Material: Stranded copper.

B. Grounding Electrode Conductor: Copper conductor insulated.

C. Bonding Conductor: Copper conductor bare.

2.3 MECHANICAL CONNECTORS

A. Manufacturers:
   1. Burndy.
   2. ERICO Internation Corporation.
   3. Galvin Industries, Inc.
   4. Harger Lightning & Ground.
   5. ILSCO.
   6. NSI Industries.
   7. Substitutions: Permitted.

B. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.
2.4 EXOTHERMIC CONNECTIONS

A. Manufacturers:
   1. Burndy.
   2. ERICO Internation Corporation.
   3. Harger Lightning & Ground.

B. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify final backfill and compaction has been completed before driving rod electrodes.

3.2 PREPARATION

A. Remove paint, rust, mill oils, surface contaminants at connection points.

3.3 EXISTING WORK

A. Modify existing grounding system to maintain continuity to accommodate renovations.

B. Extend existing grounding system using materials and methods compatible with existing electrical installations, or as specified.

C. Repair existing damaged grounding conductors as called out in Plans.

3.4 INSTALLATION

A. Install in accordance with IEEE 142.

B. Install rod electrodes at locations as indicated on Drawings.

C. Install grounding and bonding conductors concealed from view.

D. Equipment Grounding Conductor: Install separate, insulated conductor within each branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

E. Permanently ground entire light and power system in accordance with NEC, including switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.

F. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.
G. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.5 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.

C. Perform ground resistance testing in accordance with IEEE 142.

D. Perform leakage current tests in accordance with NFPA 99.

E. Perform continuity testing in accordance with IEEE 142.

F. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION 26 0526
SECTION 26 0533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes conduit, outlet boxes, pull and junction boxes, and handholes.

B. Related Sections:
1. Section 26 0526 - Grounding and Bonding for Electrical Systems.
2. Section 26 0529 - Hangers and Supports for Electrical Systems.
4. Section 26 2726 - Wiring Devices.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.

B. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA FB1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
3. NEMA OS2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
4. NEMA TC2 - Electrical Polyvinyl Chloride (PVC) Conduit.
5. NEMA TC3 - PVC Fittings for Use with Rigid PVC Conduit.

1.3 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

B. Underground: Provide, thickwall nonmetallic conduit. Provide cast metal boxes or nonmetallic handhole.

C. Outdoor Locations, Above Grade: Provide electrical metallic tubing. Provide cast metal or nonmetallic outlet, pull, and junction boxes.

1.4 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents:
1. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

B. Protect PVC conduit from sunlight.
PART 2 PRODUCTS

2.1 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
   1. Carlon Electrical Products.
   2. Emerson Process Management.
   3. Republic Conduit.
   4. Western Tube and Conduit.
   5. Wheatland Tube Company.

B. Product Description: ANSI C80.3; galvanized tubing.

C. Fittings and Conduit Bodies: NEMA FB 1; steel, compression type.

2.2 NONMETALLIC CONDUIT

A. Manufacturers:
   1. Carlon Electrical Products.
   2. EGS.
   3. Hubbell Premise Wiring.

B. Product Description: NEMA TC 2; Schedule 40 PVC.

C. Fittings and Conduit Bodies: NEMA TC 3.

2.3 OUTLET BOXES

A. Manufacturers:
   1. Allied Moulded Products.
   2. Carlon Electrical Products.
   4. RACO, Hubbell.
   5. Substitutions: Permitted.

B. Nonmetallic Outlet Boxes: NEMA OS 2.

2.4 PULL AND JUNCTION BOXES

A. Manufacturers:
   2. Hoffman.
   4. RACO, Hubbell.
   5. Substitutions: Permitted.

B. Fiberglass Concrete composite Handholes: Die-molded, glass-fiber concrete composite hand holes:
   1. Cover: Glass-fiber concrete composite, weatherproof cover with nonskid finish.
PART 3 EXECUTION

3.1 EXISTING WORK

A. Remove exposed abandoned raceway.

B. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

C. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.

D. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.2 INSTALLATION

A. Ground and bond raceway and boxes in accordance with Section 26 0526.

B. Identify raceway and boxes in accordance with Section 26 0553.

3.3 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Route conduit in and under slab from point-to-point, or as directed in Plans.

C. Maintain clearance between raceway and piping for maintenance purposes.

D. Cut conduit square using saw or pipe cutter; de-burr cut ends.

E. Bring conduit to shoulder of fittings; fasten securely.

F. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.

G. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams.

H. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

I. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.

J. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

K. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

L. Close ends and unused openings in wireway.
3.4 INSTALLATION - BOXES
   A. Orient boxes to accommodate wiring devices oriented as specified in Section 26 2726.

3.5 ADJUSTING
   A. Install knockout closures in unused openings in boxes.

3.6 CLEANING
   A. Clean interior of boxes to remove dust, debris, and other material.
   B. Clean exposed surfaces and restore finish.

END OF SECTION 26 0533
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Labels.
   2. Wire markers.

1.2 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Accept identification products on site in original containers. Inspect for damage.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

C. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Install labels only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 PRODUCTS

2.1 NAMEPLATES

2.2 LABELS

A. Manufacturers:
   1. Brady ID.
   2. Seton Identification Products.

B. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.

