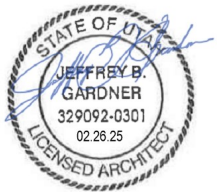
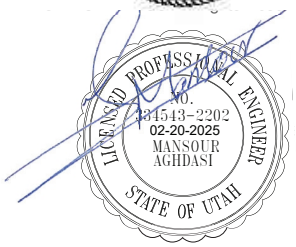
CONSTRUCTION DOCUMENTS
FEBRUARY 2025

SLCO SUGARHOUSE PAVILION REPLACEMENT (BIG FIELD & PARLEYS CREEK)

PROJECT MANUAL
VOLUME 1 OF 1





SALT LAKE COUNTY

1330 EAST 2100 SOUTH
SALT LAKE CITY, UT 84106

PROJECT NO: AN-24056

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PART 1 - GENERAL

1.1 SUMMARY

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B. NOTICE TO BIDDERS:

1. During the bid process, all communications and questions are to be submitted via the online solicitation portal only. No communication is to be had directly with architect/engineer during, or prior, to bids being received. This paragraph supersedes all notes on the drawings and the specifications.

1.2 PROJECT INFORMATION

A. Project Identification:

1. SLCo Sugarhouse Pavilion Replacement (Parleys Creek & Big Field):
1330 East 2100 South, Salt lake City, Utah 841065

B. Owner's Representatives: Salt Lake County (SLCo)

1. SLCo Project Manager: Dan Sonntag (385.468.1819), dsonntag@saltlakecounty.gov)

C. Architect: Architectural Nexus, Inc.

1. Principal-In-Charge: Jeff Gardner (801.924.5000, jgardner@archnexus.com)
2. Project Manager: Ali Smith (801.924.5000, asmith@archnexus.com)
3. Project Architect: Steve Tanner (801.924.5000, stanner@archnexus.com)

D. Electrical Engineer: EELD

1. Engineer of Record: Mansour Aghdasi (801.486.2222, mansour@ee-ld.com)

1.3 SCOPE OF WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Replacement of the Parleys Creek & Big Field Pavilions. Selective Demolition of existing pavilion and adjacent space. Update electrical and site components.
2. Owner Provided Information: Owner has as-builts of irrigation lines & utilities, they will be provided after bid has been awarded as reference only documents.

1.4 TYPE OF CONTRACT

A. Project will be constructed under single prime contract as initiated and prepared by SLCo.

B. SLCo's General Conditions and Supplemental Conditions will supersede all standard specifications.

1.5 PERMITS AND FEES

A. County's responsibility:

1. The Architect will submit the construction documents for plan review. The County will pay the following costs to be paid directly to the governing agency and entity upon request from the contractor:

   a. Plan check fees (completed prior to bidding).
   b. Building Permits.
   c. Impact Fees (i.e. – hydrology)
   d. Conditions Use Permit Fee (i.e. – gas, sewer, water, power, phone)
   e. Utility unit labor and material costs for work not included with connection fees and normally performed by the utility company.
   f. Testing
   g. Commissioning

2. Contractors responsibility:

   a. The contractor will make arrangements to secure the building permit and will notify the County's project representative, in a timely manner, of the fee amount required to obtain the building permit. The contractor will research, coordinate and schedule all work required by the utility companies, special service districts and subcontractors to complete all work shown on the construction documents. The contractor will be responsible for all work not normally performed by the utility companies or special service districts (i.e. – trenching and backfilling) even if this work is not indicated in the construction documents. The contractor will be responsible for notifying the County Project Manager, in a timely manner of all costs to be paid by the County.
   b. The contractor will be responsible for all bonding requirements and deposits that might be required by utility or government entities to perform the work.

1.6 SPECIAL INSPECTIONS, TESTING AND COMMISSIOING

A. The County will engage an independent, qualified testing agency, as defined in the construction documents. The contractor will be responsible for coordinating and scheduling all inspections and disseminating all required reports to the proper parties.

B. The testing agency representative shall meet with the Architect, County Project Manager and contractor to establish the testing requirements and frequency of testing including, but not limited to, the testing and inspection specified in the contract documents. Other testing and inspections will be performed at the discretion of the County Project Manager.

C. All retesting for previously failed tests shall be paid for by the contractor.

D. The County will engage an independent qualified commissioning agency(s) as defined in the construction documents.

E. The commissioning agency representative shall meet with the Architect, County Project Manager and contractor to establish the testing requirements and frequency of testing including, but not limited to, the testing and inspection specified in the contract documents. Other testing and inspections will be performed at the discretion of the County Project Manager.

1.7 CHANGES IN THE WORK

A. Any changes in the work of this contract due to discovered conditions or project scope modifications are subject to the following requirements:

1. A “Request for Proposal” shall be issued to the Contractor by the Architect clearly stating the exact conditions of the proposed change in the work or a “Request for Change” shall be issued to the Architect by the Contractor for review and acceptance.
2. The Contractor shall provide a written “Proposal” identifying the specific material and labor required to complete the change in the work. The Proposal shall completely itemize all material quantities, unit costs, labor estimates, hourly rates, and mark-up factors calculated in the overall cost. Material costs shall not exceed those listed at established market levels and labor costs shall not exceed those listed at Journeyman schedules as established for this region by current year R.S.Means.

    a. Direct subcontractor and/or contractor mark-up for profit, overhead and administrative costs shall not exceed a combined total of 15% of the itemized costs for material supplied and labor directly performed by that individual firm. Additional contractor mark-up on subcontractor work is limited to 5% of the work of those other subcontractor amount. A maximum additional performance bond mark-up of 1%, or the actual bond cost rate as verified by the bonding company, will also be allowed as valid mark-up as part of the Contractor’s submittals.
    b. No other mark-ups are allowed. (i.e. project management, supervision)

3. The Architect shall review and certify all Contractor’s proposals and shall issue to the County a justification statement for all proposed changes.
4. Execution of formal change orders is a time consuming process which could delay action on critical work. Any work performed prior to the issuance of the official change order is at the contractor’s risk. However, the County Project Manager will endeavor to minimize that risk through the expeditious processing of all change order items. Full, complete and detailed information on each item by the contractor will aide in that process.
5. Change Authorizations: A construction change authorization form will be issued by the County under special circumstances, to authorize immediate completion of changes in the work. The form will be prepared and completed by the Architect when time limits are such that the formal change order will cause unreasonable delays or additional costs to the project. The form will include a fixed or estimated cost to be included as part of a change order at the earliest possible date. All forms should be numbered consecutively, beginning with number one of each project. Electronic format shall be used. The Architect shall maintain a log for construction change authorizations throughout the entire construction phase.

1.8 PRIOR APPROVALS

A. Where possible, three or more acceptable brands of equipment, manufactured articles or methods of construction have been identified in the contract documents in order to establish a

standard and allow for competition. The intent of this process is not to exclude the use of other brands, articles or methods which may be acceptable and deserving of consideration. However, only explicitly specified or prior approved items are acceptable to the County. To be considered for a prior approval the bidder must during the bidding period:

1. Submit fully detailed technical data, samples, installation methods, test reports and certification, references and all other supporting documentation as may be requested by the Architect.
2. Prove to the Architect and the County that items held up as equal or superior to specified items meet project specification design and intent. Obtaining prior approval does not relieve the contractor from meeting the project specifications or any portion thereof.

B. Specification Sections: For convenience or reference and to facilitate letting of subcontracts, the specifications are separated into respective divisions and sections. The forming of these separations shall not operate to make the Architect or the County or any of its representatives an arbiter to establish subcontract limits between contractor and subcontractor or suppliers.

1.9 SCHEDULE OF VALUES / LIST OF SUBCONTRACTORS

A. After the bid opening, the apparent low bidder, and if deemed advisable, the apparent second or third low bidders shall submit the schedule of values and the entire list of subcontractors, used in formulating their respective bids, to the County Project Manager and the Architect within twenty-four hours.

1. If a bidder has any doubt regarding the correctness or acceptability of any subcontract proposal, the bidder may submit the names and amount of other competing subcontractors, making sure that the bidder clearly states which one was used in formulating his proposal.

B. No changes to the original Schedule of Values will be allowed except by change order. Changes to the original List of Subcontractors involving major subcontractors will not be allowed except with the approval of the County Project Manager.

1.10 CONTRACTOR SUPERVISION

A. The contractor shall designate and keep continuously on the project, during its progress and until the project is finally accepted, an experienced and competent superintendent and any necessary assistants, all satisfactory to the County's project representative. The superintendent shall not be changed except with the consent of the County's project representative unless the superintendent proves to be unsatisfactory to the contractor and ceases to be in his employ.

B. The superintendent shall represent the contractor in his absence and all notices, requests and instructions given to the superintendent shall be considered as having been given to the contractor.

C. The contractor shall give efficient supervision to the work, using his best skill and attention. The contractor shall carefully study and compare all drawings, specifications and other instructions giving prompt notice to the Architect of any errors, inconsistency, or omission which have been discovered, but shall not be held responsible for their existence or discovery.

1.11 CONTRACTOR DAILY RECORD

A. The contractor, at each scheduled progress meeting, shall provide the county project manager with a copy of their daily work log. This refers to the daily report that documents the number of

staff on site, materials delivered, sub-contractor activity, etc. This report will provide information to be compared against the approved work schedule.

1.12 LIQUIDATED DAMAGES

A. It is recognized and agreed by the contractor and County that it is of importance to the County to have this project completed within the time schedule contained in the contract documents. Should the contractor fail to complete the work within the time stated in the Agreement or within such additional time as may have been allowed by change order extension, there shall be deducted from any moneys due, or that may become due the contractor, the sum per day (as defined in each contract), for each and every calendar day beyond the agreed or extended completion day, that the work remains uncompleted. Such sum is fixed and agreed upon by the County and the contractor as liquidated damages due the County by reason of the inconvenience and added costs of administration, loss of use and/or revenue and supervision resulting from the contractor's default, and not as penalty.

1. Permitting the contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion, or after the date to which the time for completion may have been extended, shall in no way operate as a waiver on the part of the County or any of their rights under the contract.
2. Said liquidated damage provision shall remain in effect and continue until substantial completion and acceptance of the project by the County. The contractor hereby authorizes the County to retain sufficient amounts of money due it and remaining in the hands of the county to pay the damages caused by any such default or defaults.

1.13 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations during construction period as coordinated with owner. Contractor's use of Project site is limited by Owner's operational requirements and as described in attached documents.

B. Use of Site: Limit use of Project site to work in areas and parking lot staging area agreed to by Owner's representative. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building and systems affected by construction operations during construction period. Repair damage caused by construction operations.

D. All demolished materials to be removed from the building carefully and disposed of in dumpsters located in visitors parking area as directed by facility manager.

E. Refer to General Notes and Keynotes on the drawings for additional project site requirements.

1.14 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage.

Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
3. Access site as directed by owner, complying with access and tool restrictions.

1.15 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work to normal business working hours of 7:00 a.m. to 7:00 p.m., Monday through Saturday, unless otherwise indicated.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Architect & Owner not less than two days in advance of proposed disruptive operations.
2. Nonsmoking Building: Smoking is not permitted within the park.

1.16 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000

SECTION 01 2300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternate(s) under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternate(s) is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 DOCUMENTATION NOTES:

The construction documentation, as provided for bid, and as submitted to the Authority Having

Jurisdiction for review and permitting, has been documented “in full”, demonstrating the scope of work if the Bid Alternate was to be accepted and executed. .

3.2 SCHEDULE OF ALTERNATES:

Bid Alternate No. 1: Parleys Creek Sidewalk: REMOVE: Existing sidewalk. Reference Demolition Plan D101 (Parleys Creek) ADD: New sidewalk connecting to existing sidewalk with flared curb ramp, 6” tube steel bollards, & truncated dome pad. Reference AS101 (Parleys Creek)

Bid Alternate No. 2: Big Field 1st Drinking Fountain: ADD: Run new waterline from box to new location. Provide a T for future drinking fountain. New concrete pad & Drinking fountain with high/low, pet bowl & bottler filler. See drawings for size of concrete pad & location.

Bid Alternate No. 3: Big Field Sidewalk: REMOVE: Existing side walk. Reference Demolition Plan D101 (Big Field) ADD: New sidewalk connecting to existing sidewalk. Reference AS101 (Big Field)

END OF SECTION 01 2300

SECTION 01 2500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
d. Samples, where applicable or requested.
e. Certificates and qualification data, where applicable or requested.
f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
g. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time do not submit. Cost information, including a proposal of change, if any, in the Contract Sum.
h. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
i. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 7 days of receipt of request

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials.

PART 2 - **PRODUCTS**

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution will not adversely affect Contractor's construction schedule.
c. Requested substitution has received necessary approvals of authorities having jurisdiction.
d. Requested substitution is compatible with other portions of the Work.
e. Requested substitution has been coordinated with other portions of the Work.
f. Requested substitution provides specified warranty.

B. Substitutions for Convenience: Not allowed.

PART 3 - **EXECUTION (Not Used)**

END OF SECTION 01 2500

SECTION 01 2600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. See Section 18.0 “CHANGES OF THE WORK” of SLCo’s General Conditions, current edition for additional requirements, which is incorporated by reference as if fully set forth in the Contract Documents.

1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on form consistent with format of AIA Document G710.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01 2500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Contractor shall issue a Change Order Form for signatures of Owner, Architect and Contractor on form consistent with format of AIA Document G701.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on form consistent with format of AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.6 WORK CHANGE DIRECTIVE

A. Work Change Directive: Architect may issue a Work Change Directive. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2600

SECTION 01 2900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 SLCO'S REQUIREMENTS

A. Section 19.0, "PAYMENTS", per SLCo's General Conditions, Current Edition

B. Section 20.0, "ACCEPTANCE FOR PAYMENT" per SLCo's General Conditions, Current Edition

1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Arrange schedule of values consistent with format of AIA Document G703.
2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
3. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site.

4. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
5. Overhead Costs: Include total cost and proportionate share of general overhead and profit for each line item.
6. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
7. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms:

1. Request for construction phase payments, including final payment, shall be submitted on printed forms available from the County.
2. Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit electronic copies in PDF file format, signed and notarized of each Application for Payment to Architect by a method ensuring receipt. Application shall include waivers of lien and similar attachments if required.

1. Transmit each file with a transmittal form listing attachments and recording appropriate information about application.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

G. Construction Waste Management Receipts: With each Application for Payment, submit monthly construction waste management receipts and documentation as required in Section 017419 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Products list (preliminary if not final).
5. Sustainable design action plans, including preliminary project materials cost data.
6. Construction waste management plan.
7. Indoor air quality management plan when required.
8. Schedule of unit prices.
9. Submittal schedule (preliminary if not final).
10. List of Contractor's staff assignments.
11. List of Contractor's principal consultants.
12. Copies of building permits.
13. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
14. Initial progress report.
15. Report of preconstruction conference.
16. Certificates of insurance and insurance policies.
17. Performance and payment bonds.

I. Application for Payment at Contractor’s Punch Walk: After the Contractor’s Punch Walk, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect the Contractor’s Punch List issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements and Final Acceptance by the County has been given, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. Required Forms provided by the County
5. AIA Document G706.
6. AIA Document G706A.
7. AIA Document G707.
8. Evidence that claims have been settled.
9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final liquidated damages settlement statement.

1.5 PRICE ADJUSTMENT

A. No partial payment will be made on living, or perishable plant materials until planted.

B. Defective Work or Non-complying Material: If Owner, Architect and/or Engineer of Record determines it is not practical to remove and replace Defective Work or non-complying material, any of the following remedies may be applied:

1. Defective Work or non-complying material may remain, but the price reduced up to 50 percent.
    a. Non-complying materials: Contractor must submit a substitution request per section 01 25000, “Substitution Procedures”.
2. If non-complying material has been installed and no price for the material is specified, apply price reduction against cost of work requiring complying material as part of its installation.
3. Defective Work or non-complying material will be partially repaired and the price will be adjusted to a new price.
4. Pay for Defective Work on a pay factor basis:
    a. Where two (2) or more pay factors apply to one item of Defective Work or material (even if pay factors are determined using separate specification sections), the smallest pay factor shall be used to determine price adjustment.
    b. Pay factors shall not be cumulative.
    c. Pay factors shall be applied to unit prices in either the bid form or a Change Order.

C. Contract Price Adjustment: In lump sum contracts, Contract Price adjustment shall be effected by Change Order. In unit price contracts, Contract Price adjustment shall be effected by adjusting unit quantities.

D. Early Completion: No additional money will be due CONTRACTOR:

1. If CONTRACTOR completes Work or any portion of Work before Contract Time, or

2. If early completion is delayed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2900

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. Coordination
      a. General Coordination Procedures.
      b. Coordinating with Private and Public Agencies.
      c. Coordinating with Separate Contractors.
      d. Coordinating with Adjacent Property Owner.
      e. Interruptions of Utilities.
      f. Interruption of Owner's Operations.
      g. Coordination Drawings
   2. Requests for Information (RFIs).
   3. Construction Progress meetings.

1.2 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

   1. Preparation of Contractor's construction schedule.
   2. Preparation of the schedule of values.
   3. Delivery and processing of submittals.
   4. Construction Progress meetings.
   5. Preinstallation conferences.
   6. Project closeout activities.

1.4 COORDINATING WITH PRIVATE AND PUBLIC AGENCIES

A. Notify private and public agencies affected by the proposed construction, coordinate required adjustments, and arrange for all necessary adjustments of utilities within or adjacent to the limits of construction.

B. Obtain utility locations from the one call center (Blue Stake) or other utility coordination service two (2) to seven (7) working Days before any excavation. Locations must be updated every 14 Days.

C. All utilities and utility appurtenances within the limits of the Work that are to be relocated or adjusted shall be moved by the affected utility company, unless specified otherwise.

D. Notify police, fire and transit authority.

E. Modifications to existing utilities shall conform to the owner's utility standards and specifications.

1.5 COORDINATING WITH SEPARATE CONTRACTORS

A. Coordinate with separate contractors at no additional cost to owner to leave Work complete and finished.

B. Inspect and promptly report any apparent discrepancies or defects in work done by separate contractors that render Work unsuitable for proper execution and results. Failure to inspect and report shall constitute acceptance of separate contractor's work as fit and proper to receive work of this contract, except as to defects that may develop in the other separate contractor's work after the execution of the Contractor's work.

1.6 COORDINATING WITH ADJACENT PROPERTY OWNER

A. Notice: Notify property owner 10 Days before the start of construction and at least 48 hours in advance of the interruption of utility service or the interruption of access, or the installation of bituminous material.

B. Access: Provide all weather access to property owner at all times, unless property owner approve otherwise.

C. Easements: Where work is on easements on private property, coordinate work with the property owner so that work will minimize inconvenience to property owner.

D. Refuse Collection:

1. Inform all affected property owners ahead of time by written notice of the place of deposit and time when their refuse will be collected.
2. If necessary, haul refuse to nearest point of suitable collection as determined by the refuse collection agency.
3. Mail: Cooperate with the U.S. Postal Service in the delivery of mail.

1.7 INTERRUPTION OF UTILITIES

A. Notify fire and police services in local jurisdiction if emergency is safety related or if construction activities interrupt any utility service.

B. Contact the affected utility company. Find out how soon repairs can be made as well as when the repairs will begin.

C. Contact the affected local residences or businesses. Inform when repairs will begin and how long it will take to complete them.

D. Inform ENGINEER and OWNER.

1.8 INTERRUPTION OF OWNER'S OPERATIONS

A. If any aspect of normal Owner operations needs to be interrupted for completion of the Work, notify Owner and Architect in writing.

B. Submit notice with an alternate plan to cover contingency problems. In the alternate plan allow for maintenance of utilities or other essential services that must be interrupted for any period otherwise deemed necessary by Owner to be unacceptable for necessary Owner operations.

C. Shutdown of utilities must be accomplished during approved hours at no additional cost to Owner. If work requires a longer shutdown, it must then be accomplished during separate periods.

D. Do not proceed with proposed shutdown without written approval.

1.9 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

1.10 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
2. Project number.
   a. SLCo’s Project Number
   b. Architect’s, AN Project Number
3. Date Issued.
4. Response date deadline if requested different then allowed Contract Time.
5. Name of Contractor.
6. Name of Architect
7. RFI number, numbered sequentially.
8. RFI subject.
9. Specification Section number and title and related paragraphs, as appropriate.

10. Drawing number and detail references, as appropriate.
11. Field dimensions and conditions, as appropriate.
12. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
13. Contractor's signature.
14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: AIA Document G716. Optional: Contractor may use personalized/custom RFI form, but must be submitted for review and approval by the Architect.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow 7 working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
2. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit a Proposed Change Order/Change Order Request as required by Owner.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log to Architect at each Construction Progress Meeting (OAC Meeting). Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.11 CONSTRUCTION PROGRESS MEETINGS

A. General: The Architect of Record will schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Contractor to inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Architect will prepare and distribute the meeting agenda to all invited attendees.
3. Minutes: Architect responsible for conducting meeting will record significant discussions and agreements achieved. Distribution of the meeting minutes to everyone concerned, including Owner, Agency, Contractor and A/E Team prior to next progress meeting.

B. Preinstallation Conferences: Conduct a preinstallation conference at Project site before construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

C. Construction Progress Meetings: Bi-Weekly intervals or as determined during the pre-construction meeting, and as contracted with the Owner and A/E Team.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Notify Architect of other significant topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present.
    c. RFI & Submittal Logs: Contractor to submit to Architect prior to each Progress Meeting for review.

3. Minutes: The Architect will record and distribute the meeting minutes to each party present and to parties requiring information.

    a. Schedule Updating: Contractor to revise and update construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3100

SECTION 01 3233 **- PHOTOGRAPHIC DOCUMENTATION**

PART 1 - GENERAL

1.1 SUMMARY

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

1. Preconstruction photographs.
2. Periodic construction photographs.

B. Related Requirements:

1. Section 01 7700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.

1.2 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of building area with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit unaltered, original, full-size image files within seven days of taking photographs.

1. Digital Camera: Minimum sensor resolution of 8 megapixels.
2. Identification: Provide the following information with each image description in file metadata tag:

a. Name of Project.
b. Name and contact information for photographer.
c. Date photograph was taken.
d. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

PART 2 - **PRODUCTS**

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, with minimum size of 8 megapixels.

PART 3 - **EXECUTION**

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.

2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.

C. Preconstruction Photographs: Before commencement of demolition take photographs of Project area, including existing items to remain during construction, from different vantage points

D. Periodic Construction Photographs: Take weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

END OF SECTION 01 3233

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 01 7823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
2. Section 01 7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Contractor shall maintain a log for shop drawings and submittals throughout the entire construction administration phase, which will be reviewed at eat regularly scheduled construction progress meeting and as a whole at the completion of the project.

a. Submittal Log: Prepare, maintain, and submit a tabular log of Submittals organized by the Submittal number. Submit log to Architect at each Construction Progress Meeting (OAC Meeting). Include the following:

1) Project name.
2) Architect’s Project Number.
3) Name and address of Contractor.
4) Name and address of Architect.
5) Submittal number including Submittals that were dropped and not submitted.
6) Submittal description.
7) Date the Submittal was submitted.
8) Date Architect/Engineer(s) review was received.
9) Submittal Status.
10) Submittal Comments.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow **15 days** for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow **15 days** for review of each resubmittal.

C. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

a. Project name.
b. Architect’s Project Number.
c. Date Issued.
d. Name of Architect.
e. Name of Construction Manager.
f. Name of Contractor.
g. Name of subcontractor.
h. Name of supplier.
i. Name of manufacturer.
j. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., Sub 01_061000.01.0). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., Sub 01R1_061000.01.1).

k. Number and title of appropriate Specification Section.
l. Drawing number and detail references, as appropriate.
m. Location(s) where product is to be installed, as appropriate.
n. Other necessary identification.

D. Electronic Submittals: (Preferred) Identify and incorporate information in each electronic submittal file as follows, with the same submittal information indicated in paper submittals above. Electronic combined PDF must be bookmarked for each product data and/or shop drawings section.:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with bookmark links enabling navigation to each item. Submittals not bookmarked will be returned without review. Review time will not start until PDF is returned to the Architect with bookmarks.
2. Name file with the Architect's project number with submittal number or other unique identifier, including revision identifier.

    a. File name shall use Architect's project identifier, Submittal Number and Specification Section number followed by a decimal point and then a sequential number (e.g., **24056_Sub 01_061000.01.0.pdf**). Resubmittals shall include the submittal revision number and an alphabetic suffix after another decimal point (e.g., **24056_Sub 01R1_061000.01.1.pdf**).

3. Provide submittal log for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

E. Options: Identify options requiring selection by Architect.

F. Deviations: Identify deviations from the Contract Documents on submittals.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site**. Use only final action submittals that are marked with approval notation from Architect action stamp(s).**

PART 2 - **PRODUCTS**

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Submit electronic submittals via email as PDF electronic files.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies, unless electronic.
3. Informational Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will not return copies.

4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. Submit Product Data concurrent with Samples.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
3. Submit Shop Drawings in the following format:

    a. PDF electronic file.
    b. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.

        1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:

    a. PDF electronic file.
    b. Index and Bookmark Links

F. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

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

H. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

I. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

J. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - **EXECUTION**

3.1 CONTRACTOR'S REVIEW

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

1. Sign or initial each sheet of Shop Drawings and product data, and each sample label to certify compliance with requirements of Contract Documents. Notify Architect/Engineer in writing at time of submittal, of any deviations from requirements of Contract Documents.
2. Do Not fabricate products or begin work that requires submittals until return of submittal review with Architect/Engineer acceptance.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 7700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S/ENGINEER'S ACTION

A. General: **Architect/Engineer will <u>not</u> review submittals that do not bear Contractor's approval stamp and will return them without action.**

B. Action Submittals: Architect/Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect/Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

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

D. Architect's Review Stamp Disclaimer:
"CHECKING IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS AND QUANTITIES WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF HIS OR HER WORK WITH THAT OF ALL OTHER TRADES; AND THE SATISFACTORY PERFORMANCE OF HIS OR HER WORK."

E. Architect's Review Stamp Actions may be one or more of the following (Engineer review stamp(s) may be similar):

1. Reviewed
2. No Exception Taken
3. Rejected
4. Submit Specified Items
5. Make Corrections Noted
6. Revise and Resubmit

F. **Incomplete submittals are unacceptable**, will be considered nonresponsive, and will be returned for resubmittal without review.

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

END OF SECTION 01 3300

SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

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

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
3. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work and the following:

1. **Before Construction:** Identify:
   a. Name and telephone number of testing agency.
   b. Person whom agency has charged with engineering managerial responsibility.
   c. Licensed professional for testing agency who is to review services.
   d. Name and levels of certification and years of experience of testing agency’s laboratory and field technicians.

2. **During Construction**: Submit quality control test data requested by the Architect and Engineer of Record to demonstrate work performed complies with Contract Documents.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority and the following:

1. **During Construction**: Submit field test results immediately to authority having jurisdiction, Owner, Architect and Contractor and another other designated project representative(s) or no later than day of test. Submit laboratory test results within 48 hours of determination.

2. **After Construction**: Submit a final summary report in tabular form. Show each failed test and its corresponding passing test.

1.5 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

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

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

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

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
d. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect 14 days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

    a. Allow 14 days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed unless otherwise indicated.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

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

E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

1.9 LIMITS ON TESTING AGENCY

A. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Agency many not suspend work.

C. Agency has no authority to determine acceptance for Architect and Engineer of Record. Samples collected and secured only by the testing agency.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Material furnished from sources that have been found satisfactory under Owner’s or Architect and Engineer of Records normal testing and sampling procedures may be used in the work.

B. Materials that are supported with a Supplier’s certificate of compliance may be used in the Work. Certificate must be in possession of the Contractor for review by the Architect and Engineer of Record.

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections per SLCo standards. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

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

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 7300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

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

END OF SECTION 01 4000

SECTION 01 4200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

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

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; (Formerly: ACI International); www.abma.com.
9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA - American Forest & Paper Association; www.afandpa.org.
12. AGA - American Gas Association; www.aga.org.
13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. APWA – (Utah) American Public Works Association; https://utah.apwa.org/wp-content/uploads/sites/64/2024/04/2017-Specifications-and-Plans-2.pdf
27. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
28. ARI - American Refrigeration Institute; (See AHRI).
29. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
30. ASCE - American Society of Civil Engineers; www.asce.org.
31. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
32. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
33. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
34. ASSE - American Society of Safety Engineers (The); www.asse.org.
35. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
36. ASTM - ASTM International; www.astm.org.
37. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
38. AWEA - American Wind Energy Association; www.awea.org.
39. AWI - Architectural Woodwork Institute; www.awinet.org.

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

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

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

190. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
191. TMS - The Masonry Society; www.masonrysociety.org.
192. TPI - Truss Plate Institute; www.tpinst.org.
193. TPI - Turfgrass Producers International; www.turfgrasssod.org.
194. TRI - Tile Roofing Institute; www.tileroofing.org.
195. UL - Underwriters Laboratories Inc.; www.ul.com.
196. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
197. USAV - USA Volleyball; www.usavolleyball.org.
198. USGBC - U.S. Green Building Council; www.usgbc.org.
199. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
200. WASTEC - Waste Equipment Technology Association; www.wastec.org.
201. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
202. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
203. WDMA - Window & Door Manufacturers Association; www.wdma.com.
204. WI - Woodwork Institute; www.wicnet.org.
205. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
206. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.

    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.

6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 4200

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 01 1000 "Summary" for work restrictions and limitations on utility interruptions.
2. Section 31 1000 “Site Clearing”
3. Section 31 2000 “Earth Moving”

1.2 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

1.3 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion and Sedimentation Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

1.4 QUALITY ASSURANCE

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

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate material and equipment for construction operations.

2.3 EQUIPMENT

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

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. On or before the expiration of the Contract Time, restore these facilities to condition existing before initial use.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

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

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

H. At job site trailer, post a list of important telephone numbers.

1. Police and fire departments.
2. Ambulance service.
3. Contractor's home office.
4. Contractor's emergency after-hours telephone number.
5. Architect's office.
6. Engineers' offices.
7. Owner's office.
8. Principal subcontractors' field and home offices.
9. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until the Contractor’s punch list walk is scheduled by the Contractor. Remove before the punch list walk. Personnel remaining after the punch list walk will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and non tracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.

2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 31 2000 "Earth Moving."
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Provide temporary parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 7300 "Execution."

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

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

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

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

I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

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

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Discard or replace water-damaged and wet material.
4. Discard, replace, or clean stored or installed material that begins to grow mold.
5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

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

B. Maintenance: Maintain facilities in good operating condition until removal.

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

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Completion of Contraction.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than expiration of the Contract Time. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At completion of construction, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 7700 "Closeout Procedures."

END OF SECTION 01 5000

SECTION 01 5639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

1.2 DEFINITIONS

A. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

B. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.

C. Samples: For each type of the following:

1. Organic Mulch: Sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
2. Protection-Zone Fencing: Assembled Samples.
3. Protection-Zone Signage: Full-size Samples.

D. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1. Species and size of tree.
2. Location on site plan. Include unique identifier for each.
3. Reason for pruning.
4. Description of pruning to be performed.
5. Description of maintenance following pruning.

1.5 INFORMATIONAL SUBMITTALS

A. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

B. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

C. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain prior to beginning demolition or construction operations.

1.6 QUALITY ASSURANCE

A. Arborist Qualifications: Certified Arborist as certified by ISA, licensed arborist in jurisdiction where Project is located, current member of ASCA, or registered Consulting Arborist as designated by ASCA.

1.7 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Moving or parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: [**Stockpiled soil from location shown on Drawings**] [**Stockpiled soil mixed with planting soil**] [**Planting soil**] of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

1. Mixture: Well-blended mix of two parts stockpiled soil to one part planting soil.
2. Planting Soil: Planting soil as specified in sections pertaining to topsoil and soil under Divisions 31 and 32.

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood.

a. Size Range: 3-inches maximum, 1/2-inch minimum.
b. Color: Natural.

C. Protection-Zone Fencing: Fencing fixed in position and meeting one of the following requirements:

1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch opening, 0.148-inch- diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- OD line posts, and 2-7/8-inch- OD corner and pull posts; with 1-5/8-inch- OD top rails and 0.177-inch- diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.

a. Height: 48 inches.

2. Plywood Protection-Zone Fencing: Plywood framed with four 2-by-4-inch rails, with 4-by-4-inch preservative-treated wood posts spaced not more than 96 inches apart.

a. Height: 48 inches.

3. Wood Protection-Zone Fencing: Constructed of two 2-by-4-inch horizontal rails, with 4-by-4-inch preservative-treated wood posts spaced not more than 96 inches apart, and lower rail set halfway between top rail and ground.

a. Height: 48 inches.

4. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches apart. High-visibility orange color.

a. Height: 48 inches.

5. Gates: Swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones.

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

3.2 PREPARATION

A. Prior to any sitework, Contractor shall locate and tag all trees to be saved, as indicated on Drawings.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.

1. Apply 2-inch uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches of tree trunks.
2. Install temporary root protection matting over mulch to the extent indicated.

D. Trunk Protection: Protect the trunk of each tree to remain as follows:

1. Install 2-by-4-inch wood planks around trunk at maximum 3 inches apart. Minimum three planks per tree. Band together with no less than three steel bands stapled to the planks to hold them securely in place. Wrap orange plastic construction fencing to a minimum of three layers outside slats. Fasten wrap with wire.

a. Height: 48 inches.

2. Trunk protection to remain in place no longer than 6 months. If construction exceeds timeframe indicated, inspect trunk protection at 6-month intervals and loosen if necessary.

3.3 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected areas except by entrance gates.

1. Chain-Link Fencing: Install to comply with ASTM F567 and with manufacturer's written instructions.
2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
3. Access Gates: Install where required.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect.

C. Maintain protection zones free of weeds and trash.

D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 31 2000 "Earth Moving" unless otherwise indicated.

B. Preserve and protect all existing trees, plants, monuments, structures, hardscape and architectural elements from damage due to work in this section. In the event that damage does occur to inanimate object and structures, the contractor shall repair or replace such damage to the satisfaction of the Owner or Owner's representative. Damage or injury to living plant material will be replaced by the contractor at the contractor’s expense.

C. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by

drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

D. Trenching in areas where root diameter exceeds 2 inches shall be done by hand. Exposed roots of this size shall be heavily wrapped with moistened burlap to avoid scarring or excessive drying. Where a trenching machine is operated in proximity to roots that are less than 2 inches, the wall of the trench shall be hand trimmed , making clean cuts through roots.

E. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

1. Contractor shall mulch the area with a 4 inch deep layer of wood chips where slopes do not exceed 4:1.

F. Trenches adjacent to or under existing trees shall be closed within 24 hours, and when this is not possible, the side of trench closest to the tree or trees affected shall be covered with moistened burlap.

G. Do not allow exposed roots to dry out before placing permanent backfill.

3.5 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
3. Cover exposed roots with burlap and water regularly.
4. Backfill as soon as possible according to requirements in Section 31 2000 "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune tree roots by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.

1. Prune to remove only broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees according to ANSI A300 (Part 1) and as indicated on Drawings.

B. Cut branches with sharp pruning instruments; do not break or chop.

C. Do not paint or apply sealants to wounds.

D. Chip removed branches and spread over areas identified by Architect.

3.7 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

C. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect.

1. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
2. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 4-inch uniform thickness to remain.

3.10 DIVERSION AND DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove and recycle excess material as required by the Construction Waste Management Plan.

B. Disposal: Remove excess excavated material that cannot be diverted, such as unrecyclable trash and debris and legally dispose of them off Owner's property.

END OF SECTION 01 5639

SECTION 01 5723 - TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Temporary stormwater pollution controls.

1.2 STORMWATER POLLUTION PREVENTION PLAN

A. The Stormwater Pollution Prevention Plan (SWPPP) is part of the Contract Documents and is bound into this Project Manual.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Stormwater Pollution Prevention Plan (SWPP): Within 15 days of date established for commencement of the Work, submit completed SWPPP.

B. EPA authorization under the EPA's "2017 Construction General Permit (CGP)."

C. Stormwater Pollution Prevention (SWPP) Training Log: For each individual performing Work under the SWPPP.

D. Inspection reports.

1.5 QUALITY ASSURANCE

A. Stormwater Pollution Prevention Plan (SWPPP) Coordinator: Experienced individual or firm with a record of successful water pollution control management coordination of projects with similar requirements.

1. SWPPP Coordinator shall complete and finalize the SWPPP form.
2. SWPPP Coordinator shall be responsible for inspections and maintaining of all requirements of the SWPPP.

B. Installers: Trained as indicated in the SWPPP.

PART 2 - PRODUCTS

2.1 TEMPORARY STORMWATER POLLUTION CONTROLS

A. Provide temporary stormwater pollution controls as required by the SWPPP.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with all best management practices, general requirements, performance requirements, reporting requirements, and all other requirements included in the SWPPP.

B. Locate stormwater pollution controls in accordance with the SWPPP.

C. Conduct construction as required to comply with the SWPPP and that minimize possible contamination or pollution or other undesirable effects.

1. Inspect, repair, and maintain SWPPP controls during construction.

a. Inspect all SWPPP controls not less than every seven days, and after each occurrence of a storm event, as outlined in the SWPPP.

D. Remove SWPPP controls at completion of construction and restore and stabilize areas disturbed during construction.

END OF SECTION 01 5723

SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Section 01 3300 "Submittal Procedures."
b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 3300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

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

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.

2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 7700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    b. Non-restricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed

manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

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

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 2500 "Substitution Procedures" for proposal of product.

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

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

SECTION 01 7300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Section 01 1000 "Summary" for limits on use of Project site.
2. Section 01 7700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

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

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Before construction, verify the location and connections of electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by owner serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be removed and re-installed or replaced.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Punch List walk prior to completion of construction.

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

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.

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

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

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

E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
4. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of the Contractor’s Punch List walk.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Contractor’s Punch List walk.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 4000 "Quality Requirements"

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. **Contractor is responsible for weather sealing the building every night.**

B. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Contractor’s Punch List walk.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 7300

SECTION 01 7419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes Salt Lake County preferences for responsible construction waste management and disposal.

B. Related Requirements:

1) Section 02 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.

1.2 DEFINITIONS

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

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

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

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

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

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

1.3 ACTION SUBMITTALS

A. Waste Management Plan: At the beginning of the contract, submit a proposed waste management plan complying with above noted requirements to be reviewed and accepted by the County Project Manager.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include the following information:

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

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

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

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

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

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

H. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.4 QUALITY ASSURANCE

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

B. Waste Management Conference: Conduct conference at Project site.

1.5 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification and waste reduction. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan at start of construction.