2.3 WIRE MARKERS

A. Manufacturers:
1. Brady ID.
2. Grafoplast Wire Markers
3. Ideal Industries Inc.

B. Description: Split sleeve or tubing type wire markers.

C. Legend:
   1. Power and Lighting Circuits: Branch circuit number as indicated on Drawings.

2.4 UNDERGROUND WARNING TAPE

A. Manufacturers:
   1. Brady ID.
   2. Kolbi Pipe Marker Company.

B. Description: 4 inch wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 EXISTING WORK

A. Install identification on existing equipment to remain in accordance with this section.

B. Install identification on unmarked existing equipment.

C. Replace lost labels.

3.3 INSTALLATION

A. Label Installation:
   1. Install label parallel to equipment lines.
   2. Install labels for permanent adhesion and seal with clear lacquer.

B. Wire Marker Installation:
   1. Install wire marker for each conductor at pull boxes, outlet and junction boxes, and each load connection.

C. Underground Warning Tape Installation:
   1. Install underground warning tape along length of each underground conduit, raceway, or cable 6 to 8 inches below finished grade, directly above buried conduit, raceway, or cable.

END OF SECTION 26 0533
PART 1 GENERAL

1.1 SUMMARY

A. Section includes receptacles.

B. Related Sections:
   1. Section 26 05 33 - Raceway and Boxes for Electrical Systems: Outlet boxes for wiring devices.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
   1. NEMA WD 1 - General Requirements for Wiring Devices.
   2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 QUALIFICATIONS

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

PART 2 PRODUCTS

2.1 RECEPTACLES

A. Manufacturers:
   1. Hubbell.
   2. Substitutions: By Prior Approval.

B. Bollard Receptacle Description: General use receptacle provided and factory installed by bollard manufacturer, with weatherproof cover

A. Fire Pit Receptacle Description: Weather-Resistant NEMA 5-20R receptacle. Must be protected with a GFCI breaker.

B. Ground Box Receptacle Description: Weather-Resistant NEMA 5-20R receptacle. Must be protected with a GFCI breaker.

C. Post Receptacle Description: Weather-Resistant NEMA 5-20R receptacle with weatherproof cover. Dark Bronze or Black Finish to match post. Must be protected with a GFCI breaker.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
MCILVAINE PLAZA
LARAMIE COUNTY COMMUNITY COLLEGE
CHEYENNE, WYOMING

3.2 PREPARATION
   A. Clean debris from outlet boxes.

3.3 EXISTING WORK
   A. Disconnect and remove abandoned wiring devices.
   B. Modify installation to maintain access to existing wiring devices to remain active.
   C. Clean and repair existing wiring devices to remain or to be reinstalled.

3.4 INSTALLATION
   A. Install devices plumb and level.
   B. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
   C. Connect wiring devices by wrapping solid conductor around screw terminal.

3.5 FIELD QUALITY CONTROL
   A. Inspect each wiring device for defects.
   B. Operate each wall switch with circuit energized and verify proper operation.
   C. Verify each receptacle device is energized.
   D. Test each receptacle device for proper polarity.
   E. Test each GFCI-protected receptacle device for proper operation.

3.6 ADJUSTING
   A. Adjust devices and wall plates to be flush and level.

3.7 CLEANING
   A. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION 262726
PART 1 GENERAL

1.1 SUMMARY
A. Section includes exterior luminaries, poles, and accessories.

1.2 SUBMITTALS
A. Shop Drawings: Indicate dimensions and components for each luminaire not standard Product of manufacturer.
B. Product Data: Submit dimensions, ratings, and performance data.

1.3 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.4 COORDINATION
A. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

PART 2 PRODUCTS

2.1 LUMINAIRE
A. Product Description: Complete exterior luminaire assemblies, with features, options, and accessories as scheduled.

2.2 LAMPS - GENERAL
A. Minimum Efficacy, Lamps Greater Than 100 Watts: 60 lumens/W, except where otherwise indicated or permitted by applicable code.

2.3 METAL POLES
A. Manufacturers:
   1. Valmont.
B. Material and Finish: Manufacturer’s powder coat finish, as scheduled.
C. Section Shape and Dimensions: Tapered round.
D. Height: As indicated on Drawings.
E. Base: Nonbreakaway.
F. Accessories:
   1. Handhole.
   2. Anchor bolts.
   3. Cover plate.

PART 3 EXECUTION

3.1 EXAMINATION

   A. Verify foundations are ready to receive fixtures.

3.2 EXISTING WORK

   A. Disconnect and remove abandoned exterior luminaries.

   B. Extend existing exterior luminaire installations using materials and methods compatible with existing installations, or as specified.

   C. Clean and repair existing exterior luminaries to remain or to be reinstalled.

3.3 INSTALLATION

   A. Install poles plumb. Install double nuts to adjust plumb. Grout around each base.

   B. Install lamps in each luminaire.

   C. Bond and ground luminaries, metal accessories and metal poles in accordance with Section 26 0526. Install supplementary grounding electrode at each pole.

3.4 FIELD QUALITY CONTROL

   A. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

3.5 ADJUSTING

   A. Aim and adjust luminaries to provide illumination levels and distribution as indicated on Drawings.

3.6 CLEANING

   A. Clean photometric control surfaces as recommended by manufacturer.

   B. Clean finishes and touch up damage.

3.7 PROTECTION OF FINISHED WORK

   A. Relamp luminaries having failed lamps and/or drivers at Substantial Completion.

3.8 SCHEDULES

   1. As shown in Plans.
MCILVAINE PLAZA
LARAMIE COUNTY COMMUNITY COLLEGE
CHEYENNE, WYOMING

END OF SECTION 26 5600