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

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

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

dividuals and organizations, include list of their names, addresses, and telephone numbers.

3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

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

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
   1. Distribute waste management plan to everyone concerned within three days of submittal return.
   2. Distribute waste management plan to entities when they first begin work on- site. Review plan procedures and locations established for salvage, recycling, and disposal.

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

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

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:
   1. Clean salvaged items.
   2. Pack or crate items after cleaning. Identify contents of containers.
   3. Store items in a secure area until installation.
   4. Protect items from damage during transport and storage.
   5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, sup-

ports, and miscellaneous materials necessary to make items functional for use indicated.

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

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

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

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
   1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin. Inspect containers and bins for contamination and remove contaminated materials if found.
   2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
   4. Store components off the ground and protect from the weather.
   5. Remove recyclable waste off Owner's property.

3.4 DISPOSAL OF WASTE

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

   1. Do not allow waste materials that are to be disposed of to accumulate on-site.
   1. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 01 7419

SECTION 01 7700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Contractor’s Punch List Procedures.
2. Inspections Procedures.
3. Expiration of Contract Procedures.
4. Warranties.
5. Final cleaning.
6. Repair of the Work.

B. Related Sections include the following:

1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Contractor’s Punch Walk & Final Acceptance of Work by the County.
2. Division 1 Section "Execution" for progress cleaning of Project site.
3. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
4. Divisions 2 through 33 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.3 ACTION SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Contractor’s Punch List.

1.4 CONTRACTOR’S PUNCH LIST PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Punch List Walk: Complete the following a minimum of 7 days prior to requesting inspection for determining date of Contractor’s Punch List Walk. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Submit submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

C. Procedures Prior to Contractor's Punch List Walk: Complete the following a minimum of 7 days prior to requesting inspection for determining date of Contractor's Punch list Walk. List items below that are incomplete at time of request.

1. Instruct Owner's personnel in maintenance of products.
2. Complete final cleaning requirements, including touchup sealant installation.
3. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Contractor's Punch List Walk a minimum of 7 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will notify Contractor of items, either on Contractor's list or additional items identified by Architect that must be completed or corrected on or before the expiration of Contract.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected. **Cost for reinspection(s) after initial and on follow up reinspection may be back-charged to Contractor.**
2. Results of completed inspection will form the basis of requirements for final completion.

1.5 EXPIRATION OF CONTRACT PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment.
2. Certified List of Incomplete Items: Submit certified copy of Architect's inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance, unless approved by otherwise by the Owner's designated representative(s).
3. Submit Commissioning Checklists
4. Instruct Owner's personnel in maintenance of products and systems

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before the County will give a Final Acceptance of the entire property.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected. **Cost for reinspection(s) after initial and on follow up reinspection may be back-charged to Contractor.**

1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Submit list of incomplete items in the following format:

    a. PDF electronic file. Architect will return annotated copy electronically.

1.7 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of the County's Final Acceptance of the entire property is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inchpaper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Provide Digital Copies of all contents on (4) thumb/USB drives clearly marked and identified with project name, number and date, which will be provided to the owner's representative.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - **PRODUCTS – NOT USED**

PART 3 - **EXECUTION**

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for the Contractor's Punch Walk for the entire Project or for a designated portion of Project:

    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    d. Remove tools, construction equipment, machinery, and surplus material from Project site.

e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
p. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 7700

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Requirements for Operation, and Maintenance Manuals.
2. Manual Preparation

1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
b. Enable inserted reviewer comments on draft submittals.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Contractor’s Final Walk and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR OPERATION, AND MAINTENANCE MANUALS

A. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data as required below:

1. Hardcopy Requirements: The following table of contents should be common to all O & M Manuals and is based on ASI388 2 and Industry Best Practice.

Introduction and Scope

This is a basic introduction about the project, the builder, and the scope of work documented in the manual

Assets Record Information

Describing items of equipment, assets, or elements of the work.

Maintenance Documents:

The maintenance schedules and tasks required to maintain a piece of equipment/assets and hence prevent breakdown and/or meet compliance and manufacturer requirements.

Operations

This section should be used to record relevant information on the Operations of the system and/or assets. It should also include safety instructions, special tools, cleaning and operating instructions and trouble-shooting to assist in solving problems to prevent expensive call outs.

Warranties and Certificates

Record specific warranty and certificate reference information. Important test results and performance criteria relating to commissioning and operations should also be included.

Spare Parts

Record any relevant information on the Spare Parts data for assets provided as part of the contract. It may also include information on spare parts suppliers.

Help and Contact

This section should be used to record information to allow the Client to call for expert assistance in relation to the assets included in the project. This would include the main contractors, sub-contractors and suppliers.

Drawings and References

This section allows you to attach/bind and or upload information like as-built plans, copies of specifications, complete product manuals and other documents relevant to the works and the O&M.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation & Maintenance Manual Digital

1. An intuitive digital instructional manual shall be provided to give the owners representative the information they need to care, adjust, maintain and operate all of the equipment within the building, to include but not limited to, the heating, air conditioning, ventilating, plumbing automatic temperature control systems, kitchen equipment, stage and theatrical equipment, electrical equipment and building products requiring maintenance.
2. An orientation date shall be set up to instruct the owner’s representative on the use of the operation and maintenance digital copy. A written report specifying times, dates, and names of personnel instructed shall be forwarded to the owner’s representative.

3. O & M Digital data preparation shall be under the direction of an individual or organization that has demonstrated expertise in the preparation of comprehensive and complete digital products. Qualifications shall be submitted for approval.
4. All digital copies shall be authored with Adobe Acrobat and shall not be limited to include the following:

    a. All design drawings and documentation shall be included on the digital copy in a PDF format. These drawings shall be provided in an electronic format to the company contracted to create the digital copy and shall include the civil engineering, architectural, structural, electrical and mechanical and any specialty engineering sections.
    b. Icons shall be located on the PDF plans to link test and balance reports and mechanical operation and maintenance information to the design drawings.
    c. All information on the digital copy shall be printable on 8.5" x 11" plain paper with the design drawings and automatic temperature control drawings printable on 11" x 17" plain paper.
    d. Linked information such that the user can key word search for information.
    e. Provide a hyper-text alphabetical index of all equipment and building products as outlined in item 1 above.
    f. Use of multimedia formatting (text, pictures, graphics and sound etc.) will be used to make the information more accessible and understandable.
    g. All documentation shall be converted to an unchangeable Portable Document Format (PDF).

5. Digital file shall include a General Information Index screen to direct the user to the portion of the data desired. This index screen will consist of four (4) major groups. The groups will include:

    a. Equipment List: This section to include:

        1) A job specific alphabetical list of all items supplied to the project with names of the manufacturer, Item description including the plan number, model number and local supplier with current address and telephone number.

    b. Design drawings
    c. Manufacturer's Operation and Maintenance Manuals:

6. Architectural section: This section to include:

    a. Building products, applied materials and finishes: Include product data with catalog number, size, composition, color and texture designations. Provide information for reordering custom manufactured products. Data shall include, but not limited to, information on finishes, builders hardware, etc.
    b. Instruction for care and maintenance to include manufacturer=s recommendation for cleaning agents and methods, precaution against detrimental agents and methods and recommended schedule for cleaning and maintenance.
    c. County's O.P.R. and B.O.D

7. Mechanical/Plumbing section:

a. A general description of the mechanical system.
b. A step by step procedure to follow in putting each piece of mechanical equipment into operation.
c. Schematic control diagrams for each separate fans system, heating system, control panel, etc. Each diagram shall show locations of all control and operating components and devices.
d. Test and balance report
e. Valve tag schedule
f. All manufacturers operation and maintenance manual information
g. Maintenance instructions: This portion shall include:

8. A summary list of mechanical equipment requiring lubrication showing name of equipment and type and frequency of lubrication.
9. Special Maintenance Instructions to be summarized as follows:

    a. Preventative Maintenance Procedures
    b. Seasonal start-up and shut-down maintenance
    c. Periodical inspection requirements
    d. Water treatment procedures

10. Electrical section:

    a. Building products, applied materials and equipment: Include product data with catalog number. Provide information for reordering custom manufactured products.
    b. Instruction for care and maintenance to include all manufacturers' recommendations.

11. Warranty section: Include all product warranties.
12. Training films and videos: Include all training films and videos.
13. Four (4) of the CD or USB drives will be provided to the owner's representative.

END OF SECTION 01 7823

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings (Contractor's As-Builts).
2. Record Specifications.
3. Record Product Data.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings (Contractor's As-Builts): Comply with the following:

1. Number of Copies: Submit copies of marked-up Record Drawings (As-Builts) as follows:

a. Initial Submittal:

1) Submit PDF electronic files of scanned as-built prints in color with pages bookmarked on combined PDF electronic File or Bluebeam annotated files.
2) Submit record digital data files.
3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting/markups are acceptable.
4) Submit electronic files via file exchange server, (1) compact disc, or (1) thumb drive to Architect.

b. Final Submittal:

1) Submit PDF electronic files of scanned as-built prints in color with pages bookmarked on combined PDF electronic file or Bluebeam annotated files.
2) Color scan each drawing, whether or not changes and additional information were recorded.
3) Submit electronic files via file exchange server, (1) compact disc, or (1) thumb drive to Architect.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

1.3 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.
    e. Cross-reference record prints to corresponding photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Architect's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Contractor’s Punch List Walk, review marked-up record prints with Architect and SLCo Manager.

1.4 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Specifications.

1.5 RECORD PRODUCT & EQUIPMENT DATA

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

C. Format: Submit record Product Data as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Product Data.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.6 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's, SLCo Manager’s & Agency’s reference during normal working hours.

PART 2 - **PRODUCTS**

PART 3 - EXECUTION

END OF SECTION 017839

SECTION 02 41 00 - SELECTIVE DEMOLITION

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work includes, but is not limited to the following:

1. The Contractor shall provide all equipment, tools, materials, and labor necessary to complete the work.

2. Completely coordinate with work of all other trades.

3. Provide protection for all existing objects or conditions designated on the drawings to remain on the site.

4. Provide protection to prevent injury or damage to persons, trees, irrigation system or adjacent properties.

5. Remove and dispose of demolished materials from the site.

6. Comply with applicable codes and ordinances concerning demolition operations.

B. Definition: The term “demolition”, as used herein, includes the removal and disposal of all existing objects (except for those objects designated to remain) down to the existing grade level or subgrade level to the extent indicated or as otherwise required to permit new construction and all other work as described in this Section necessary to complete all Demolition Work.

C. Use of explosives will not be permitted.

1.02 PERMITS, ORDINANCES, ETC.

A. Procure all necessary permits or certificates required to complete the Demolition Work specified. Make any and all required notifications and comply with all applicable Federal, State, and Local ordinances concerning demolition operations.

1.03 JOB CONDITIONS

A. Visit the site and examine the existing conditions and observe the conditions under which the work is to be performed. Notify the Architect or Landscape Architect of unsatisfactory conditions and do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Architect or Landscape Architect. Note all conditions as to character and extent of work involved.

1.04 PROTECTION

A. Execute all Selective Demolition Work in an orderly and careful manner with due consideration for any existing condition designated to remain. Provide protection to

preserve existing items indicated to remain and to prevent injury or damage to persons or adjacent properties.

B. Use all means necessary to protect existing conditions designated to remain and adjacent properties. Avoid any encroachment on adjacent properties. In the event of damage or loss to any existing condition designated to remain or adjacent properties, immediately make all repairs and replacements necessary to the approval of the Architect or Landscape Architect at no additional cost to the Owner.

C. Do not interfere with the normal traffic on roads, streets, walks, parking lot or use of adjacent properties. Provide alternate routes around closed or obstructed traffic ways as required by governing regulations.

D. Protect tops, trunks, and roots of existing trees and vegetation which are to remain from any physical damage. Protect trees and vegetation with barriers before any construction work is started; remove barriers on completion of Contract. Do not permit storage of materials, stockpiles or heavy equipment within the drip line of remaining trees. Use qualified workmen to remove any interfering branches of tress to remain without injury to trees. Replace trees that have been damaged and cannot be restored to full growth at no additional cost to the Owner.

1.05 CUTTING AND PATCHING

A. Cut existing sidewalks, roads, and curbs as required to complete demolition work. Pavement shall be cut vertically along straight lines forming the edges of the demolition work and so as not to damage the adjacent pavement. Repair all pavement as specified in Sections of the specification covering the applicable trades.

1.06 DUST CONTROL

A. Use all means necessary to prevent the spread of dust during performance of the work of this Section; thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of other work on the site.

PART 2 – PRODUCTS

2.01 OTHER MATERIALS

A. All other materials not specifically described but required for proper completion of the work of this Section shall be as selected by the Contractor subject to approval by the Project Manager.

PART 3 – EXECUTION

3.01 PREPARATION

A. Notification

Notify the Project Manager at least two (2) full working days prior to commencing the work of this Section.

B. Site Observation

1. Prior to all work of this Section, carefully observe the entire site for all objects designated to be removed and to be preserved.

2. Locate all existing utility lines indicated on the drawings to remain, and determine the requirements for their protection.

3. Locate, if any, all existing utility line indicated on the drawings to be disconnected and capped, and determine all requirements for disconnecting and capping.

C. Clarification

1. The drawings do not purport to show all objects existing on the site.

2. Before commencing the work of this Section, verify with the Project Manager and the Sugarhouse Park Authority all objects to be removed and all objects to preserve.

D. Scheduling

1. Schedule all work in a careful manner with all necessary consideration for adjacent properties and the general public.

2. Avoid interference with the use of, and passage to and from, adjacent properties.

3. Conduct operations so as not to interfere with the use of adjacent roads, streets, drives, walks, service lines, etc.

E. Disconnection of Utilities

1. Before starting site construction, arrange for the disconnection of all utility lines designated to be removed, relocated, or capped with the appropriate utility company. Utility company services for this work shall be paid for by the Contractor.

F. Protection of Utilities

1. Retain and protect in operating condition all active utilities traversing the site designated to remain.

3.02 DEMOLITION OF OBJECTS

A. Remove and dispose of all existing objects (except for those objects designated to remain) down to existing grade level or subgrade level to the extent indicated on the plans or as otherwise required to permit new construction.

3.03 REQUIREMENTS FOR REMOVAL OF CONCRETE PAVEMENT

A. Concrete curbs, gutters, cross gutters, driveways and walks: Remove concrete to neatly sawed edges, with saw cuts made to a minimum depth of one and one-half (1-1/2) inches. Concrete sidewalk of driveway to be removed shall be neatly sawed in straight lines, either parallel to the curb or at right angles to the alignment of the sidewalk. No section to be replaced shall be smaller than thirty (30) inches in either length or width. If the saw cut in sidewalk or driveway fall within thirty (30) inches of a construction joint, expansion joint, cold joint or edge, the concrete shall be removed to the joint or edge, except that where the saw cut would fall within twelve (12) inches of a score mark, the saw cut shall be made in and along the score mark. Curb and gutter shall be sawed to a depth of one (1) inch below the bottom surface in a neat line at right angles to the curb face.

3.04 BACKFILL AND COMPACTION

A. All excavations left by the demolition work shall be filled and compacted to make the surface at these points conform in contour and density to that of the surrounding ground, and as specified in SECTION 31 2333 – TRENCHING AND BACKFILLING.

3.05 STORAGE OF ITEMS TO BE RELOCATED

A. Coordinate with the Project Manager.

3.06 DISPOSAL OF DEBRIS

A. All material removed under this Contract, which is not to be salvaged or reused, or otherwise specified on the Plan shall become the property of the Contractor and be promptly disposed of. If shall be the responsibility of the Contractor to procure dumping facilities or other means of disposal for all items specified to be removed from the site. Storing or permitting refuse to accumulate on the site will not be permitted.

B. Disposal of all materials from the site shall be done in a lawful manner. Transport all refuse materials from the site without spilling on the streets.

C. Burning of refuse material on the site will not be permitted.

END OF SECTION

SECTION 02 4101 **- CUTTING AND PATCHING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Division 02 Section "Selective Demolition" for demolition of existing buildings and parts of existing buildings.
2. Division Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

1. Primary operational systems and equipment.
2. Fire-suppression systems.
3. Mechanical systems piping and ducts.
4. Electrical wiring systems.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

1. Equipment supports.
2. Piping & ductwork.
3. Noise- and vibration-control elements and systems.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - **PRODUCTS**

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

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

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - **EXECUTION**

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.

2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut as necessary.

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

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, extended or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
5. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 02 4101

SECTION 03 3000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures:

    a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

5. Curing materials.
6. Joint fillers.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

    a. Location of construction joints is subject to approval of the Architect.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Welded wire fabric reinforcing
8. Floor treatment, if any.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Welded wire fabric
4. Curing compounds.
5. Joint-filler strips.

B. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures:

C. Research Reports: For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.

D. Preconstruction Test Reports: For each mix design.

E. Field quality-control reports.

F. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.

1. Include the following information in each test report:

a. Admixture dosage rates.

b. Slump.
c. Air content.
d. Seven-day compressive strength.
e. 28-day compressive strength.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I or Type II as noted, gray.
2. Fly Ash: ASTM C618, Class C or F.

B. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:

a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.

2. Maximum Coarse-Aggregate Size: as noted nominal.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Lightweight Aggregate: ASTM C330/C330M, 3/8-inch nominal maximum aggregate size.

D. Air-Entraining Admixture: ASTM C260/C260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

F. Water and Water Used to Make Ice: ASTM C94/C94M, potable

2.3 SLAB REINFORCING

A. woven Wire fabric: #4 #4 mesh size is woven from 0.047” diameter Type 304 stainless steel wire with 0.203” openings, resulting in 66% open area. The wires are crimped to stay in position (not welded).

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

a. Ambient Temperature Below 50 deg F: Black.
b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
c. Ambient Temperature Above 85 deg F: White.

C. Water: Potable or complying with ASTM C1602/C1602M.

D. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

E. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

2.5 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.

2.6 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete with a w/cm below 0.50.

2.7 CONCRETE MIXTURES

A. Mixes

1. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement for foundation elements and 0.15 percent by weight for exterior reinforced paving.
2. 4,000 lb. mixes minimum requirement

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.2 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
2. Place joints perpendicular to main reinforcement.

a. Continue reinforcement across construction joints unless otherwise indicated.
b. Do not continue reinforcement through sides of strip placements of floors and slabs.

3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

6. Space vertical joints in walls. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 07 9200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.3 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

a. Do not use vibrators to transport concrete inside forms.
b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.4 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
b. Remove projections larger than 1 inch.
c. Tie holes do not require patching.
d. Surface Tolerance: ACI 117 Class D.
e. Apply to concrete surfaces not exposed to public view.

2. ACI 301 Surface Finish SF-3.0:

a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
b. Remove projections larger than 1/8 inch.
c. Patch tie holes.

d. Surface Tolerance: ACI 117 Class A.
e. Locations: Apply to concrete surfaces exposed to public view, or to be covered with a coating or covering material applied directly to concrete.

B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.5 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.
3. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

3.6 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.

    a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    b. Cast anchor-bolt insert into bases.
    c. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.7 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:

    a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    b. Continuous Sprinkling: Maintain concrete surface continuously wet.
    c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
    d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
    e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

        1) Recoat areas subject to heavy rainfall within three hours after initial application.
        2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:

    a. Floors to Receive Curing Compound:

        1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
        2) Recoat areas subjected to heavy rainfall within three hours after initial application.
        3) Maintain continuity of coating, and repair damage during curing period.
        4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

    b. Floors to Receive Curing and Sealing Compound:

        1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
        2) Recoat areas subjected to heavy rainfall within three hours after initial application.
        3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.8 TOLERANCES

A. Conform to ACI 117.

3.9 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

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

1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

1) Project name.
2) Name of testing agency.
3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
4) Name of concrete manufacturer.
5) Date and time of inspection, sampling, and field testing.
6) Date and time of concrete placement.
7) Location in Work of concrete represented by samples.
8) Date and time sample was obtained.
9) Truck and batch ticket numbers.
10) Design compressive strength at 28 days.
11) Concrete mixture designation, proportions, and materials.
12) Field test results.
13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
14) Type of fracture and compressive break strengths at seven days and 28 days.

C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M:

    a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests when concrete consistency appears to change.

3. Slump Flow: ASTM C1611/C1611M:

    a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests when concrete consistency appears to change.

4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; ASTM C173/C173M volumetric method, for structural lightweight concrete.

    a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C1064/C1064M:

    a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.

6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.

    a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C31/C31M:

    a. Cast and laboratory cure two sets of four 4-inch by 8-inch cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C39/C39M.

    a. Test one laboratory-cured specimen at seven days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:

    a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.

        1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.

13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 72 hours of completion of floor finishing and promptly report test results to Architect.

3.10 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 03 3000

SECTION 10 7300 – PREMANUFACTURED PAVILION (**SPECIALTIES MANUFACTURERS OF PROTECTIVE COVERS)**

PART 1 - GENERAL

1.01 DESCRIPTION OF PRODUCT

A. Gable Roof Pavilion for Parleys Creek, 40’ x 64’ with Standing Seam Roofing over Tongue and Groove structural decking.

B. Gable Roof Pavilion for Big Field, 45’ x 84’ with Standing Seam Roofing over Tongue and Groove structural decking.

C. ROOF SLOPE: 4 : 1 2

1. Minimum Clearance Height (MCH): 10 in ft. Minimum clearance height under the structure indicates the lowest height of a member from finish grade for clearance under the structure. This is generally the clearance under roof eave or frame, whichever is lower.

1.02 REFERENCES

A. REFERENCE STANDARDS:

1. AISC - American Institute of Steel Construction Manual of Steel Construction.

2. ASTM - American Society for Testing and Materials.

3. AWS - American Welding Society.

4. LEED - Leadership in Energy and Environmental Design.

5. OSHA Occupational Safety and Health Administration Steel Erection Standard 29 CFR 1926 Subpart R-Steel Erection.

6. PCI - Powder Coating Institute.

7. SSPC The Society for Protective Coatings.

8. Architecturally Exposed Structural Steel (AESS) - as defined by AISC

1.03 SUBMITTALS

A. GENERAL SUBMITTAL:

Submit 3 sets of engineered drawings and 3 sets of engineered calculations, both signed and sealed by a Professional Engineer licensed in the State of Utah.

B. PRODUCT DESIGN REQUIREMENTS:

The building shall meet the following design requirements as shown on the drawings:

1. Building Code: IBC 2021

2. Ground Snow Load (Pg): 43 psf.

1. Basic Wind Speed (V): 120 mph.

1. Seismic Design: Category D.

C. FOUNDATION DESIGN:

1. The shelter shall be set on concrete foundations designed by manufacturer.

2. Foundation materials shall be provided by contractor.

3. Owner shall provide manufacturer with complete information about the site including soil bearing capacity and lateral load capacity.

4. If soil data are not provided, foundations will be designed to the minimum values identified in the governing building code.

D. ANCHOR BOLTS:

Anchor bolts shall be provided by manufacturer.

Hooked anchors are not permitted per AISC requirements.

1.01 QUALITY ASSURANCE

A. MANUFACTURER QUALIFICATIONS:

1. Minimum of (10) years in the shelter construction industry.

2. Full time on-staff Licensed Engineer.

3. Full time on-staff Quality Assurance Manager.

4. Full time on-staff LEED AP.

5. All welders AWS Certified.

6. Manufacturer owned and controlled finishing system to include shot blast, pretreatment, primer, and top coat.

7. Published Quality Management System.

8. Annual audit of Quality System and Plant Processes by Third Party Agency.

9. Annual audit of powder coat finish system by Third Party Agency (PCI).

B. MANUFACTURER S CERTIFICATONS:

1. AISC Certified Building Fabricator, (American Institute of Steel Construction) Certified Building Fabricator is an AISC Quality Management Systems (QMS) Certification which sets the quality standard for the structural steel industry.

2. PCI 4000 S Certified, Certification thru Powder Coating Institute for original equipment manufacturers (OEMs) to evaluate process on entire finish system to add powdercoat over steel.

1. State of Utah Approved Fabricator for Medium and High Strength Steel.

1.01 FIELD OR SITE CONDITIONS

A. Foundations shall be at the same elevation

1.02 MANUFACTURER WARRANTY

A. Shelter must have a (10) year limited warranty on steel frame members.

B. Shelter must have a (10) year limited warranty on paint system.

PART 2 - PRODUCTS

2.01 SHELTER SYSTEM AND MATERIALS

A. MANUFACTURERS:

1. Acceptable Manufacturer: Poligon, a Product of PorterCorp, 4240 N 136th Ave., Holland, MI 49424; 616.399.1963;

   E-mail: info@poligon.com; www.poligon.com.

2. The product shall be designed, produced, and finished at a facility operated and directly supervised by the supplier who has a minimum of (10) years in the business of making pre-manufactured shelters.

3. Manufacturer must be an AISC Certified Building Fabricator.

B. SUBSTITUTION LIMITATIONS:

i. Substitutions for cause: Will only be considered when circumstances, outside ofthe contractor s control, will create a substantial delay in the completion of the project. Approval of substitution requests is at the discretion of the architect, owner, and/or their designated consultants. Architect will only consider contractor's request for substitution when the following conditions are satisfied:

1. Requested substitution meets or exceeds requirements as per the Contract Documents and will produce indicated results

2. Requested substitution provides equal design characteristics that specified product provides

3. Substitution request is fully documented and properly submitted.

ii. If those conditions are not satisfied, Architect may return requests without action, except to record non compliance with these requirements. It is required that the contractor provide the following:

Documentation that the proposed substitution complies with all requirements as stated or shown in the contract documents and/or drawings

1. Proof of meeting or exceeding specified warranty and/or certifications. Example: Fabricator Qualifications, such as AISC or PCI4000

i. Detailed comparison of significant qualities of proposed substitutions with those of the specified product. Include annotated copy of applicable Specification Section. Product data, including drawings and descriptions of products and fabrication

ii. Documentation of any deviations from the specified material/product

iii. Architect may request additional information and documentation prior to rendering a decision

iv. If substitution approval happens during bidding, Architect will approve substitution requests by issuing an Addendum. Substitutions not approved by addendum are rejected. This information will be provided in an expeditious manner.

v. Substitutions for convenience: Will not be considered

C. PRODUCT REQUIREMENTS AND MATERIALS:

1. GENERAL:

The pre-engineered package shall be pre-cut unless otherwise noted and

pre-fabricated which will include all parts necessary to field construct the shelter. The shelter shall be shipped knocked down to minimize shipping expenses.

Field labor will be kept to a minimum by pre-manufactured parts. Onsite welding is not necessary.

2. REINFORCED CONCRETE:

a. Concrete shall have minimum 28-day compressive strength of 3,000 psi and slump of 4 inches (+/- 1), unless otherwise noted on the drawings.

b. Reinforcing shall be ASTM A615, grade 60.

3. STEEL COLUMNS:

a. Hollow structural steel tube minimum ASTM A500 grade B with a minimum wall thickness of 3/16 inch.

b. Unless columns are direct buried, columns shall be anchored directly to concrete foundation with a minimum of four anchor rods to meet OSHA requirement 1926.755(a)(1).

1. COMPRESSION MEMBERS:

Compression rings of structural channel or welded plate minimum ASTM A36 or compression tubes or structural steel tube minimum ASTM A500 grade B shall only be used.

2. CONNECTION REQUIREMENTS:

a. Anchor bolts shall be ASTM F1554 (Grade 36) unless otherwise noted.

b. Structural fasteners shall be zinc plated ASTM A325 high strength bolts and A563 high strength nuts.

1. Structural fasteners shall be hidden within framing members wherever possible.

1. Structural fasteners shall be manufactured in the U.S

2. No field welding shall be required to construct the shelter.

3. All welds shall be free of burrs and inconsistencies.

4. Exposed fasteners shall be powder coated by manufacturer prior to shipment to match frame or roof colors as applicable.

5. Manufacturer shall provide extra structural and roofing fasteners.

3. ROOFING MATERIALS:

a. PRIMARY ROOF DECK: FACTORY PRE-STAINED TONGUE AND GROOVE (TG):

1. T&G shall be of 2x6 tongue and groove, Hem Fir, Select Structural KD 15. Factory stained per architect's selection from manufacturer's full range of selections.

2. Manufacturer shall supply 30 pound felt and drip edge if both primary and secondary roofs are being supplied by the manufacturer.

3. Contractor shall cut T&G down to required lengths.

b. SECONDARY ROOF SYSTEM: STANDING SEAM METAL ROOFING (SS):

1. Standing seam metal roofing to be 24-gauge galvalume 16 wide with ribs 1-3/4 high.

2. Roof surface shall be painted with Kynar 500 to the manufacturers standard color: Any ceiling surface shall be a wash coat primer.

3. Angles shall be cut in the field.

4. Metal roofing trim shall match the color of the roof and shall be factory made of 26 gauge Kynar 500 painted steel.

5. Trim shall include panel ridge caps, hip caps, eave trim, splice channels, rake trim, roof peak cap, and corner trim as applicable for model selected. Trim may need to be cut to length and notched. Installation drawings shall have detailed information on how to cut and affix roof trim.

6. Ridge, hip, and valley caps shall be pre-formed with a single central bend to match the roof pitch and shall be hemmed on the sides.

7. Roof peak cap shall be pre-manufactured.

8. Manufacturer shall supply painted screws and butyl tape.

9. ACCESSORIES

a. ELECTRICAL ACCESS & CUTOUTS:

1) Electrical access to be provided a 1 diameter hole in the column base plate and diameter holes are provided through

connection plates for wire access through columns, trusses, and into the compression ring/tube.

2) Electrical cutouts shall be provided in 15 places for fixtures or wires.

PART 3 - EXECUTION

1.01 **I**NSTALLERS STORAGE AND HANDLING

A. Protect building products after arrival at destination from weather, sunlight, and damage.

B. Installer shall store product elevated to allow air circulation and to not introduce mold, fungi, decay or insects to the product.

C. Product must be handled with protective straps or padded forks if lifting with mechanical equipment. Use of chain or cable to lift product into place will not be accepted and may void manufacturer s warranty.

E. The secondary roof shall be installed immediately after the primary roof to prevent moisture damage to wood.

1.02 ERECTION

A. INSTALLATION:

Install all components according to manufacturer’s installation instructions and these specifications.

B. GENERAL CONTRACTOR:

Interface with other work is to be coordinated by the customer or the customer s agent. Electrical boxes and lighting j-boxes and wiring and other miscellaneous requirements that are not supplied by Poligon, shall be concealed within Poligon supplied structure.

C. TOLERANCES:

Tolerances on steel structural members are set according to AISC construction practices, abided in the factory, and cannot be increased. No field slotting or opening of holes will be allowed. It is

therefore essential that contractors conform to the tolerances specified on the installation drawings for anchor bolt or column layout details.

D. OSHA COMPLIANCE:

OSHA Compliance to Steel Erection Standard 29CRF 1926 Subpart R-Steel Erection.

1.03 REPAIR

A. Do not attempt any field changes without first contacting Poligon.

1.02 FIELD OR SITE QUALITY CONTROL

A. Field or Site Tests and Inspections are not required by Poligon but may be required by the customer or by the local building inspector.

END OF SECTION 107300

PART 1 - **SECTION 26 0500 – COMMON WORK RESULTS FOR ELECTRICAL**GENERAL

1.1 SUMMARYs

A. Section Includes:

1. Sleeves for raceways and cables.
2. Sleeve seals.
3. Grout.
4. Common electrical installation requirements.

1.2 SUBMITTALS

A. Product Data: For sleeve seals.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

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

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
3. Pressure Plates: Stainless steel. Include two for each sealing element.

4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

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

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches above finished floor level.

G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry

1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants.".

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 26 0500

SECTION 26 0519 **- LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:

1. Section 26 0513 "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 2001 to 35,000 V.
2. Section 26 0523 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2 and 3 control cables.
3. Section 27 1500 "Communications Horizontal Cabling" for cabling used for voice and data circuits.

1.3 DEFINITIONS

A. VFC: Variable frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

1. Alpha Wire Company;

2. American Insulated Wire Corp.;
3. Belden Inc;
4. Cerro Wire LLC;
5. Encore Wire Corporation;
6. General Cable Technologies Corporation;
7. General Cable; General Cable Corporation;
8. Senator Wire & Cable Company;
9. Southwire Company;

B. Aluminum and Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658

D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 with ground wire.

E. VFC Cable:

1. Comply with UL 1277, UL 1685, and NFPA 70 for Type TC-ER cable.
2. Type TC-ER with oversized crosslinked polyethylene insulation, spiral-wrapped foil plus 85 percent coverage braided shields and insulated full-size ground wire and sunlight- and oil-resistant outer PVC jacket.

2.2 CONNECTORS AND SPLICES

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

1. 3M;
2. AFC Cable Systems, Inc;
3. Gardner Bender;
4. Hubbell Power Systems, Inc.;
5. Ideal Industries, Inc.;
6. ILSCO;
7. NSi Industries LLC;
8. O-Z/Gedney; an EGS Electrical Group brand; an Emerson Industrial Automation business;
9. Tyco Electronics Corp.;

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

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

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway

E. Feeders in Cable Tray: Type THHN/THWN-2, single conductors in raceway

F. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway

G. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway

H. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway

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

J. VFC Output Circuits: Type XHHW-2 in metal conduit

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 26 0533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 26 0529 "Hangers and Supports for Electrical Systems."

G. Complete cable tray systems installation according to Section 26 0536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least [6 inches] [12 inches] of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 26 0553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 0544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 8413 "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Infrared Scanning: After date of final acceptance certification by Salt Lake County, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of final acceptance certification by Salt Lake County.
b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

D. Test and Inspection Reports: Prepare a written report to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

E. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 26 0519

SECTION 26 0526 **- GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment, plus the following special applications:

1. Underground distribution grounding.
2. Ground bonding common with lightning protection system.
3. Foundation steel electrodes.

1.3 ACTION SUBMITTALS

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

1.4 QUALITY ASSURANCE

A. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Burndy; Part of Hubbell Electrical Systems.
2. Dossert; AFL Telecommunications LLC.
3. ERICO International Corporation.
4. Fushi Copperweld Inc.
5. Galvan Industries, Inc.; Electrical Products Division, LLC.
6. Harger Lightning & Grounding.
7. ILSCO.
8. O-Z/Gedney; an EGS Electrical Group brand; an Emerson Industrial Automation business.
9. Robbins Lightning, Inc.
10. Siemens Power Transmission & Distribution, Inc.

2.2 SYSTEM DESCRIPTION

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

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

A. Insulated Conductors: tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad 3/4 inch by 10 feet

B. Grounding Electrodes: Copper tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts

1. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches long.
2. Backfill Material: Electrode manufacturer's recommended material.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.

C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

D. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.

E. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, non-shrink grout.

C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-

copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches from the foundation.

3.5 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Armored and metal-clad cable runs.
8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
9. X-Ray Equipment Circuits: Install insulated equipment grounding conductor in circuits supplying x-ray equipment.

C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

D. Water Heater, Heat-Tracing, and Anti-frost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

F. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

G. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

H. Metallic Fences: Comply with requirements of IEEE C2.

1. Grounding Conductor: Bare, tinned copper, not less than No. 8 AWG.
2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
3. Barbed Wire: Strands shall be bonded to the grounding conductor.

3.6 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 26 0543 "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches deep, with cover.

1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

F. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

G. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.

H. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.

1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
2. Bury ground ring not less than 24 inchesfrom building's foundation.

I. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 feet long. If reinforcing is in multiple pieces, connect together by the usual steel tie wires or exothermic welding to create the required length.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells Make tests at ground rods before any conductors are connected.

a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 0526

SECTION 26 0529 **- HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

B. Related Sections include the following:

1. Section 26 0548.16 "Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of [five] times the applied force.

1.5 ACTION SUBMITTALS

1.6 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 07 7200 "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

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

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.; a division of Cooper Industries.
c. ERICO International Corporation.
d. GS Metals Corp.
e. Metal Ties Innovation.
f. Thomas & Betts Corporation, A Member of the ABB Group.
g. Unistrut; an Atkore International company.
h. Wesanco, Inc.

2. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
3. Channel Dimensions: Selected for applicable load criteria.

B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch- diameter holes at a maximum of 8 inches o.c., in at least 1 surface.

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

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.; a division of Cooper Industries.
c. Fabco Plastics Wholesale Limited.
d. Seasafe, Inc.; AMICO, a Gibraltar Industries Company.

2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
3. Fitting and Accessory Materials: Same as channels and angles.
4. Rated Strength: Selected to suit applicable load criteria.

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

D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

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

1) Hilti, Inc.
2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
3) MKT Fastening, LLC.
4) Simpson Strong-Tie Co., Inc.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

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

1) Cooper B-Line, Inc.; a division of Cooper Industries.
2) Empire Tool and Manufacturing Co., Inc.
3) Hilti, Inc.
4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
5) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 05 5000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

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

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

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

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

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

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 05 5000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 03 3000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

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

B. Touchup: Comply with requirements in Section 09 9113 "Exterior Painting", Section 09 9123 "Interior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 0529

SECTION 26 0533 **- RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes, enclosures, and cabinets.
7. Handholes and boxes for exterior underground cabling.

B. Related Requirements:

1. Section 26 0543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.
2. Section 27 0528 "Pathways for Communications Systems" for conduits, wireways, surface pathways, innerduct, boxes, faceplate adapters, enclosures, cabinets, and handholes serving communications systems.
3. Section 28 0528 "Pathways for Electronic Safety and Security" for conduits, surface pathways, innerduct, boxes, and faceplate adapters serving electronic safety and security.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.

2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Qualification Data: For professional engineer.

C. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.

D. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

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

1. AFC Cable Systems, Inc.
2. Allied Tube & Conduit.
3. Anamet Electrical, Inc.
4. Electri-Flex Company.
5. FSR Inc.
6. O-Z/Gedney; an EGS Electrical Group brand; an Emerson Industrial Automation business.
7. Patriot Aluminum Products, LLC.
8. Picoma Industries.
9. Republic Conduit.
10. Robroy Industries.
11. Southwire Company.
12. Thomas & Betts Corporation, A Member of the ABB Group.
13. Western Tube and Conduit Corporation.
14. Wheatland Tube Company.

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

C. GRC: Comply with ANSI C80.1 and UL 6.

D. ARC: Comply with ANSI C80.5 and UL 6A.

E. IMC: Comply with ANSI C80.6 and UL 1242.

F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch, minimum.

G. EMT: Comply with ANSI C80.3 and UL 797.

H. FMC: Comply with UL 1; zinc-coated steel

I. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

J. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

a. Material: Steel
b. Type: compression

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

K. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

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

1. AFC Cable Systems, Inc.
2. Anamet Electrical, Inc.
3. Arnco Corporation.
4. CANTEX INC.
5. CertainTeed Corporation.
6. Condux International, Inc.
7. Electri-Flex Company.
8. Kraloy.
9. Lamson & Sessions.
10. Niedax-Kleinhuis USA, Inc.
11. RACO; Hubbell.
12. Thomas & Betts Corporation, A Member of the ABB Group.

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

C. ENT: Comply with NEMA TC 13 and UL 1653.

D. RNC: Type EPC-40-PVC complying with NEMA TC 2 and UL 651 unless otherwise indicated.

E. LFNC: Comply with UL 1660.

F. Rigid HDPE: Comply with UL 651A.

G. Continuous HDPE: Comply with UL 651B.

H. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.

I. RTRC: Comply with UL 1684A and NEMA TC 14.

J. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

K. Fittings for LFNC: Comply with UL 514B.

L. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

M. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

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

1. Cooper B-Line, Inc.; a division of Cooper Industries.
2. Hoffman; a brand of Pentair Equipment Protection.
3. MonoSystems, Inc.
4. Square D.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Hinged type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.4 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Tele-Power Poles:

1. Material: Galvanized steel with ivory baked-enamel finish
2. Fittings and Accessories: Dividers, end caps, covers, cutouts, wiring harnesses, devices, mounting materials, and other fittings shall match and mate with tele-power pole as required for complete system.

2.5 BOXES, ENCLOSURES, AND CABINETS

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

1. Adalet.
2. Cooper Technologies Company.
3. EGS/Appleton Electric.
4. Erickson Electrical Equipment Company.
5. FSR Inc.
6. Hoffman; a brand of Pentair Equipment Protection.
7. Hubbell Incorporated.
8. Kraloy.
9. Milbank Manufacturing Co.
10. MonoSystems, Inc.
11. Oldcastle Enclosure Solutions.
12. O-Z/Gedney; an EGS Electrical Group brand; an Emerson Industrial Automation business.
13. RACO; Hubbell.
14. Robroy Industries.
15. Spring City Electrical Manufacturing Company.
16. Stahlin Non-Metallic Enclosures.
17. Thomas & Betts Corporation, A Member of the ABB Group.
18. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

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

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

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

F. Metal Floor Boxes:

1. Material: Cast metal
2. Type: Semi-adjustable.
3. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

H. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.

1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

I. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

J. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

K. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

L. Device Box Dimensions: 4 inches square by 2-1/8 inches deep

M. Gangable boxes are prohibited.

N. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Fiberglass.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

O. Cabinets:

1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.6 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of reinforced concrete.

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

a. Armorcast Products Company.
b. Carson Industries LLC.
c. NewBasis.
d. Nordic Fiberglass, Inc.
e. Oldcastle Precast, Inc.
f. Quazite: Hubbell Power Systems, Inc.
g. Synertech Moulded Products.

2. Standard: Comply with SCTE 77.
3. Color of Frame and Cover: Green.
4. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.

5. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
6. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
7. Cover Legend: Molded lettering, "ELECTRIC."
8. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
9. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.7 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

1. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
2. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: IMC
2. Concealed Conduit, Aboveground: IMC
3. Underground Conduit: RNC, Type EPC-40-PVC
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFNC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT
2. Exposed and Subject to Physical Damage: IMC. Raceway locations include the following:

a. Loading dock.
b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
c. Mechanical rooms.
d. Gymnasiums.
e. Equipment room

3. Concealed in Ceilings and Interior Walls and Partitions: EMT to be used for homeruns, MC cable with ground is allowed to be used from homerun to devises.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
5. Damp or Wet Locations: IMC.
6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew steel fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface raceways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 26 0529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inchesof enclosures to which attached.

I. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-footintervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from ENT to IMC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

O. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

P. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

Q. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

R. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

S. Surface Raceways:

1. Install surface raceway with a minimum 2-inchradius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

T. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

U. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.

3. Where otherwise required by NFPA 70.

V. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

W. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F] temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F] temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F temperature change.
    e.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

X. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

Y. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

AA. Locate boxes so that cover or plate will not span different building finishes.

BB. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

CC. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

DD. Set metal floor boxes level and flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 31 2000 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 31 2000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 31 2000 "Earth Moving."
4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

5. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
6. Underground Warning Tape: Comply with requirements in Section 26 0553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install handholes with bottom below frost line, 30” Minimum below grade.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.

F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 0544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 8413 "Penetration Firestopping."

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 0533

SECTION 26 0553 **- IDENTIFICATION FOR ELECTRICAL SYSTEMS**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.2 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.2 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.3 FLOOR MARKING TAPE

A. 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.4 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE,
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE, >.

C. Tag:

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, compounded for direct-burial service.
2. Overall Thickness: 5 mils.
3. Foil Core Thickness: 0.35 mil.
4. Weight: 28 lb/1000 sq. ft..
5. 3-Inch Tensile According to ASTM D 882: 70 lbf, and 4600 psi.

2.5 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

C. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Apply identification devices to surfaces that require finish after completing finish work.

C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

G. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Emergency Power.
2. Power.
3. UPS.

B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Colors for 480/277-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

C. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

D. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

E. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

F. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

G. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

    a. Power transfer switches.
    b. Controls with external control power connections.

I. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer

K. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

    a. Indoor Equipment: Adhesive film label Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
    b. Outdoor Equipment: Engraved, laminated acrylic or melamine label
    c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION 26 0553

SECTION 26 2416 **- PANELBOARDS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.
3. Load centers.
4. Electronic-grade panelboards.

1.3 DEFINITIONS

A. ATS: Acceptance testing specification.

B. GFCI: Ground-fault circuit interrupter.

C. GFEP: Ground-fault equipment protection.

D. HID: High-intensity discharge.

E. MCCB: Molded-case circuit breaker.

F. SPD: Surge protective device.

G. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

7. Include wiring diagrams for power, signal, and control wiring.
8. Key interlock scheme drawing and sequence of operations.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 7823 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Two spares for each type of panelboard cabinet lock.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001 or 9002 certified.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NECA 407

1.10 FIELD CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.
b. Altitude: Not exceeding 6600 feet.

B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Owner no fewer than five days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Owner's written permission.
3. Comply with NFPA 70E.

1.11 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 18 months from date of final acceptance certificate by Salt Lake County.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 26 0548.16 "Seismic Controls for Electrical Systems."

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

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

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

F. Enclosures: Flush and Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1
b. Outdoor Locations: NEMA 250, Type 3R
c. Kitchen Areas: NEMA 250, Type 4X <Insert type>, stainless steel
d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4
e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 5

2. Height: 84 inches maximum.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
4. Finishes:

a. Panels and Trim: Steel factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.

b. Back Boxes: Galvanized steel

G. Incoming Mains:

1. Location: Convertible between top and bottom.
2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

H. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.

a. Plating shall run entire length of bus.
b. Bus shall be fully rated the entire length.

2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.

I. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Terminations shall allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
6. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

J. NRTL Label: Panelboards or load centers shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

K. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

L. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.

2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

2.3 POWER PANELBOARDS

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

1. Eaton Electrical Sector; Eaton Corporation.
2. General Electric Company; GE Energy Management - Electrical Distribution.
3. Siemens Energy.
4. Square D; by Schneider Electric.

B. Panelboards: NEMA PB 1, distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.

D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

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

1. Eaton Electrical Sector; Eaton Corporation.
2. General Electric Company; GE Energy Management - Electrical Distribution.
3. Siemens Energy.
4. Square D; by Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: As shown on the drawings

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Door-in-door construction with concealed hinges; secured with multipoint latch with tumbler lock; keyed alike. Outer door shall permit full access to the panel interior. Inner door shall permit access to breaker operating handles and labeling, but current carrying terminals and bus shall remain concealed.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

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

1. Eaton Electrical Sector; Eaton Corporation.
2. General Electric Company; GE Energy Management - Electrical Distribution.
3. Siemens Energy.
4. Square D; by Schneider Electric.

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

a. Inverse time-current element for low-level overloads.
b. Instantaneous magnetic trip element for short circuits.
c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic Trip Circuit Breakers:

a. RMS sensing.
b. Field-replaceable rating plug or electronic trip.
c. Digital display of settings, trip targets, and indicated metering displays.
d. Multi-button keypad to access programmable functions and monitored data.
e. Ten-event, trip-history log. Each trip event shall be recorded with type, phase, and magnitude of fault that caused the trip.
f. Integral test jack for connection to portable test set or laptop computer.
g. Field-Adjustable Settings:

1) Instantaneous trip.
2) Long- and short-time pickup levels.
3) Long and short time adjustments.
4) Ground-fault pickup level, time delay, and I squared T response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
6. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
7. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
8. Subfeed Circuit Breakers: Vertically mounted.
9. MCCB Features and Accessories:

2.6 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in transparent card holder

1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards according to NECA 407

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Comply with NECA 1.

C. Install panelboards and accessories according to NECA 407

D. Equipment Mounting:

1. Attach panelboard to the vertical finished or structural surface behind the panelboard.
2. Comply with requirements for seismic control devices specified in Section 26 0548.16 "Seismic Controls for Electrical Systems."

E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

F. Comply with mounting and anchoring requirements specified in Section 26 0548.16 "Seismic Controls for Electrical Systems."

G. Mount top of trim 90 inches above finished floor unless otherwise indicated.

H. Mount panelboard cabinet plumb and rigid without distortion of box.

I. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

J. Mounting panelboards with space behind is recommended for damp, wet, or dirty locations. The steel slotted supports in the following paragraph provide an even mounting surface and the recommended space behind to prevent moisture or dirt collection.

K. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth. Orient steel slotted supports vertically.

L. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.
2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

M. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

N. Install filler plates in unused spaces.

O. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

P. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 26 0553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."

E. Install warning signs complying with requirements in Section 26 0553 "Identification for Electrical Systems" identifying source of remote circuit.

3.4 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS, Paragraph 7.6 Circuit Breakers optional tests. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

    a. Initial Infrared Scanning: After date of final acceptance certification by Salt Lake County, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
    b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of final acceptance certification by Salt Lake County.

C. Panelboards will be considered defective if they do not pass tests and inspections.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Section 26 0573 "Overcurrent Protective Device Coordination Study."

C. Load Balancing: After date of final acceptance certification by Salt Lake County, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Architect of effect on phase color coding.

1. Measure loads during period of normal facility operations.
2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by the Architect. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
4. Tolerance: Maximum difference between phase loads, within a panelboard, shall not exceed 20 percent.

3.6 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 26 2416

SECTION 26 2726 **- WIRING DEVICES**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Weather-resistant receptacles.
3. Snap switches and wall-box dimmers.
4. Solid-state fan speed controls.
5. Wall-switch and exterior occupancy sensors.
6. Communications outlets.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Cooper Wiring Devices, Inc.; Division of Cooper Industries, Inc.
2. Hubbell Incorporated; Wiring Device-Kellems.
3. Leviton Manufacturing Co., Inc.
4. Pass & Seymour/Legrand (Pass & Seymour).

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

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

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

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

a. Cooper Wiring Devices, Inc.; Division of Cooper Industries, Inc.
b. Hubbell Incorporated; Wiring Device-Kellems.
c. Leviton Manufacturing Co., Inc.
d. Pass & Seymour/Legrand (Pass & Seymour).

2.4 GFCI RECEPTACLES

A. General Description:

1. Straight blade, non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

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

a. Cooper Wiring Devices, Inc.; Division of Cooper Industries, Inc.
b. Hubbell Incorporated; Wiring Device-Kellems.
c. Leviton Manufacturing Co., Inc.
d. Pass & Seymour/Legrand (Pass & Seymour).

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following

a. Single Pole:

1) Cooper; AH1221.
2) Hubbell; HBL1221.
3) Leviton; 1221-2.
4) Pass & Seymour; CSB20AC1.

b. Two Pole:

1) Cooper; AH1222.
2) Hubbell; HBL1222.
3) Leviton; 1222-2.
4) Pass & Seymour; CSB20AC2.

c. Three Way:

1) Cooper; AH1223.
2) Hubbell; HBL1223.
3) Leviton; 1223-2.
4) Pass & Seymour; CSB20AC3.

d. Four Way:

1) Cooper; AH1224.
2) Hubbell; HBL1224.
3) Leviton; 1224-2.
4) Pass & Seymour; CSB20AC4.

C. Pilot-Light Switches, 20 A:

1. Description: Single pole, with neon-lighted handle, illuminated when switch is "off."

D. Key-Operated Switches, 120/277 V, 20 A:

1. Description: Single pole, with factory-supplied key in lieu of switch handle.

2.6 WALL-BOX DIMMERS

A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.

1. 0-10volt dimmers shall have pre-set on-off and be low profile and be rated for the load.

B. Control: Continuously adjustable slider with single-pole or three-way switching. Comply with UL 1472.

1. 600 W; dimmers shall require no derating when ganged with other devices. Illuminated when "off." . Dimmers shall be rated for type of load it is controlling

2.7 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Provide stainless steel cover plate for all the devices in public area
2. Plate-Securing Screws: Metal with head color to match plate finish.
3. Material for Finished Spaces: Smooth, high-impact thermoplastic
4. Material for Unfinished Spaces: Galvanized steel
5. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.8 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Emergency Power System: Red .

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

a. Cut back and pigtail, or replace all damaged conductors.
b. Straighten conductors that remain and remove corrosion and foreign matter.

c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.

5. Using the test plug, verify that the device and its outlet box are securely mounted.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 26 2726

SECTION 32 1313 - SITE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Driveways and concrete pads
2. Curbs and gutters
3. Walkways

1.2 SUBMITTALS

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

B. Design Mixtures: For each concrete pavement mixture.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94 requirements for production facilities and equipment.

B. ACI Publications: Comply with ACI 301, “Specification for Structural Concrete,” unless modified by requirements in the Contract Documents.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: ASTM C 150, Type II, gray.

B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate, uniformly graded. Provide aggregates from a single source.

C. Water: ASTM C 94.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: ASTM C 494, of type suitable for application, certified by manufacturer to be compatible with other admixtures and to contain no more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

2.2 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth.

A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

B. Water: Potable.

C. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

2.3 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.4 STEEL REINFORCEMENT

A. Epoxy-Coated Reinforcing Bars: ASTM A 615, Grade 60, deformed bars, ASTM A 775, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.

B. Bar Supports: bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars or dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice".

2.5 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:

1. Compressive Strength (28 Days): 4500 psi.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
3. Slump Limit: 4 inches.
4. Air Content: 4.5 % Air Content.
5. Cement: 6-1/2 bag mix.
6. F1/S1/C1 Exposure Class

2.6 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to require lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

A. Micro Fiber Reinforcement complying with ASTM A706, Grade 60

3.4 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edging true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness to match jointing of existing adjacent concrete pavement.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.

B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

D. Screed pavement surfaces with a straightedge and strike off.

E. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further

disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.6 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.7 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
1. Comply with ACI 306.1 for cold-weather protection.
2. Cure: Sealer (Double Application).

A. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. Ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screening, and bull floating or darbying concrete, but before float finishing.

B. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

C. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these methods.

3.8 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

Elevation: 1/4 inch.
Thickness: Plus 3/8 inch, minus 1/4 inch.
Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/4 inch.
Joint Spacing: 3 inches.
Contraction Joint Depth: Plus 1/4 inch, no minus.
Joint Width: Plus 1/8 inch, no minus.

3.9 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.

C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date of final acceptance certificate by Salt Lake County inspections.

END OF SECTION

SECTION 32 1373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Hot-applied joint sealants.

1.2 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, eight, Samples of materials that will contact or affect joint sealants. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each kind and color of joint sealant required.

C. Pavement-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

D. Product certificates.

E. Product test reports.

F. Preconstruction compatibility and adhesion test reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021.

B. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Nonsag, Silicone Joint Sealant for Concrete: ASTM D 5893, Type NS.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Crafco Inc., an ERGON company; RoadSaver Silicone.
b. Dow Corning Corporation; 888.
c. Pecora Corporation; 301 NS.

B. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893, Type SL.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Crafco Inc., an ERGON company; RoadSaver Silicone SL.
b. Dow Corning Corporation; 890-SL.
c. Pecora Corporation; 300 SL.

C. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Pecora Corporation; Urexpan NR-200.

2.

2.3 HOT-APPLIED JOINT SEALANTS

A. Hot-Applied, Single-Component Joint Sealant for Concrete: ASTM D 3406.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Crafco Inc., an ERGON company; Superseal 444/777.

B. Hot-Applied, Single-Component Joint Sealant for Concrete and Asphalt: ASTM D 6690, Types I, II, and III.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Meadows, W. R., Inc.; Sealtight Hi-Spec or Sealtight 3405.
b. Right Pointe; D-3405 Hot Applied Sealant.

2.

2.4 JOINT-SEALANT BACKER MATERIALS

A. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

C. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.5 PRIMERS

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

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Cleaning of Joints: Clean out joints immediately before installing joint sealants.

C. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

D. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place joint sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

1. Remove excess joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

G. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

H. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION

SECTION 32 8400 - PLANTING IRRIGATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Piping.
2. Encasement for piping.
3. Transition fittings.
4. Manual valves.
5. Automatic control valves.
6. Quick couplers.
7. Boxes for automatic control valves.
8. Sprinklers.

1.2 DEFINITIONS

A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.

C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.3 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be automatic operation with controller and automatic control valves.

B. Location of pressure supply and lateral lines is diagrammatic and approximate. Install pipes in the landscape area nearest the pipe location shown on the drawings

C. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.

D. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:

1. Irrigation Main Piping: 200 psig.
2. Circuit Piping: 150 psig.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated in the irrigation legend and written specifications. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Wiring Diagrams: For power, signal, and control wiring.

C. Qualification Data: Proof of any certifications from the Irrigation Association required as part of this specification.

1.6 INFORMATIONAL SUBMITTALS

A. Zoning Chart: Graphically identify the area served by each control valve.

B. Controller Programming Schedule: Indicate program settings for each automatic controller zone for each month of the year. Include general controller settings applicable to project conditions.

C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Action Submittals - submit the following at the beginning of the project:

1. Four (4) copies of Materials List of all products specified.
2. Four (4) copies of the Product Data or cut sheets of all products specified. The Owner shall permit no substitutions without written acceptance. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
3. Wiring Diagrams: For power, signal, and control wiring.

B. Informational Submittals

1. Coordination Drawings: Irrigation systems, drawn to scale, on which components are shown and coordinated with each other, using input from Installers of the items involved. Also include adjustments necessary to avoid plantings and obstructions such as signs and light standards.
2. Qualification Data: For qualified Installer.
3. Zoning Chart: Show each irrigation zone and its control valve.
4. Cutting and patching locations of existing concrete, as well as location and size of all borings.
5. Field quality-control reports.

C. Closeout Submittals – submit the following at project close-out:

1. Final Record Drawings: Two (2) paper sets of these shall be produced, one (1) for placement at or within the irrigation controller cabinet reduced to 11" x 17" and laminated and one (1) full size paper set for delivery to the Owner. One (1) digital format (PDF) file of the record drawings shall be delivered to the Owner.

a. Record drawings shall have the entire irrigation valve zone lateral lines color-coded so as to readily distinguish between adjacent zones. The valve size, station number and gallons per minute shall be legible at each valve and shall match how the controller is wired. Additionally, each valve shall be annotated to describe

which type of irrigation it is, i.e.: spray, rotor, bubbler, etc. The color-coded copies shall then be professionally laminated in 5 mil clear plastic.

b. Accurately record locations of all piping and equipment that varies from what is shown on the Drawings horizontally to within one foot (1') and vertically to within a half of a foot (0.5').

2. Operation and Maintenance Data: Submit two (2) copies of manufacturer's data for all irrigation equipment including, but not limited to, controllers, remote control valves, sprinklers, drip tubing, etc., the maintenance schedule and operational schedule in a three ring binder, labeled and indexed.
3. Turn-over Materials: Provide the following to the Owner:

a. One (1) Quick Coupler swivel hose key equipped with standard thread hose bib per every four (4) Quick Couplers installed on the project.
b. One (1) set of tools required for removing and adjusting each type of sprinkler and valve supplied for the project.
c. One (1) five foot (5') valve key for operation of gate valves.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers that include a licensed contractor qualified to install irrigation systems.

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

1.10 GUARANTEE

A. All work shall be guaranteed for compliance with the drawings and specifications for a period of one year from the date of substantial completion.

B. The contractor shall correct any deficiencies when notified during the warranty period, and additionally correct, to the satisfaction of the owner, any damage to buildings or grounds caused by the deficient work, at no additional expense to the owner. All guarantees shall be made in writing on the contractor's company letterhead.

1.11 DELIVERY, STORAGE, AND HANDLING

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

B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.12 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to the requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of water service.
2. Do not proceed with interruption of water service without Owner's written permission.

1.13 SCOPE

A. It is the intention of these specifications, together with the accompanying drawings to accomplish the work of installing a complete and fully functioning irrigation system which will operate in an efficient and satisfactory manner according to current industry irrigation standards.

B. The work consists of furnishing and installing a complete underground irrigation system as shown on the drawings and described in these specifications. Include all labor, equipment and materials, and perform all operations in connection with the installation of the irrigation system.

C. It will be the Contractor’s responsibility to report to the Owner’s representative and the Landscape Architect on Contractor company letterhead, any contradictions between the drawings, specifications, and site prior to submitting the bid in sufficient time to allow the issuance of an addendum to the bid documents. Failure to do so will require the Contractor, at no additional cost to the Owner, to include any replacements and/or relocations necessary to complete a fully functional installation in full compliance with the contract documents, when such conditions were identifiable prior to the bid.

D. Irrigation piping shown on the drawings are essentially diagrammatic. Locations of all sprinkler heads, valves, piping, wiring, etc. will be changed only with the permission of the Landscape Architect.

E. Do not combine differing plant materials or environments on the same zone. Each zone is to serve plants with similar water requirements and exposures.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

B. Galvanized-Steel Pipe: ASTM A 53/A 53M, Standard Weight, Type E, Grade B.

1. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Standard Weight, seamless-steel pipe with threaded ends.
2. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
3. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface, and female threaded ends.
4. Cast-Iron Flanges: ASME B16.1, Class 125.

C. Ductile-Iron Pipe with Mechanical Joints: AWWA C151, with mechanical-joint bell and spigot ends.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

D. Ductile-Iron Pipe with Push-on Joint: AWWA C151, with push-on-joint bell and spigot ends.

1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Gaskets: AWWA C111, rubber.

E. Soft Copper Tube: ASTM B 88, Type L, water tube, annealed temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

F. Hard Copper Tube: ASTM B 88, Type L, and ASTM B 88, Type M, water tube, drawn temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

G. PE Pipe with Controlled ID: ASTM F 771, PE 3408 compound; SIDR 11.5 and SIDR 15.

1. Insert Fittings for PE Pipe: ASTM D 2609, nylon or propylene plastic with barbed ends. Include bands or other fasteners.

H. PE Pipe with Controlled OD: ASTM F 771, PE 3408 compound, SDR 11.

1. PE Butt, Heat-Fusion Fittings: ASTM D 3261.
2. PE Socket-Type Fittings: ASTM D 2683.

I. PE Pressure Pipe: AWWA C906, with DR of 7.3, 9, or 9.3 and PE compound number required to give pressure rating not less than 200 psig.

1. PE Butt, Heat-Fusion Fittings: ASTM D 3261.
2. PE Socket-Type Fittings: ASTM D 2683.

J. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedules 40 and 80.

1. PVC Socket Fittings: ASTM D 2466, Schedules 40 and 80.
2. PVC Threaded Fittings: ASTM D 2464, Schedule 80.
3. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.

K. PVC Pipe, Pressure Rated: ASTM D 2241, PVC 1120 compound, SDR 21 and SDR 26.

1. PVC Socket Fittings: ASTM D 2467, Schedule 80.
2. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.

L. Flexible PVC Pipe: UVR, algae-resistant, S-0124 non-rigid PVC blend materials, Schedule 40.

1. PVC Socket Fittings: ASTM D 2466, Schedule 40.

M. Encasement/Sleeving for Piping: Schedule 40 PVC Socket Fittings and solvent-cemented joints.

N. Electrical Conduit: Gray PVC SCH40 Conduit, non-metallic above ground and underground UL Listed 3KA0, UA9AEB.

2.2 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656. For flexible PVC, use P-70 primer and IPS-795 cement. Do not use IPS-795 on standard PVC joints.

F. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.3 TRANSITION FITTINGS

A. General Requirements: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

B. Transition Couplings:

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

a. Cascade Waterworks Mfg. Co.
b. Ford Meter Box Company, Inc. (The).
c. JCM Industries, Inc.
d. Approved equal.

2. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.

C. Plastic-to-Metal Transition Fittings:

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

a. Harvel Plastics, Inc.
b. Spears Manufacturing Company.

c. Equal, as approved.

2. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-socket or threaded end.

D. Plastic-to-Metal Transition Unions:

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

a. Colonial Engineering, Inc.
b. NIBCO INC.
c. Spears Manufacturing Company.

2. Description: MSS SP-107, PVC four-part union. Include one brass or stainless-steel threaded end, one solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.

2.4 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

B. Dielectric Unions:

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

a. HART Industrial Unions, LLC.
b. WATTS.
c. Zurn Industries, LLC.

2. Description: Factory-fabricated union, NPS 2 and smaller.

a. Pressure Rating: 150 psig minimum at 180 deg F.
b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.

C. Dielectric Flanges:

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

a. Epco Sales, Inc.
b. WATTS.
c. Zurn Industries, LLC.

2. Description: Factory-fabricated, bolted, companion-flange assembly, NPS 2-1/2 to NPS 4 and larger.

    a. Pressure Rating: 150 psig minimum.
    b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Kits:

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

    a. Advance Products & Systems, Inc.
    b. Calpico, Inc.
    c. Central Plastics Company.
    d. Pipeline Seal and Insulator, Inc.

2. Description: Nonconducting materials for field assembly of companion flanges, NPS 2-1/2 and larger.

    a. Pressure Rating: 150 psig minimum.
    b. Gasket: Neoprene or phenolic.
    c. Bolt Sleeves: Phenolic or polyethylene.
    d. Washers: Phenolic with steel backing washers.

E. Dielectric Couplings:

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

    a. Calpico, Inc.
    b. Lochinvar, LLC.

2. Description: Galvanized-steel coupling.

    a. Pressure Rating: 300 psig at 225 deg F.
    b. End Connections: Female threaded.
    c. Lining: Inert and noncorrosive, thermoplastic lining.

F. Dielectric Nipples:

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

    a. Elster Perfection Corporation.
    b. Precision Plumbing Products.
    c. Victaulic Company.

2. Description: Electroplated steel nipple complying with ASTM F 1545.

a. Pressure Rating: 300 psig at 225 deg F.
b. End Connections: Male threaded or grooved.
c. Lining: Inert and noncorrosive, propylene.

2.5 MANUAL VALVES

A. Curb Valves:

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

a. Mueller Co. (basis of design).
b. Equal, as approved.

2. Description:

a. Standard: AWWA C800.
b. Body Material: Brass or bronze with ball or ground-key plug.
c. End Connections: Matching piping.
d. Stem: With wide-tee head.

B. Curb-Valve Casing:

1. Casing: 3-inch Schedule 40 PVC of length required for depth of burial of curb valve.
2. Casing Plug: Yellow with lettering “WATER”.

C. Shutoff Rods for Curb-Valve Casings: Furnish one steel, tee-handle shutoff rod with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve for Project.

D. Plastic Ball Valves:

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

a. NIBCO INC. (basis of design for flush valve assemblies).
b. Spears Manufacturing Company (basis of design for valve manifolds).
c. KBI (King Bros. Industries).

2. Description:

a. Body Material: PVC.
b. Type: Union and Single Piece.
c. End Connections: Socket or threaded.
d. Port: Full.

E. Bronze Gate Valves:

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

    a. Griswold (basis of design)
    b. NIBCO INC (basis of design).
    c. Equal, as approved.

2. Description:

    a. Standard: MSS SP-80, Type 2.
    b. CWP Rating: 200 psig.
    c. Body Material: ASTM B 62 bronze with integral seat and screw-in bonnet.
    d. Ends: Threaded or solder joint.
    e. Stem: Bronze, nonrising.
    f. Wedge: Solid wedge; bronze.
    g. Handwheel: Malleable iron, bronze, or aluminum.

F. Manual Drain Valves:

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

    a. Mueller Co. (basis of design).
    b. Equal, as approved.

2. Description:

    a. Standard: AWWA C800.
    b. Body Material: Brass or bronze with ball or ground-key plug.
    c. End Connections: Matching piping.
    d. Stem: With wide-tee head.

2.6 AUTOMATIC CONTROL VALVES

A. Plastic, Automatic Control Valves:

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

    a. Hunter Industries Incorporated.
    b. Rain Bird Corporation
    c. Approved Equal.

2. Description: Molded-plastic body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.

2.7 QUICK COUPLERS

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

1. Hunter Industries Incorporated
2. Rain Bird Corporation
3. Toro Company
4. Approved equal.

B. Description: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key. Purple cap.

2.8 BOXES FOR AUTOMATIC CONTROL VALVES

A. Plastic Boxes:

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

a. Oldcastle, Inc.
b. Approved equal.

2. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.

a. Size: As required for valves and service.
b. Shape: Rectangular.
c. Sidewall Material: PE, ABS, or FRP.
d. Cover Material: PE, ABS, or FRP.

2.9 BOXES FOR AUTOMATIC AND MANUAL VALVES

A. Plastic Boxes:

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

a. Oldcastle, Inc.
b. Approved equal.

2. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.

a. Size: As required for valves and service.
b. Shape: Round.
c. Sidewall Material: PE, ABS, or FRP.
d. Cover Material: PE, ABS, or FRP.

B. Drainage Backfill: Cleaned gravel or crushed stone, graded to 3/4-inch maximum.

2.10 BOXES FOR PULL BOXES, SPARE WIRES, AND GROUNDING ROD

A. Plastic Boxes:

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

    a. Oldcastle, Inc.
    b. Approved equal.

2. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.

    a. Size: As required for valves and service.
    b. Shape: Round.
    c. Sidewall Material: PE, ABS, or FRP.
    d. Cover Material: PE, ABS, or FRP.

2.11 SPRINKLERS

A. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.

B. Plastic, Pop-up Spray Sprinklers:

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

    a. Hunter Industries Incorporated (basis of design).
    b. Rain Bird Corporation.
    c. Approved Equal.

2. Description:

    a. Body Material: ABS.
    b. Retraction Spring: Stainless steel.
    c. Internal Parts: Corrosion resistant.
    d. Pattern: Fixed, with flow adjustment.
    e. Automatic Matched Precipitation.

3. Capacities and Characteristics:

    a. Nozzle: High Efficiency, Color Coded, Wind Resistant, Distribution Uniformity.
    b. Flow: Varies.
    c. Pop-up Height: 6 inches aboveground to nozzle.
    d. Arc: 45-360 Degrees.
    e. Radius: Varies.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 31 2000 "Earth Moving."

B. Trenches shall be a minimum of 12 inches away from buildings, curbs, and sidewalks, and a minimum of 36 inches away from vehicle access pathways.

C. Where multiple pipes are to be installed in the same trench, each pipe shall be separated by a minimum distance of 4 inches.

D. Install detector metallic tape directly above pressure piping, as indicated on Drawings.

E. Provide minimum cover over top of underground piping according to the following:

1. Irrigation Main Piping: Not less than 18 inches below finished landscapes area grades, and not less than 36 inches below finished hardscape elevations.
    1) Install Irrigation Main Piping in bedding sand as indicated on drawings.

2. Circuit Piping: Not less than 12 inches below finished landscaped area grades, and not less than 24 inches below finished hardscape elevations.
3. Sleeves: Not less than 36 inches below finished hardscape elevations.

3.2 PREPARATION

A. Set stakes to identify locations of proposed irrigation system. Obtain Landscape Architect's approval before excavation.

B. Coordinate and install sleeves and conduits prior to placement of hardscape surfaces.

1. Sleeves for water lines shall be 4" minimum diameter and at least twice the size of the piping contained in the sleeve. Contractor shall attach a locating magnet in both ends of the sleeve and mark the location on an as-built drawing. Where sleeves are buried under hardscape, Contractor shall mark the location of each sleeve by installing a magnetized masonry nail, flush with the hardscape, indicating the location of each end of the sleeve.
2. Provide conduit as follows:

    a. (1) one separate 3/4" conduit for master valve wire from Hydrometer valve to controller.
    b. (1) one separate 3/4" conduit for flow sensing cable from Hydrometer to controller.
    c. (1) one 3/4" conduit for up to 5 wires
    d. (1) one 1" conduit for up to 8 wires.
    e. (1) one 1 1/4" conduit for up to 15 wires.
    f. (1) one 1 1/2" conduit for up to 20 wires.
    g. (1) one 2" conduit for up to 30 wires.
    h. (1) one 2 1/2" conduit for up to 35 wires.
    i. (1) one 3" conduit for up to 40 wires.

3.3 PIPING SCHEDULE

A. Install components having pressure rating equal to or greater than system operating pressure.

B. Piping in control-valve boxes and aboveground may be joined with flanges or unions instead of joints indicated.

C. Aboveground irrigation main piping, NPS 4 and smaller, shall be the following:

1. Galvanized-steel pipe and galvanized-steel pipe nipples; galvanized, gray-iron threaded fittings; and threaded joints.

D. Underground irrigation main piping, NPS 2 and smaller, shall be the following:

1. Schedule 40, PVC pipe and socket fittings, and solvent-cemented and/or threaded joints.

E. Underground irrigation main piping, NPS 2-1/2 to NPS 4, shall be one of the following:

1. Schedule 80 PVC pipe, Schedule 80 socket and/or threaded PVC fittings, and solvent-cemented and/or threaded joints.

F. Circuit piping, NPS 2 and smaller, shall be the following:

1. Schedule 40 PVC pipe, Schedule 40 socket fittings, and solvent-cemented joints.

G. Circuit piping, NPS 2-1/2 to NPS 4, shall be one of the following:

1. Schedule 40 PVC pipe, Schedule 80 socket and/or threaded fittings, and solvent-cemented and/or threaded joints.

H. Underground Branches and Offsets at Sprinklers: Schedule 40 PVC pipe, 1/2-inch diameter flexible swing pipe, Schedule 40 PVC socket fittings, and solvent-cemented joints.

1. Option: Plastic swing-joint assemblies, with offsets for flexible joints, manufactured for this application.

I. Risers to Aboveground Drip Specialties: Schedule 40 PVC pipe, Schedule 40 PVC socket fittings, and solvent-cemented joints.

J. Manual drain valve piping shall be the following:

1. Schedule 40 PVC pipe with Schedule 80 PVC socket fittings, Schedule 80 Slip x MIPT toe nipples, and solvent-cemented joints on the upstream side of the drain valve.

3.4 PIPING INSTALLATION

A. Location and Arrangement: Drawings indicate approximate location and diagrammatic arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.

B. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.

C. Install piping free of sags and bends.

D. Install groups of pipes parallel to each other, spaced a minimum distance of 4” between each pipe. NO EXCEPTIONS will be considered for this requirement.

E. Install fittings for changes in direction and branch connections.

F. Install unions adjacent to valves and to final connections to other components with NPS 2 or smaller pipe connection.

G. Install flanges adjacent to valves and to final connections to other components with NPS 2-1/2 or larger pipe connection.

H. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.

I. Install water regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet. Install aboveground or in control-valve boxes.

J. Install piping in sleeves under parking lots, roadways, sidewalks, and hardscapes.

K. Install transition fittings for plastic-to-metal pipe connections according to the following:

1. Underground Piping:

a. NPS 1-1/2 and Smaller: Plastic-to-metal transition fittings.
b. NPS 2 and Larger: AWWA transition couplings.

2. Aboveground Piping:

a. NPS 2 and Smaller: Plastic-to-metal transition fittings.
b. NPS 2 and Larger: Use dielectric flange kits with one plastic flange.

L. Install dielectric fittings for dissimilar-metal pipe connections according to the following:

1. Underground Piping:

a. NPS 2 and Smaller: Dielectric coupling or dielectric nipple.
b. NPS 2-1/2 and Larger: Prohibited except in control-valve box.

2. Aboveground Piping:

a. NPS 2 and Smaller: Dielectric union.
b. NPS 2-1/2 to NPS 4: Dielectric flange.
c. NPS 5 and Larger: Dielectric flange kit.

3. Piping in Control-Valve Boxes:

a. NPS 2 and Smaller: Dielectric union.
b. NPS 2-1/2 to NPS 4: Dielectric flange.
c. NPS 5 and Larger: Dielectric flange kit.

3.5 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Flanged Joints: Select rubber gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

E. Ductile-Iron Piping Gasketed Joints: Comply with AWWA C600 and AWWA M41.

F. Copper-Tubing Brazed Joints: Construct joints according to CDA's "Copper Tube Handbook," using copper-phosphorus brazing filler metal.

G. Copper-Tubing Soldered Joints: Apply ASTM B 813 water-flushable flux to tube end unless otherwise indicated. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.

H. PE Piping Fastener Joints: Join with insert fittings and bands or fasteners according to piping manufacturer's written instructions.

I. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
3. PVC Nonpressure Piping: Join according to ASTM D 2855.

3.6 VALVE SCHEDULE

A. Underground, Shutoff-Duty Valves: Use the following:

1. NPS 2 and Smaller: Curb valve, curb-valve casing, and shutoff rod.
2. NPS 3 and Larger: Iron gate valve, resilient seated; iron gate valve casing; and operating wrench(es).

B. Aboveground, Shutoff-Duty Valves:

1. NPS 2 and Smaller: Brass or bronze ball valve.
2. NPS 2-1/2 and Larger: Iron ball valve.

C. Drain Valves:

1. NPS 1 to NPS 2: Brass or bronze ball valve.

3.7 VALVE BOX INSTALLATION

A. Install valve boxes at the nearest landscaped area approximately where shown on the drawings. In planting beds, install no closer than three feet from sidewalks, curbs, and all hard surface areas unless specifically indicated otherwise. Where three feet clearance from hardscape is not possible, locate the valve box as far as is practical from areas of vehicular traffic. Coordinate box placement with plant locations to break up groupings of boxes and

screen them from casual view. In lawn areas, install no further than 12 inches from sidewalks or other hard edges.

1. Top of valve box shall be flush with finish grade. Valve box extensions are not allowed. Set valve boxes on a base of 3/4-inch gravel and ensure valve boxes are level and plumb.
2. Provide a 2” clearance between irrigation equipment within the valve box and the gravel sump and a 2” clearance between the top of the irrigation equipment within the valve box and the valve box lid.
3. No extra cuts other than the pre-cut pipe holes provided by the manufacturer will be allowed unless specifically approved in writing by the Landscape Architect.
4. Place filter fabric between existing subgrade and backfill with cleaned gravel or crushed stone, graded from #8 to ¾”, to 6 inches deep below base of valve box. Cover gravel or crushed stone with filter fabric and backfill remainder with excavated material.
5. With the exception of drain valves, do not install valve boxes at the low point of the irrigation system.
6. Brand valve box lids according to the branding instructions under the “Identification” Article.

B. Provide pull boxes at every major change of direction for irrigation wire as necessary for continuous uncut irrigation wires from controller to final destination locations.

C. Install spare wire boxes at the ends of each and every separate length of pressure supply line, providing two separate electric wires and one common wire extending from the controller to each spare wire box.

3.8 VALVE INSTALLATION

A. Aboveground Valves: Install as components of the connected piping system.

B. Underground Curb Valves: Install in curb-valve casings with tops flush with grade.

C. Underground Iron Gate Valves, Resilient Seat: Comply with AWWA C600 and AWWA M44. Install in valve casing with top flush with grade.

1. Install valves and PVC pipe with restrained, gasketed joints.
2. Install valves and PVC pipe with push-on gasketed joints and thrust-blocking.

D. Underground Manual Valves: Install as components of the pressure piping system, inside of rectangular or round valve boxes.

E. Underground Quick Coupler Valves: Install as components of the pressure piping system and electric control valve manifolds, inside of a round valve box.

F. Underground Electric Control Valves: Install as components of the pressure piping system, inside of rectangular valve boxes. Install each valve using schedule 80 piping on both the upstream and downstream sides to extend beyond the valve box. Provide identification tag indicating the controller and station number. Install two valves in each box except for 1-1/2” and 2” valves, which shall be installed 1 valve per box.

G. Air Release Valves: Install at all high points of the pressure supply line in a separate valve box at the nearest landscaped area approximately where shown on drawings and as shown in the irrigation details according to manufacturer’s specifications.

H. Manual Drain Valves: Install at all low points of the pressure supply line in a separate valve box at the nearest landscaped area approximately where shown on drawings and as shown in the irrigation details according to manufacturer's specifications.

1. Provide an appropriately sized PVC Schedule 40 stack from drain valve location to 2" below lid of valve box.
2. Install 3/4" x #8 washed gravel drainage sumps directly under each drain valve according to the table below:

3.

CUBIC FEET OF GRAVEL PER DRAIN				
Pipe Size (in inches)	Pipe Length			
	0-250 LF	250-500 LF	500-750 LF	750-1000 LF
1"	.75	1.5	2.25	3.0
1 1/2"	1.5	3.0	4.5	6.0
2"	2.5	5.0	7.5	10.0
2 1/2"	4.0	8.0	12.0	16.0
3"	6.0	12.0	18.0	24.0
4"	11.0	22.0	33.0	44.0
6"	25.0	50.0	50.0	50.0
8"	40.0	50.0	50.0	50.0
10"	50.0	50.0	50.0	50.0

3.9 CONNECTIONS

A. Comply with requirements for piping specified in plumbing specifications for water supply from exterior water service piping, water meters, protective enclosures, and backflow preventers. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.

C. Connect wiring between controllers and automatic control valves.

3.10 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 22 0553 "Identification for Plumbing Piping and Equipment."

B. Valve Identification Tags: All valves shall be tagged with approved tag indicating the appropriate controller and station number.

C. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground pressure supply line piping during backfilling of trenches. See Section "Earth Moving" or "Trenching" for warning tapes.

D. Valve Box Branding: Each valve box shall be branded to a minimum depth of 1/8" with equipment capable of professional, consistent, 1" high lettering similar to Nova Tool Companies "Valve Box Brander". Lettering shall be as follows:

1. Air Relief Valve: 'ARV'
2. Manual Drain Valve: 'MDV'

3. Manifold Isolation Valve: ‘MAN’
4. Pressure Supply Isolation Valve: ‘ISO’
5. Electric Control Valve: Brand with the appropriate station number
6. Flush Valve Assembly: ‘FVA’
7. Pull Box: ‘PB’
8. Spare Wire Box: “SW’
9. Reclaimed Water. “R”

3.11 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. See line 1.2, Construction Inspections and Post-Construction Inspections of this Specification Section and the below.

2. Pressure Test: After installation of all valves and equipment connecting to pressure supply line, charge the system with 40 psi greater than the designated static water pressure or 150 psi, whichever is greater, and install a pressure gauge at the point of connection to be under constant static water pressure for a period of not less than 2 hours. The contractor is responsible for notifying the Owner’s representative and the Landscape Architect.

3. Preliminary Test: After installation of each new piping circuit, including swing pipe, and prefabricated swing joints, but before installation of irrigation heads and before trenches have been completely backfilled, the control valve shall be opened fully and a full head of water used to flush out the system. Each control valve shall then be disassembled, inspected for rocks, cleaned, and reassembled. Install irrigation heads and test each zone for complete coverage. This test shall occur again after completion of the entire system.
4. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.

5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
6. Substantial Completion Walk-Through: To prepare for this walk-through, the Contractor shall have all lids located off of the valve box and placed adjacent to the valve box for which they belong so that all branding of valve box lids is fully visible. The Contractor shall deliver final redline as-built drawings and controller charts to the Landscape Architect for review and final drafting prior to beginning the walk-through. The walk-through for Substantial Completion shall consist of two parts:

    a. Physical Walk-through: During this walk-through a comparison of each valve box and corresponding irrigation components will be made with the irrigation drawings and details noting conformance or lack thereof.
    b. Operational Walk-through: Once the physical walk-through is completed, the entire irrigation system will be tested for operational conformance to the drawings by

having the Contractor's employee turn on each station using the automatic controller in sequence as requested by the Landscape Architect, noting sequential and operational conformance to the drawings including head and row spacing, emitter and drip tubing spacing, master valve and flow sensing operation and irrigation programming for each station. Upon completion, the Landscape Architect will provide a written punch list of items needing adjustment, replacement and/or repair and it will be the Contractor's responsibility to completely remedy the punch list provided prior to requesting a final walk-through or beginning the maintenance period.

7. Final Completion Walk-Through: After successfully completing all outstanding items on the Substantial Completion punch list provided by the Landscape Architect, the Landscape Architect and the Contractor will review compliance in the same manner described above.

D. Any irrigation product will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.12 WINTERIZATION

A. If walk-through for substantial completion certificate has not been issued by October 15th, or the first freeze, it will be the responsibility of the contractor to work with the Owner's representative to arrange winterization of the system. The contractor will then be responsible for assisting the Owner's maintenance personnel in activating the irrigation system the following spring to insure irrigation system meets the required performance standards.

3.13 IRRIGATION MAINTENANCE

A. Adjust settings of controllers to utilize full functionality of all programming features. Adjust watering times as necessary for plant establishment without excessive use of water.

B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.

C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than 1/2 inch above, finish grade.

D. Adjust nozzles to achieve the correct arc and radius and to eliminate overspray onto hardscape.

3.14 MAINTENANCE SERVICE

A. Maintenance Service: Provide maintenance by skilled employees of irrigation Installer. Maintain as required in "Irrigation Maintenance" Article. Begin maintenance immediately after irrigation system is installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period: 90 days from date of Substantial Completion.
2. If a portion of the maintenance period would fall between the dates of October 15 and April 15, the maintenance period will be suspended until April 15th, at which time it will re-start and continue until the full 90 days have elapsed.

END OF SECTION 32 8400

SECTION 32 9113 - SOIL PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Furnish all material, labor, transportation, equipment and property to complete the soil preparation for all planting areas.

1.3 SUBMITTALS

A. At least 30 days prior to ordering materials, the Contractor shall submit to the Project Manager representative samples, certifications, manufacturer's literature and certified test results for all materials as specified below. No materials shall be ordered or delivered until the required submittals have been reviewed and stamped approved by the Project Manager. Delivered materials shall match the approved samples.

B. Approval shall not constitute final acceptance. The Project Manager reserves the right to reject, on or after delivery, any material that does not meet these Specifications.

C. List of submittals required.

1. Agricultural Soil Analysis Testing Results for Topsoil
2. Literature on Fertilizers and additives
3. Sample of topsoil and soil analysis testing results
4. Sample of compost and testing results

1.4 QUALITY ASSURANCE

A. The following standards apply to the work of this Section:

1. AOAC: Association of Official Agricultural Chemists.
2. ASA: Methods of Soils Analysis, American Society of Agronomy, Soil Science Society of America, Inc., Madison Wisconsin, latest edition.
3. American Society for Testing and Materials (ASTM).
4. All applicable local codes and regulations.

B. It is the intent of this specification that all materials herein specified and shown on the drawings shall be of the highest quality available and meeting the requirements specified.

C. The work of this Section shall be performed by a Contracting firm that has successfully installed work of a similar quality, schedule requirement, and construction detailing with a minimum of five (5) years' experience.

D. All work shall be performed in accordance with the best standards of practice relating to the trade and under the continuous supervision of a competent foreman capable of interpreting the Drawing and Specifications.

E. Soil shall not be worked when moisture content is so great that excessive compaction occurs, nor when it is so dry, that dust will form in air or that clods will not break readily. Water shall be applied, if necessary, to provide ideal moisture content for tilling and for planting.

F. All accumulated debris and rubbish shall be cleaned up and removed from the site before commencing work. Clear and grub all dead vegetative matter. The site shall be weed free prior to proceeding with any work.

G. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

H. Topsoil Analysis: Furnish a soil analysis for each planting soil mix specified in this section by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.

PART 2 - PRODUCTS

1.5 **TOPSOIL**

A. Topsoil shall be of uniform quality, free from subsoil stiff or lumpy clay, hard clods, hardpan, rocks, disintegrated debris, plants, roots, seeds, and any other materials that would be toxic or harmful to plant growth. Topsoil shall contain no noxious weeds or noxious weed seeds.

B. Topsoil shall meet all specifications below for the “Ideal” or “Acceptable” categories. Soil that falls within the “Not-Acceptable” range shall not be used.

C.

D.

E.

TOPSOIL QUALITY*

Category	pH	Soluble Salts dS/m or mmho/cm	Sodium Absorption Ratio (SAR)	Organic Matter %	Sand %	Silt %	Clay %	Texture Class
Ideal	5.5-7.5	<2	<3	≥2.0	<70	<70	<30	Loam (L), Silt Loam (SiL)
Acceptable	5.0-8.2	<4	3 to 7 SiL, SiCL, CL 3 to 10 SCL, SL, L	≥1.0	<70	<70	<30	Sandy Clay Loam (SCL) Sandy Loam (SL) Clay Loam (CL) Silty Clay Loam (SiCL)

Not-Acceptable	<5.0 >8.2	>4	>10	<1.0	≥70	≥70	≥30	Loamy Sand (LS) Sandy Clay (SC) Silty Clay (SiC) Sand (S), Silt (S), Clay (C)

COARSE FRAGMENTS*

Category	%>2 mm (>5.0% exceeds guidelines)	Rocks Present >1.5" (>1.5" exceeds guide-lines)
Ideal	□2.0	—
Acceptable	2.1-5.0	—
Not-Acceptable	>5.0	—

TOPSOIL NUTRIENT SPECIFICATION*

	Nitrate Nitrogen ppm	Phosphorus ppm	Potassium ppm	Iron ppm
Ideal / Acceptable	>20	>15	>150	>10

*from “Topsoil Quality Guidelines for Landscaping”, June 2002, AG/SO-02, prepared by Rich Koenig, Utah State University Cooperative Extension Soil Specialist, and Von Isaman, QA Consulting and Testing, LLC.

F. Mechanical Analysis shall be performed and shall conform to ANSI/ASTM D 422. QUALITY ASSURANCE.

1.6 **COMPOST**

A. Compost shall meet all specifications below for either “Ideal” or “Acceptable” categories. Compost that falls within the “Not-Acceptable” range shall not be used.

B.

COMPOST QUALITY GUIDELINES FOR LANDSCAPING*

	pH	Soluble Salts dS/m	Sodium Absorption Ratio (SAR)	Carbon:Nitrogen Ratio (C:N)%	Moisture%	≥ 98% Coarse Material Passing (dry weight basis)
Ideal	6 to 8	≤5	<10	≤20:1	25 to 35	3/8”
Acceptable	5-6, 8-9	≤10	≤20	21:1 to 30:1	<25, >35	3/4”

Not-Acceptable	<5.0, >9.0	>10	>20	<10:1, >30:1	<20, >50	<98% 3/4”

*Von Isaman MS, Pres. Of QA Consulting and Testing, LLC., Dr. Rich Koenig, Utah State University Cooperative Extension Soils Specialist, and Dr. Teresa Cerny, USU Cooperative Extension Horticulturalist, 3 March 2003.

1.7 **FERTILIZER AND ADDITIVES**

A. Required fertilizer and additives shall be determined by the Agricultural Soil Analysis.

B. Fertilizer shall be furnished in bags or other standard containers with name, weight, and guaranteed analysis of contents clearly marked thereon.

C. Chemical fertilizers shall be a mixed commercial fertilizer conforming to FS O-F-241 D, Type I, with percentages of nitrogen, phosphoric acid, and potash at 5-10-5 and 16-16-8. The combined N-P-K content shall be following percentages of total weight: 5 percent nitrogen 10 percent phosphoric acid and 5 percent potash. Fertilizers shall be uniform in composition, dry, and free flowing.

PART 3 - EXECUTION

1.8 **TOPSOIL TESTING**

A. PRIOR to placement of topsoil, an Agricultural Soil Analysis shall be performed for the existing and/or proposed topsoil conditions.

B. The landscape work shall not begin until all other trades have repaired all areas of settlement, erosion, rutting, etc., and the soils have been re-established, re-compacted, and refinished to finish grades. The L.A. shall be notified of all areas which prevent the landscape work from being executed.

C. Areas requiring grading by the landscape contractor including adjacent transition areas shall be uniformly level or sloping between finish elevations to within 0.10-ft above or below required finish elevations.

D. The landscape work shall not proceed until after walks, curbs, pavings, edging, and irrigation systems are in place. The contract operations shall be completed to a point where the landscape areas will not be disturbed. The subgrade shall be cleaned free of waste materials of all kinds.

E. During grading, waste materials in the planting areas such as weeds, rocks (1 inches and larger) building materials, rubble, wires, cans, glass, lumber, sticks, hazardous materials etc., shall be removed from the site. Weeds shall be dug out by the roots.

F. Fertilizers, additives, compost, etc. subject to moisture damage shall be kept in a weatherproof storage place in such a manner that they will be kept dry.

G. Finish subgrade and topsoil placement and grading shall consist of:

1. Prepare subgrade by rough grading and removing all irregularities and debris. Dig subgrade down as required in shrub beds and turf areas for the placement of topsoil. Provide laser leveling on large flat areas to create a uniform level subgrade.
2. Planting areas shall have all road base and other debris removed prior to placement of topsoil. Subgrade soil shall be in a loosened and rough surface finish before topsoil is placed over subgrade. (Sub-grade surface shall not be smooth, but a rough surface shall exist for a transition zone of topsoil to subsoil.) If areas of subgrade become compacted before topsoil is placed, subgrade shall be tilled again before topsoil placement.
3. Placing all amendments, soil additives and fertilizers for the areas as per the topsoil report and mixing amendments into topsoil.
4. Adding amendments (compost, & fertilizers) and thoroughly mixing amendments by mechanical means to produce evenly mixed amended topsoil prior to placement topsoil.
5. Till lawn and planting area subsoil's and topsoil's that are compacted.
6. After tilling or placement of topsoil, bring areas to uniform grades by floating and/or hand raking. In large open level areas, perform laser leveling to create uniform level areas.
7. Make minor adjustment of finish grades as directed by the project manager.
8. Remove waste materials over 1" in size such as stones, roots, or other undesirable foreign materials and finish raking, dishing, dragging, and smoothing soil ready for planting.
9. No grading or soil placement shall be undertaken when soils are wet or frozen

H. Any unusual subsoil condition that will require special treatment shall be reported to the L.A.

I. Topsoil shall be uniformly distributed over all areas where required. Subgrade and topsoil shall be damp and free from frost.

J. Surface drainage shall be provided as shown by molding the surfaces to facilitate the natural run-off of water. Low spots and pockets shall be filled with topsoil and graded to drain properly.

K. Finish grade for sodded areas shall be 2 inches below finish grade of adjacent pavement. Finish grade (top of bark mulch) shrub bed areas shall be 1 inches below finish grades of adjacent pavement.

L. Topsoil shall be backfilled in lifts of no more than six inches (6"). Compact each lift by foot tamping to 95% prior to placing next layer of backfill. For irrigation trenches, settle trenches with water during backfill operations.

1.9 FINE GRADING

A. When rough grading, weeding, soil preparation have been completed, and soil has been thoroughly water settled, all planting areas should be smoothly graded, ready for placement of plant materials.

B. Fine grading shall be done when soil is at optimum moisture content.

C. Finish grades shall be smooth, even and on a uniform plane with no abrupt changes of surface. The finish grade shall not vary more than one half inch (1/2") in ten feet (10') from the required line, and grade set forth in the Drawings. Adjustments of finish grades shall be made at direction of Project Manager as required.

D. Finish grade of soil in all turf areas shall be one inch (1") below all paved surfaces before laying sod.

END OF SECTION 32 9113

SECTION 32 9200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sodding.
2. Turf renovation.
3. Erosion-control material(s).

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 32 9113 "Soil Preparation and drawing designations for planting soils.

E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

F. Date of final acceptance certificate by Salt Lake County: The point in time when the Work is sufficiently complete, in accordance with the Contract Documents, that the County can occupy or use the Work for its intended purpose.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Product Certificates: For fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by County for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Three years' experience in turf installation.
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

    a. Landscape Industry Certified Technician - Exterior.
    b. Landscape Industry Certified Lawncare Manager.
    c. Landscape Industry Certified Lawncare Technician.

5. Pesticide Applicator: State licensed, commercial.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.8 FIELD CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial establishment periods to provide required maintenance from date of planting completion.

1. Spring Planting: 15 March.
2. Fall Planting: 15 October.
3. Days considered for the establishment period must be conducive to the growth and establishment of the sod and not non-growing seasonal months.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

A. Turfgrass Species: Bluegrass Sod

1. Sod specifications include but are not limited to:

a. Shall be grown from a 10 seed blend utilizing at least 6 highly-rhizomatous cultivars that exceed normally accepted industry criterion. Shall be rated highly wear-tolerant, have strong living color, be disease resistant, with strong leaf texture and early spring and late fall green color.
b. Shall contain no rye grass cultivars.
c. Shall have a maximum 50# per acre seeding rate.
d. Shall have a minimum one year root base with strong rhizome development.
e. Shall be certified noxious weed free.
f. Shall be Water Wise TurfTM as grown by a Water Wise CertifiedTM grower.

1) Shall require no more than 30” annual supplemental water during establishment and no more than 20” annual supplemental water after establishment.
2) Shall contain a strong root base capable of root penetration to a minimum depth of 8” into landscape soil.

g. Growing medium shall be a sandy soil (75% sand, 17% silt, 8% clay) with low clay content.
h. Shall be grown without netting.
i. Shipping mow height shall be 1-1/2”.

2.2 TOP DRESSING:

A. Top dressing: 1 part topsoil and 1 part clean sand, fertile, friable, and of fine texture, free of sub-soil, stones, lumps, clods, sticks, weeds, roots, or other extraneous materials.

1. Top dressing shall not be installed while site conditions are frozen or muddy.

2.3 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Fertilizer shall be a complete mixture, analyzing sixteen (16)% Nitrogen; sixteen (16)% Phosphoric Acid; and eight (8)% Pot Ash, of commercial type and applied at a rate of six (6) pounds per thousand (1000) square feet of area.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.4 PESTICIDES

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.5 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 incheslong.

B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 incheslong.

C. Erosion-Control Mats: Cellular, non-biodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of 4-inchnominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

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

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Project Manager and replace with new planting soil.

3.2 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. All areas of fill, i.e., trenches, mounds, etc., shall be compacted and settled as specified in the Grading and excavation of sprinkler irrigation sections of this project before any topsoil is placed on areas to be sodded.

B. Remove weeds before sodding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

C. Before topsoil is spread, the sub-grade shall be scarified to a depth of four (4) inches to ensure proper bonding with applied topsoil if it has been compacted due to weather or equipment. The area shall be leveled, weeded and raked free of stones larger than one half (1/2") inch in diameter and other debris.

D. Topsoil shall be spread to a depth of four (4) inches or as directed by the Project Manager.

E. Any existing topsoil used in sodded areas shall be loosened and pulverized to a depth of four (4) inches and all stones over one (1) inch in any dimension, sticks, roots, rubbish, or other extraneous matter, shall be removed from the premises. The surface will be fine graded so that when settled, the surface is free from depressions or ridges and will conform to the required grades indicated. The surface shall be smooth, loose, and of uniformly fine texture at the time of installation.

F. Any areas containing new topsoil shall be rolled by a hand roller on small areas. After rolling at a weight of 150-200 pounds per linear foot of roller, the bed shall again be graded to the specified grade with a smooth surface. Large areas shall be final graded by passing a land plane in three different directions over the entire area to be planted.

G. New turf shall be installed so that the finished grade shall be one-half (1/2) inch below the top of adjacent paving.

H. The Contractor shall prepare no more ground than can be sodded in a twenty-four (24) hour period. Sod shall be placed within 24 hours of ground preparation. The ground shall be re-prepared if weather or traffic has compromised the friability of the prepared area.

I. No sodding shall be done immediately after a rain storm of if a prepared surface has been compacted without first loosening the surface to a smooth, loose, uniformly fine texture just prior to sodding.

J. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

K. The specified fertilizer shall be applied and incorporated into the upper four (4) inches of topsoil at a rate of six (6) pounds per thousand (1000) square feet.

L. Before planting, obtain Project Manger's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SOD AVAILABILITY AND CONDITION

A. The Contractor shall satisfy himself as to the existing conditions prior to any construction. The Contractor shall be fully responsible to furnish and lay all sod required on the plans. He shall furnish new sod as specified above and lay it so as to completely satisfy the intent and meaning of the plans and specifications at no extra cost to the County.

B. In the case of any discrepancy in amount of sod to be removed or amount to be used, it shall be the contractor's responsibility to report such to the Project Manager prior to commencing the work.

C. Any condition of the sod that shall prevent it from being lifted shall also be reported to the Project Managers. This shall not relieve the Contractor of the responsibility of removing the sod necessary to complete the project.

3.6 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy. No sod shall be stored on the site for longer than two (2) days. Sod that becomes yellow, dry, or broken, shall be removed from the site by the Contractor at his expense.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. No partial strip or pieces will be accepted. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. All work shall be done from boards laid on top of the prepared surface or on already laid sod. Care shall be taken to prevent foot prints or other disturbances to the prepared bed, other than absolutely necessary. Any such disturbances shall be promptly repaired so that the sod will be laid on a proper bed to insure the necessary bonding between it and the sod.
2. Lay sod across slopes exceeding 1:3.

3. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. See table below for recommended watering amounts for the first month after installation:

D.

Week	1st	2nd	3rd	4th
How often to water	Every Day	Every Other Day	Every Third Day	Every Fourth Day
April	*			
May	*	1/3	1/2	2/3
June	1/4	1/2	2/3	3/4
July	1/4	1/2	2/3	3/4
August	1/4	1/2	3/4	1
September	*	1/3	1/2	2/3
October	*			
	*Apply ¼ of an inch as needed			

3.7 SOD LIFTING

A. All sod shall be removed from areas of construction (i.e., where walks, concrete slabs, buildings, etc., will be built) prior to excavation and other operations or when sod lifting is specified.

B. Prior to beginning to lift any large quantities of sod, the Contractor shall notify the Project Manager in sufficient time for notification of the Park Maintenance Personnel, so that they can schedule the removal of the sod from the site to lay at another park site.

C. When the sod is to be used by the Park Maintenance Personnel, as specified on the plans, the sod pieces shall be cut by a mechanical sod cutter into uniform pieces with square comers. Individual pieces shall not exceed sixteen (16) inches wide and forty-eight (48) inches long or the current standards size of the sodding industry. All sod shall be cut to a thickness of no more than one and one-quarter (1-1/4) inches, but no less than the sodding industry standards.

3.8 TOP DRESSING

A. All areas which are sodded shall be top dressed with the top dressing specified above during or at the end of the establishment period to fill in noticeable gaps between seams. The top dressing shall be first applied by spreading it over the sod and then carefully working it into the joints with a stiff brush or mat.

B. All sodded areas shall be thoroughly watered after the top dressing is applied. Watering must be done carefully so as to avoid puddling or washing. Further work shall be curtailed until the area is dried sufficiently to allow sodding continuance without damage to already laid sod or the prepared bed.

3.9 TURF RENOVATION

A. Renovate existing turf where indicated.

B. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off County's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 4 inchesof existing soil. Install new planting soil to fill low spots and meet finish grades.

J. Water newly planted areas and keep moist until new turf is established.

3.10 TURF ESTABLISHMENT

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, re-grade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inchper week unless rainfall precipitation is adequate.
3. The Contractor shall submit a watering schedule to the Project Manager.

C. Mow turf as soon as top growth is tall enough to cut, no higher than 3 inches. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Kentucky bluegrass to a height of to 2 inches.

D. Turf Post-fertilization: Apply commercial fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft.to turf area.

E. Turf Establishment Service: Provided by skilled employees of landscape Installer. Maintain as required in "Acceptable Turf Establishment," article 3.11. Begin establishment services immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:

1. Sodded Turf: 30 days from date of planting completion.

3.11 ACCEPTABLE TURF ESTABLISHMENT

A. The Contractor shall be responsible for all sodded and seeded areas during the Turf Establishment period. The Establishment Period shall begin at the time sodding or seeding for the entire project is completed and continues until all turf meets establishment criteria.

B. Turf installations shall meet the following criteria as determined by the Project Manager before Acceptance of Turf and date of final acceptance certificate by Salt Lake County will be issued in writing:

1. Acceptable Seeded Turf: Turf Establishment shall be achieved when the turf is a healthy, uniform, close stand of grass, free of weeds and surface irregularities, with coverage exceeding 95 percent over any 10 square foot areaand bare spots not exceeding 4 by 4 inches
2. Acceptable Sodded Turf: Turf Establishment shall be achieved when the turf is healthy, well-rooted, even-colored, viable turf, free of weeds, open joints, bare areas, and surface irregularities.

C. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

D. Written notice requesting establishment inspection shall be submitted to the Project Manager at least three (3) days prior to the anticipated inspection date.

3.12 PESTICIDE/HERBICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with County’s operations and others in proximity to the Work. Notify Project Manager before each application is performed.

B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.13 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off County's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove non-degradable erosion-control measures after grass establishment period.

END OF SECTION 32 9200

PART 1 - SECTION **32 9800** – LANDSCAPE MAINTENANCE

PART 2 - GENERAL

2.1 CONDITIONS

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to the Work specified in this Section.

2.2 SCOPE OF WORK

A. Furnish all labor, material, equipment, transportation and services required to maintain landscape in a healthy growing condition and in a neat and attractive appearance throughout the Maintenance Period, as shown on the Drawings and specified herein.

B. Scope of work: The general extent of landscape maintenance may include, but is not limited to the following:

1. Turf
2. Trees
3. Irrigation systems.
4. General site clean-up.

C. Related sections may include, but are not limited to:

1. Section 32 8400 – Planting Irrigation

2.3 REFERENCES AND REGULATORY REQUIREMENTS

A. State of California Department of Transportation Standard Specifications, latest edition.

2.4 QUALITY ASSURANCE

A. Control of work: Comply with Section 5 of the CalTrans Standard Specifications, latest edition.

B. Control of materials: Comply with Section 6 of the CalTrans Standard Specifications, latest edition.

C. The Contractor shall be experienced in horticulture and landscape maintenance, practices and techniques, and shall provide sufficient number of workers with adequate equipment to perform the work during the Maintenance Period.

2.5 MAINTENANCE PERIOD

A. Maintenance Period shall be one (1) Calendar year.

B. Maintain the entire project area during progress of work and during the specified Maintenance Period or until final acceptance of the project. Maintenance shall continue beyond the Maintenance Period, as required, until final acceptance is given by the Owner.

C. Maintenance Period shall not start until all elements of construction, planting and irrigation for the entire project are in accordance with Contract Documents. A main requirement is that all

lawn and landscape areas be planted and that all lawn areas show an even, healthy stand of "sod-like" turf which shall have been mown twice. If such criteria are met to the satisfaction of the Owner's Representative, written notification shall be issued to establish the effective beginning date of Maintenance Period.

D. All elements listed on the Pre-maintenance Punch-list must be completed to the satisfaction of the Owner's Representative. The Maintenance Period shall, per the discretion of the Owner's Representative, be allowed to start and finish at different times in different areas as applicable, if authorization of the Owner is obtained.

E. Any day of improper maintenance, as determined by the Owner's Representative, shall not be credited as an acceptable Maintenance Period day. The Maintenance Period shall be extended on a daily basis if the work is not in accordance to the Plans and Specifications until proper maintenance, as determined by the Owner's Representative, is being performed.

F. Contractor shall provide protection to the project site against trespass, vandalism or theft during the Maintenance Period. Any damage caused by the lack of adequate site protection shall be repaired or replaced at no additional cost to the Owner.

2.6 GUARANTEE AND REPLACEMENT

A. All work executed under the Contract shall be guaranteed for the duration of the Maintenance Period and for a period of one (1) year after Final Acceptance of project against any and all poor, inadequate or inferior materials and/or workmanship, acts of God, animal or insect damage or improper maintenance, as determined by the Owner. Material shall be replaced by the Contractor at his expense.

B. Any materials found to be dead, missing, or not in a satisfactory or healthy condition during the Maintenance Period shall be replaced immediately. The Owner's Representative shall be the sole judge as to the condition of material. Material to be replaced within the Guarantee Period shall be replaced by the Contractor within five (5) days of written notification by the Owner. All replacement materials and installations shall comply with the Plans and Specifications.

2.7 OBSERVATION SCHEDULE

A. Observations shall be requested by the Contractor from the Owner's Representative as per observations listed in specifications Section 32 9300 – Plants.

2.8 FINAL ACCEPTANCE OF THE PROJECT

A. Upon completion of all project work, including Maintenance Period, the Owner's Representative will, upon written request from Contractor, make an observation to determine final project acceptability. The Contractor shall notify the Owner's Representative a minimum of two (2) working days in advance of anticipated completion.

B. Where observed work does not comply with the Contract Documents, replace rejected work and continue specified Maintenance Period until re-inspection by the Owner's Representative and project has been determined to be acceptable. The Contractor shall repair, replace or otherwise correct all non-compliant work, continue Landscape Maintenance Period, and make another written request to the Owner's Representative to verify punch-list completion. All replacement materials and installations shall be in accordance with the Plans and Specifications. Remove rejected work and materials immediately from project. Prior to date of final observation, Contractor shall provide the Owner's Representative with all Record

Drawings, turnover items and written Guarantee Statement in accordance with the Contract Documents.

PART 3 - PRODUCTS

3.1 MATERIALS

A. All materials used shall conform to Specifications or shall otherwise be acceptable to the Owner. The Owner shall be given a monthly record of all herbicides, insecticides and disease control chemicals used.

B. General fertility maintenance fertilizer: shall consist of the following percents by weight:

1. 5% nitrogen
2. 3% phosphoric acid
3. 1% potash

C. Slow release fertilizer: shall consist of the following percents by weight:

1. 12% nitrogen
2. 8% phosphoric acid
3. 8% potash

PART 4 - EXECUTION

4.1 GENERAL

A. Proper maintenance, including watering, weeding, mowing, edging, fertilization, repairing and protection shall be required until entire project is finally accepted, but in any event for a period of not less than the specified Maintenance Period.

B. Maintenance shall be according to the following standards. All areas shall be weeded and cultivated at intervals of not more than ten (10) days. Watering, trash and debris removal, mowing, rolling, edging, trimming, fertilization, spraying and pest control, as required, shall be included in the Maintenance Period. Street gutters and sidewalks shall be included. The Contractor shall be responsible for maintaining adequate protection of the area. Damaged areas shall be repaired at the Contractor’s expense. Between the 15th day and the 20th day of the Maintenance Period, the Contractor shall reseed or resod all spots or areas within the turf where normal turf growth is not evident. Replenish mulch to originally specified depth on a monthly basis, or more frequently as required.

4.2 TREE CARE

A. Watering

1. Water appropriately (based on plant type) to insure vigorous and healthy growth until work is accepted. Maintain the water basins around trees and shrubs so that water can be applied to establish moisture through the major root zone. Water enough that moisture penetrates throughout root zone and only as frequently as necessary to maintain healthy growth. Refer to irrigation schedule as noted on Plans. When hand watering use a water wand to break the water force.

B. Pruning

1. Trees:

    a. Prune trees only as required to select and develop permanent scaffold branches that are smaller in diameter than the trunk or branch to which they are attached and which have a vertical spacing of from 18” to 48” and radial orientation so as not to overlay one another; to eliminate diseased or damaged growth; to eliminate narrow V-shaped branch forks that lack strength; to reduce toppling and wind damage by thinning out crowns; to maintain growth within space limitations; to maintain a natural appearance to balance crown with roots.
    b. Evergreen trees shall be thinned out and shaped when necessary to prevent wind and storm damage.
    c. The primary pruning of deciduous trees shall be done during the dormant season. Damaged trees or those that constitute health or safety hazards shall be pruned at any time of the year as required.

2. Only skilled workers shall perform pruning work in accordance with standard horticultural pruning practices. Remove from the project all pruned branches and material. Remove and replace any plant material excessively pruned or malformed resulting from improper pruning practices at no additional cost to the Owner.

C. Staking

1. Stakes shall remain in place through the Maintenance and Guarantee Periods and are to be periodically inspected and adjusted to prevent girdling of trunks or branches and to prevent rubbing that causes bark wounds.

D. Weed Control

1. Entire project site shall be kept free of weeds at all times. Control new weed growth with recommended, legally approved pre-emergent herbicides. If weeds develop, use recommended, legally approved herbicides.
2. Keep basins and areas between plants free of weeds. Avoid frequent soil cultivation that destroys shallow roots. Use mulches to help prevent weed germination.
3. No herbicide shall be used without the Owner’s Representative’s prior consent. Use only herbicides in accordance with manufacturer’s recommendations. If selective herbicides are used, extreme caution shall be observed so as not to damage any other plants. Spraying shall be done only under windless conditions.

E. Insect and Disease Control

1. Maintain a reasonable control with approved materials.
2. Disease and insect damage shall be controlled by the use of fungicides and insecticides, subject to the prior consent of the Owner’s Representative. Rodent mitigation shall be accomplished using legal means other than poison baits.

F. Fertilization

1. Fertilize all planting areas with the following:

    a. Commencement of Maintenance Period - 5 lbs. per 1,000 square feet with general fertility maintenance fertilizer.
    b. At the end of the first 30-day Maintenance Period - 5 lbs. per 1,000 square feet with general fertility maintenance fertilizer.

c. At the end of the Maintenance Period and at 30-day intervals should Maintenance Period be extended - 10 lbs. per 1,000 square feet with slow release fertilizer.

2. Avoid applying fertilizer to the root ball and base of main stem; rather, spread evenly under plant to drip line. Rates will vary from about a cup of nitrate fertilizer (depending on nitrogen percentage) around a newly installed small plant to about one-half (1/2) lb. of actual nitrogen per inch of trunk diameter measured four feet from the ground for mature trees.

G. Protection

1. The Contractor shall maintain protection of the planted areas. Damaged areas shall be repaired or replaced at the Contractor's expense. Install a temporary maintenance fence for the entire length of Maintenance Period around all turf areas, unless otherwise specified by the Owner.

H. Replacement of Plants

1. Replace dead, dying and missing plants with plants of a size, condition and variety to match plants acceptable to Owner at Contractor's expense under the conditions stated in the Guarantee and Replacement section of these specifications.

4.3 TURF

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, re-grade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Water turf with fine spray at a minimum rate of 1 inchper week unless rainfall precipitation is adequate.
2. The Contractor shall submit a watering schedule to the Project Manager.

C. Mow turf as soon as top growth is tall enough to cut, no higher than 3 inches. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

D. Turf Post-fertilization: Apply commercial fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft.to turf area.

E. Turf Establishment Service: Provided by skilled employees of landscape Installer. Maintain as required in "Acceptable Turf Establishment," article 3.11. Begin establishment services

immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:

1. Sodded Turf: 30 days from date of planting completion.

4.4 IRRIGATION SYSTEM

A. System Observation

1. The Contractor shall check all systems for proper operation on a weekly basis and make all necessary repairs. Lateral lines shall be flushed out by removing the last sprinkler head at each end of the lateral. All equipment shall be adjusted as necessary for proper coverage and function. All heads are to be adjusted as necessary for unimpeded, head to head coverage.

B. Controllers

1. Set and program automatic controllers for seasonal water requirements.
2. Perform a full instruction session in the presence of the Owners designated maintenance personnel demonstrating programming, system testing, trouble shooting, etc. Include instructions on how to turn off system in case of emergency.

C. Repairs

1. Repair all damages to irrigation system at the Contractor's expense. Repairs shall be made within twenty-four (24) hours.

4.5 TRASH

A. Remove trash and debris weekly. Dispose in a legal manner.

B. Remove trash in all project areas including adjacent pedestrian walkways and parking areas.

4.6 FIELD QUALITY CONTROL

A. Final Review: At, or near the end of specified Maintenance Period, the Contractor shall make written request for a final review and the work shall be reviewed for conformance with the Construction Documents. If work is not accepted at time of review, a punch-list of items requiring attention will be issued to the Contractor for correction. The Maintenance Period shall be extended at Contractor’s sole cost as necessary. Upon completion of the punch-list the Contractor shall again make written request for review. If, upon re-visiting the site, it is found that the punch-list has not been completed, the review shall end and the Contractor shall be back-charged for all additional visits.

B. All re-inspections required due to Contractor not being prepared or non-conformance with the Construction Documents shall be back charged to the Contractor.

C. Final Acceptance: When work is found to be in conformance with the Contract Documents, subject to the discretion of the Owner’s Representative, a statement of Final Acceptance shall be issued to the Contractor.

END OF SECTION 32 9800